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ZAYED UNIVERSITY

The 4th Annual Undergraduate Research Conference on Applied Computing (URC 2012)

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Book of Abstracts

April 18 - 19, 2012

College of Information Technology
Zayed University, Dubai Campus
United Arab Emirates

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Message from
VICE PRESIDENT Zayed University

Welcome to Zayed University and the Fourth Annual Undergraduate Research Conference on Applied Computing! We are proud to host this conference that focuses on undergraduate research. Zayed University has always been at the forefront in developing programs that help foster problem solving and critical thinking skills in undergraduate education.

Research is part of our institutional culture. With the fourth edition of this exceptionally successful conference, Zayed University continues to provide undergraduate students, from all across the Arab world, with a unique opportunity to showcase their research and create opportunities for future collaborations. Universities in the region have great potential for collaborative research across institutions and with industry. We believe this conference serves as a forum to encourage and facilitate collaborative research.

Research is a great tool that can be used to increase our level of knowledge and help us solve many of the problems we face today. Zayed University recognizes that "valuable research and creative activity mark a great university", as eloquently stated by His Highness Sheikh Nahyan bin Mubarak Al Nahyan, Minister of Higher Education and Scientific Research, and President of Zayed University.

We are grateful to the College of Information Technology for hosting this important event. Special thanks to all who have worked towards making this conference a great success. In particular, I acknowledge the hard work, enthusiasm, and dedication of the organizing committee, staff, and student volunteers in organizing this conference.

I wish you success.

Dr. Sulaiman Al Jassim
Vice President, Zayed University

Message from
CONFERENCE CHAIRS

Welcome to the 4th Annual Undergraduate Research Conference on Applied Computing (URC 2012) whose objective is to promote undergraduate research activity at educational institutions across the Arab world by providing a forum for undergraduate students to present their research projects and to interact with other young researchers, faculty members, and technology leaders from the region.

This year we are particularly excited to welcome student researchers and their faculty advisors from many more educational institutions in the Gulf region and other Arab countries, including Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, and Saudi Arabia.

Contained within this booklet, you'll find one hundred and fifty abstracts representing undergraduate student research projects from many universities in the Arab world. The abstracts reflect the multidisciplinary character and wide spectrum of emerging technologies.

The program contains a wide selection of events, including keynote speeches, oral and poster presentations, and a panel discussion. We will also present a total of ten awards for the best four oral and six poster presentations.

We would like to thank everyone involved in this conference. Without your paper submissions, and the volunteers who reviewed them, this conference would not have been possible. We would also like to extend our special thanks to the keynote speakers for taking the time out of their busy schedules to participate in this conference.

We are grateful to our sponsors, Zayed University Office of Research, and emaratech, for their generous contributions that helped make this conference possible. Thank you.

Our thanks go to everyone who has contributed in making this conference extraordinary. We would like to extend a heart-felt thank you for the rest of our team: Zakaria Maamar, Emad Bataineh, Mario Guimaraes, Huwida Said, Omar AlFandi, Mona Bader, Emilia Mendes, Andrew Marrington, Hind Al Dosari, Nagaraj Chandrashekara, Arwa AlNuaimi, and Izzeddin Asad; we couldn't have done it without you.

Finally, we take this opportunity to thank Zayed University for providing the needed resources.

We hope you enjoy the conference.

Conference Co-Chairs

Qusay H. Mahmoud and Leon Jololian

URC 2012
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ATS-NOLM: Adaptive Tutoring System with Negotiable Open Learner Model

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Supervised by:
Dr.Abd Allatif Abu Issa, Head of Computer Systems Engineering Department

ABSTRACT

The main aim of our project is to build one to one ATS, which is an adaptive e learning platform. That takes in consideration the learner preferences in the way the material presented, furthermore the base level of knowledge that the student already have. Since the traditional e-learning systems do not consider these factors in learning process, our system is designed to be in such a way that gives the learner the opportunity to decide what he/she prefers. To predict learner base level of knowledge the system need to initialize student model, once the student answer the quizzes the system will determine what type and level of knowledge he has. This achieves the adaptation concept in tutoring process in our system.

The trend to open the learner model in the tutoring systems came from the competitive human nature since humans in general and student in specific tends to compete each others, and sharing model information and levels could encourage learners with weak knowledge to make extra effort if peers models indicate the good knowledge for most of other peers or even cooperation between peers might be possible via student chat rooms. Negotiation with the system can be added as extension of the open learner model concept when the student is not fully convinced with system assessment, which will result in a good understanding of the domain model and performance of the knowledge.

In addition to all of the above, TAS-NOLM is important in discovering the weakness, strength or misconception knowledge the student might have , the assessment process in all e-learning tools and systems is binary (i.e this means that the answer of the student could be considered as true or false) our system aims to track if there is a pattern in the student answers that can help us to discover that he might have a misconception knowledge (e.g all answers of addition operations questions equals to a subtraction operation made on the same numbers) this could be benefited and indicate that this student is confused and consider the addition as subtraction. And this reduce the effort we need to make, and instead of giving him a brief explanation about the topic he examined in we can just tell him the misconception he had and difference between the two with extra examples that illustrate and show the difference.

The recommended courses to be tested in such systems are mathematics and science subjects for school students, since the misconception can be easily constructed either from the beliefs of the power of the parents or their friends , in addition to that the material itself more suitable than other topics for tracking answers patterns.

Voice Activated Control Systems in Disabilities Applications

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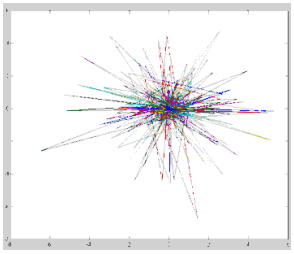
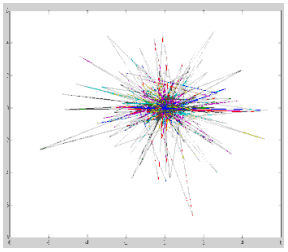
ABSTRACT

Voice Activated Control System (VACS) is a speaker dependent, isolated word recognizer. The goal of voice recognition technology is to program a machine that can understand and act upon spoken commands. The VACS capacity is measured according to the number of spoken control commands it holds. Recently, the VACS is considered quite useful for individuals with severe disabilities. For disabilities applications the efficiency metrics for any VACS are: a) the processor speed, b) the memory (RAM) for accurate conversion. Despite the significant advancements in VACSs, yet there are challenging implementation issues. Among these challenges is how to consider the changes of the individual's voice according to health situations; sickness or cold. The work presented in this paper introduces a solution to recognizing changed signal according to the health situations.

The proposed technique is based on two steps de-noising. First de-noising the background noise using the wavelet transforms filters in order to filter the recorded speech off the background noise. A signal to noise ratio is calculated and is used as a metric; matching criteria. After filtering the background noise a second step for de-noising the changes of one's voice to be considered as a noise. The filter used for isolating the changes is Dither filter. The filtered out changes are considered as noise and can be used to calculate a second signal to noise ratio that can be used as additional matching criteria.





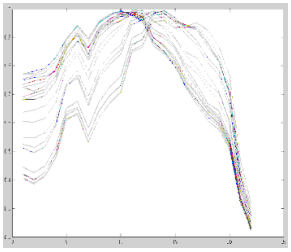


Fig 1. The spectrogram of input command
Fig 2. The spectrogram for the stored command Fig 3. represents the shortest path

The three main phases of recognition are: a) De-noising the input signal, b) Calculating the matching matrix to include criteria from features extraction, and input spectrum, c) Matching process. Features Extraction phase is based on selecting the characteristics of the recorded voice command and storing all these features in a matching matrix. Each recorded voice utterance, is then analyzed in order to produce the matching matrix and then compared with the stored command. The novelty in our matching process is the hybrid technique of both numerical features comparisons including the new metric; signal to noise ratio for the changes of the voice, and spectral displays of the signals. The calculated wave length, sum of wave energy and wave average are then stored in the utterance; command, template. Also the software adds the similarity matrix to calculate the shortest distance between the two spectrograms, please, refer to figure 3.

Acknowledgment: This research project was partially supported by a grant awarded to the Software and Knowledge Engineering Research Group from the Malaz Research Center (RGP-VPP157) and KSU's College of Computer and Information Sciences.

Indoor Map Guidance Through NFC-Based Smartphones

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ABSTRACT

Nowadays, with the rising number of buildings (e.g. shopping malls, airports), it has become difficult for the day-to-day visitors to remember the interior map of each of these places accurately. There may be an information helpdesk that could provide guidance, but some buildings may not have such facility or the helpdesk is not close-by and cannot be readily located. Moreover, the visitor may further lose his/her direction inside the building, while trying to find the nearest helpdesk or map guidance (which itself is a very time consuming task). It is hence more convenient and appropriate if the visitors could simply view the interior map of the building on his/her mobile phone, wherever and whenever it is needed.

This project presents a solution for this problem, which provides map guidance to the visitors in public buildings. It is a mobile application for Android platform with Near Field Communication (NFC) reading capability that allows the users to view the map of the building on their smartphone. NFC is a smart technology embedded recently in smartphones. NFC has a very fast setup time in comparison with other phone technologies such as Bluetooth, Wifi, GPS, etc. It is worth mentioning that NFC technology is going to be one of the technologies that will be used for indoor positioning as mentioned in the IndoorLBS report. The NFC tags should be distributed throughout the building with known located positions. Then, these tags can be used as position reference inside the buildings. Also a customized indoor map of the building should be made available on a server for the users of the application. The URL of the map is stored on the NFC tag which is located, for example, at the entrance of the building; hence the user can simply use his/her phone to scan the tag in order to download information related to the map of the building. Upon downloading, the user can then view the map of the building. The user can have further information about a specific place on the map (e.g. a particular shop in the shopping mall) by selecting this place. In addition, the user is able to identify his/her current location inside the building by scanning the nearest available NFC tag. Apart from that, the application is able to allow the user to search for a particular destination inside the building and hence provide its corresponding route details to that destination. It can not only propose the shortest path to the destination, but also update the user position in case he/she lost track along the proposed direction. Figure 1 illustrates the system architecture design for the indoor map guidance mobile application.

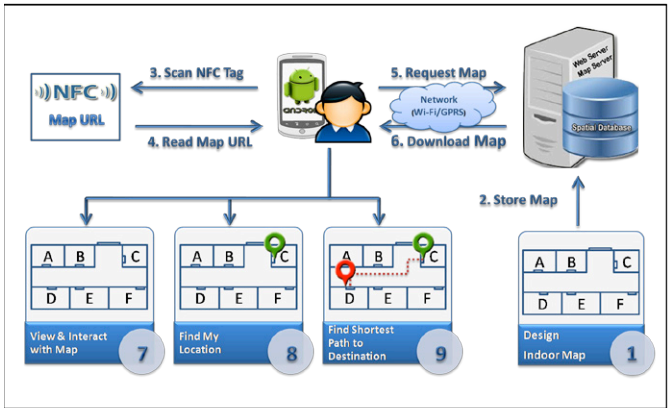

Figure 1: System architecture design

http://www.indoorlbs.com/p/free-sample-report.html

Eye Print Based Information Security System

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Supervised by
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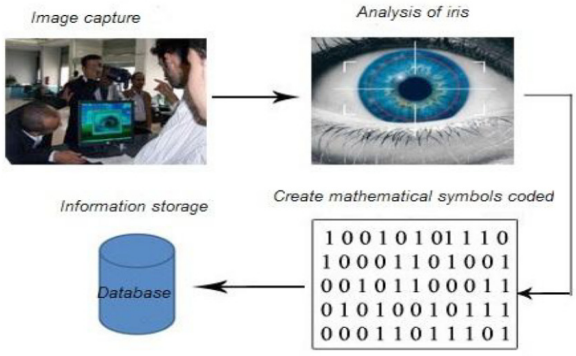
ABSTRACT

Acknowledgment: This research project was partially supported by a grant awarded to the Software and Knowledge Engineering Research Group from the Malaz Research Center (RGP-VPP157) and KSU's College of Computer and Information Sciences.

Due to the importance of information security and allowing only certain people to view certain information, advances in technology presented a wide range of biometric identification systems (BISs). BIS would make it difficult for any unauthorized access in applications like: health care, law enforcement, government applications, immigration, and personal bank. Nowadays, biometric identification is considered efficient way to protect information using a physical feature of a human being that can be measured and used for identification through iris recognition. Human iris has 266 unique characteristics. Despite the recent advances in the eye print systems, yet iris-based biometric personal identification is always ubiquitous. The main concerned problem of general eye-print identification system is that it's based on changeable features of iris image which will not guarantee the consistency of data for a life time. Hence, the selected biometric data should be unique, easy to obtain, time invariant, easy to transmit. The common techniques for the eye print systems are based on iris scan including analysis of the furrows and freckles in the colored ring that surrounds the pupil of the eye. The rings diameters are used to match the iris with one stored identity. Scientifically the diameter of the iris changes every five years.



The novelty of our work is that we also use iris scanning but to calculate the intensity reflected by the iris as one of the features to be extracted from the iris image. The captured iris intensity will be processed in a way to calculate the frequency spectral analysis, energy, and entropy. The proposed technique extracts the iris area from the captured image to calculate spatial frequencies, and power spectral data, energy, and entropy. Those features will be associated with personal identification to enable the system to recognize the user in the verification process.

First Aid Game

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ABSTRACT

First aid is so important especially now with all of the strange infections that are going around. First aid is usually meant for minor cuts and scrapes or is in reference to the first response to any kind of medical emergency (e.g., administering first aid quickly and accurately in a traumatic injury situation can make the difference between life and death). It is hard to know when you may be called upon to act quickly on the behalf of yourself or someone else. Therefore, many people take basic first aid courses which can be found at many police stations and community centers so that they can be better prepared for an emergency. The aim of this project is to develop a phone application of first aid game to help children better learn first aid skills.

Most parents understand that the need to learn first aid so they can take care of their children in the event of injury. But most parents are not aware that they should also teach their children some basic first aid skills. Children should learn first aid skills to help friends and relatives when needed.

Teaching the child first aid solves a few helpful problems:

First, the child is more likely to go along with first aid treatments without resistance when they know what is being done to them and why. Second, the child will be able to treat themselves effectively if they get injured on their own. Finally, the child will also be able to help other children with their injuries.

The motivation of our project is to design and build a game for children to help them to learn the basics of first Aid, because children are the future we need to give them knowledge to help other people need help.

Accidents and emergencies can happen any time, So our game will help all children to have some simple first aid skills so they can take positive action if faced with a first aid emergency such as :

- If someone has a bad burning.
- If someone has a bad bleeding.

The game has many stages to teach children basic first aid skills. In the game beginning stages, children will learn the dangerous/risky things in the home and at street or school by giving them picture for kitchen for example and it has many things (knife , water, hot liquid, gas ,flowers, hot oil on the stove , glasses on the table and so on). Also, in the game advanced stages the game will teach the player (kid) by fun how to help a person who need help by given tools. Figure1 shows an illustration example of the game interfaces.

Figure1: Illustration example of the game interfaces.

Toward an Interactive Mobile Arabic Learning Paradigm

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ABSTRACT

Information technology has transformed the way people interact, think, and learn. Moreover, the proliferation of mobile computing devices (e.g., smart phones, tablets, and pads) has spurred the change in the way people perceive, process, present, and share their knowledge. The psychological effects of these innovations on the students' mentality should not be ignored. Typical hard copy textbook-based education is lagging behind in terms of presentation and entertainment in comparison to the technology-driven life outside of the classroom. Mobile devices -among their many benefits- offer flexibility, multimedia capabilities, ease of use and change, and application and interface variety. In this project, we aim at –eventually– developing an interactive Arabic curriculum and learning material that runs side-by-side with, and benefits from, topical technological innovations. Initially, we target the use of mobile computing in the education of children in the Kindergarten stage with the goal of generating a fun and interactive learning experience. We started implementing and deploying our system on Windows Phone 7 mobile platform. Windows Phone is a mobile operating system developed by Microsoft, and is the successor to its Windows Mobile platform, although incompatible with it. Unlike its predecessor, it is primarily aimed at the consumer market rather than the enterprise market.

The project has the following objectives:

- Develop a curriculum for children aged 7 years and under using a Mobile computing platform. In our case, we will use the Windows Phone.
- Develop a learning environment that should be interactive, fun, easy, and entice learning by children.
- Explore further avenues for education that will benefit from Mobile Computing. For example, autism and special education.

Case Study: Learning English numbers

Figure 1 shows the various use cases and some test scenarios. The application depends on the user employing the touch screen to mimic the number of interest. A successful attempt will be marked by a congratulatory remark and thumbs up gesture (Figure 1d). If the child makes a mistake then he can restarts easily and without the frustration and wasted time of a textbook based learning environment.

So far, this project has benefited us in learning mobile application development and simple games design. The project shows great potential in transforming rigid and boring textbook-based educational material into a fun learning experience. In the second part of our project, we will continue to widen the educational material and improve on the graphics design.

Figure 1.

A windows phone-based user interface.

(a) Embedded video snapshot (b) Trying to touch-write the number 1. (c) Finished the attempt. (d) Indicating a successful attempt

Future work can proceed in various directions; the deployment platform itself can be varied to include Google's Android and Apples' iPhone. Also, the educational material will be enriched and broadened further, which is more of a routine than a creative activity. Moreover, the target users can be changed to include children with special needs. Mainly, we can target children with autism and children who are suffering from hearing impairments.

The Role of a Social Network Application in Developing Society

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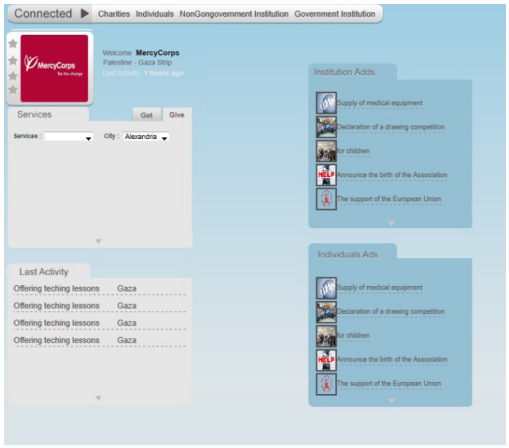
ABSTRACT

Building up a community development process is not that easy for most decision makers in any institution because of the huge amount of unestimated data and the uncontrolled relationships between community developing parties. Therefore the waste of resources and the duplication of services are some expected results and any solution must take these problems into consideration.

In general, social networks help people communicate and share daily life experiences in an easy way. However, these social networks have not taken an effective role in the development process such as improving education, fighting poverty and unemployment, and other important developmental projects. A social network that may work as a virtual community whose main goal is to invest human and technology solutions and to organize the communication among all community parties will be suitable situation for the above problems.

Connect is a social network that aims to achieve the maximum level of community developing process by focusing on the previous issues. Connect consists of a considerable number of federated databases and services that are carried over Windows Azure Cloud Computing. Connect also contains many types of users who are categorized as individuals and institutions. Also it organizes all available community services such as health, education, employment, etc. The main benefit of Connect is encouraging the culture of exchanging rather than depending on external aids (Get/Give Strategy) and organizing the relationship between community parties. The most important feature of Connect is giving each user a chance to give a service and get another in many fields of life.



The high organized interaction between all parties helps the society to go through the process of development while the degree of security insures the necessary privacy. Another important benefit of Connect is the provision of a special page for each user that is full of features and communication channels with other users.

The figure shows one of Connect interfaces, the institution home page. Institution as one of system users can found all necessary functionality to do its work over Get/Give Strategy

Connect help greatly in fighting poverty and unemployment by giving people a chance to work using their skills and save huge amount of charity and related institutional funds. Our future needs the power of people and technology to work together and this is what Connect exactly provides. It is an effective and unique idea for new types of social networks.

Open Source Operating Systems and Their Importance in Education

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ABSTRACT

The operating system is an essential part of any computer system. As it is responsible for utilizing the resources of the computer system, such CPU time and memory, it is the brain that makes the physical hardware of the computer system "think" and function to benefit human users. This importance makes the selection of the appropriate operating system a critical decision for computer users, including large corporations, academic institutions and individual home user.

Nowadays, as the use of information systems are increasingly needed in order to manage and fulfill business requirements and execute processes smoothly as well as the increasing need for intelligent business decisions, organizations depend massively on different kinds of software. In addition, the advancement in education and electronic learning has caused academic and educational institutions to rely more heavily on computer systems. However, choosing the right operating system at the right cost is a prerequisite for getting the benefits of any system. Even the need to upgrade the operating systems and some applications is a critical decision because of the costs associated in terms of labor and new products needed. Therefore, many computer users are now turning to use open source software, and particularly, open source operating systems.

This research paper focuses on a specific sector of computer system users, which is the educational institutions. It investigates the use of open source operating systems in the educational field through the demonstration an example of the most widely used open source operating system, Ubuntu.

With the aim of addressing the difficulty of choosing the right operating system at the right cost, especially for educational institutions, the concept of open source software and open source operating system is introduced to pave the path for discussion about the Ubuntu Open Source Operating System. Since Ubuntu OS is one of the distributions of the Linux Open Source Operating System, understanding Linux forms the foundation for understanding Ubuntu. Therefore, we briefly describe Linux OS and its architecture. We introduce the Ubuntu Operating System by identifying its creators and the philosophy behind its development. The users of Ubuntu OS and its market share are also investigated and compared to other open source operating systems to highlight its popularity. In addition, the research highlights the most significant features of Ubuntu that distinguish it from other open source operating systems. Moreover, we investigate the reasons for Ubuntu preference in the educational field and demonstrate a life example of implementing Ubuntu in the schools of Andalusia in Spain with the aim of providing cost-effective interactive educational system in which all educational centers are interconnected.

The special features of Ubuntu Operating System that make it highly popular for education can be used to generalize the features educational advocates look for in operating systems. We can conclude that the increasing number of adopters of open source operating systems, the majority of which are in the educational sector, is an indicator of the great benefits those adopters are achieving. This can be a motivation to follow their leads in order to realize those benefits.

Artificial Intelligence and Nanotechnology

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ABSTRACT

This research is intended to give a general idea about the field where nanotechnology intersects with artificial intelligence (AI) and some of the application and algorithm used in it. It's important to understand nanotechnology and AI in separation. Nanotechnology involves the manipulation, observation and measurement at a scale of less than 100 nanometers. Using "bottom up" approach is one of the major goals of nanotechnology, the design of structure molecule by molecule. In a mature nanotech world, macro structures would simply be grown from their smallest components. In Drexler's vision, nanodevices would build objects one molecule at a time, and billions of such devices working in parallel would be able to construct atomically almost-perfect objects of arbitrary size.

The research includes the four generations that the development of nanotechnology has been divided into by the

National Nanotechnology Initiative (NNI). The first generation, which ended in 2004, involved the development of passive nanostructures, whereas the second generation involved the manufacturing of active nanostructures including transistors, amplifiers and adaptive structures. In the year 2010, nanotechnology entered the third generation. It is estimated that systems of nanosystems, such as guided molecular assembling systems and supramolecular devices, would be developed. Finally, from the year 2020 onwards, the fourth generation of nanotechnology should be the generation of molecular nanosystems, which would integrate evolutionary systems to design molecules as devices or components at atomic levels. Until now, computer science has taken a role mostly in research tools. However, according to M. C. Roco, the third and fourth generation of nanotechnology would rely heavily on research in computer science and application of future nanotechnology would require AI and robotic innovation.

The research discusses some of AI techniques that can be used in nanotechnology. Soft computing techniques such as swarm intelligence, genetic algorithms and cellular automata can enable systems with desirable emergent properties.

Genetic algorithm is being used as a method in automatic system design for molecular nanotechnology where it uses natural selection, mutation and crossbreeding within a pool of sub-optimal scenarios. Better solutions live and worse ones die. The program then discovers the best option without trying every possible combination. In swarm intelligence, which is a technique inspired by the collective intelligence in social animals such as birds and ants, the animals require no leader. Their collective behaviors emerge from interactions among individuals, in a process known as self-organization. Each individual may not be intelligent, but together they perform complex collaborative behaviors.

Nanobots for example, could be used in swarm networks. Swarm technology is based on tiny robotic devices that communicate via wireless network. They have very little computing power individually, but are designed to work together in parallel processing tasks. As this technology develops, swarm devices could be used in tandem with neural networking technology by programming swarm devices to form a specific neural structure.

These techniques is able to provide growth, self-repair, and can be applied to control a swarm of a trillion nanoassemblers or nanobots also it would prevent the notorious scenario of self-replicating nanobots multiplying uncontrollably.

Performance Analysis of Lightweight Block Ciphers

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ABSTRACT

Cryptographic algorithms are widely used to insure confidentiality and integrity of information in various applications. With the evolution of embedded systems there is a growing need of security algorithms for applications running on low resources. XTEA, Raiden, KATAN, NOEKEON, 3-WAY, PRESENT and Skipjack are of the many existing lightweight or tiny cryptographic algorithms. Lightweight ciphers are employed for security in environments where resources are limited.

The performance of cryptographic algorithms is a primary factor in their application integration criteria. Lightweight block ciphers are characterized by their smaller code size, low power consumption, and low cost. The tradeoff between the level of security, cost, and performance is a main issue in designing and/or analyzing lightweight ciphers.

In this project, the focus is on providing a performance profile of several tiny ciphers running within different environments. The proposed performance analysis classifies the investigated algorithms into a combination of their security level, cost, and speed. The two main targeted high performance computing devices are multicore processors and high-end FPGAs. Within the multicore environment, the profile includes execution times, clocks per instruction, throughput, and a cache analysis. A part of the proposed performance profile is shown in Table 1. Within the FPGA environment, the profile includes the logic area, propagation delay, throughput, etc. The targeted systems are the Dell Precision T7500 with its dual quad-core Xeon processor and 24 GB of RAM. The targeted FPGA board is the Altera DE4 with its STRATIX-IV FPGA. The Software tools used for profiling are Quartus from Altera and Intel VTune Amplifier.

The profile findings are benchmarked against reference implementations to produce performance ratios for each measurement. Accordingly, an overall Lightness Indicator is defined as the geometric mean of all the calculated ratios. The overall Lightness Indicator provides a quantitative classification criterion.

Cipher Performance Profile												
General					Software				Hardware			
Algorithm	Security Level	Key Size	Block Size	Number of Rounds	Execution Time	Clocks per Instruction	Throughput	Cache Misses Ratio	Propagation Delay	Throughput	Logic Area	Max Frequency

Table 1: Lightweight Ciphers Performance Profile.

The calculations of the software part of the Lightness Indicator have successfully classified the investigated algorithms so that the Raiden has achieved the highest indicator value of 2.568. The lowest indicator value is for the KTANTAN-32 with a geometric mean of 0.256. The remaining algorithms achieved 2.235 as for the Skipjack, 1.584 for the 3-WAY, 1.531 for the NOEKEON (Direct-key mode), 1.528 for the NOEKEON (Indirect-key mode), 1.248 for the PRESENT, 1.239 for the XTEA, 0.637 for the KATAN-64, 0.633 for the KATAN-48, 0.628 for the KATAN-32, 0.288 for the KTANTAN-64, and 0.275 for the KTANTAN-48.

Yet the findings show that the studied algorithms largely differ in terms of size and performance. Accordingly, the term lightweight should be reconsidered for a few cases. Currently, the hardware profile is still being processed. Future work includes calculating the overall indicator that includes the hardware ratios, working on accelerating software code hotspots, and enhancing the cache performance. Future work also includes applying hardware structural optimizations to produce a variety of cores with different performance characteristics.

Developing a Smart Modular Healthcare Management System

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ABSTRACT

Healthcare Systems in Palestine, in comparison with other systems worldwide, rank low in level of development. Our hospitals face difficulties when depending on manual registration and procedures in the medical process using papers and files, in addition to the manual retrieval of these files from isolated rooms. These steps result in inconvenient waiting times for patients and could be deteriorating for their health.

We would like to propose a solution to these challenges by building a smart modular centralized mobile Healthcare Management System using RFID technology (Radio Frequency Identification) with Android –Mobile Operating System- enhancement. The main objectives of our system are: developing information system solutions and services in English and Arabic languages for hospitals and other healthcare facilities, delivering value by making connections between hospitals, technicians and patients, and building a central database that connects all the Palestinian Hospitals as a single coherent hospital. In addition, our system improves clinical processes by delivering care safely in a flexible, fast and easy way, it improves financial processes by integrating accounting activities, facilitates accessing patient's information in real time from any location and finally it improves the durability of patients' information by getting rid of papers and files.

Our solution will be an open source one, the software will be free and it will be considered as a platform for innovation especially for university students. Another added value is the integration of Android and RFID. Android mobile is chosen to provide mobility and facilitate accessibility of system. Due to the fact that carrying laptops or other Personal Computers with doctors will handicap their movements, we decided that accessibility to our system will be through Android mobiles or Tablets. In addition, an android phone could perform many of the same functions as a computer with its open source applications, functionalities, development capabilities and low cost. It could also be integrated with any hardware easily. Our design includes connecting to the Internet via a wireless network that covers the whole hospital. This helps in increasing the interactions between the users of the system. Moreover, the uniqueness and cost-benefits of our RFID tags solves the problem of repeated or ambiguous patient IDs. By giving each patient a unique card, we ensure that his file is kept in unison with our database.

A huge problem faced in Palestinian Hospitals is the medical errors. This is considered a very critical issue that endangers people's lives. It is caused by the negligence of doctors and nurses; our system detects these errors using a log file which records every step done in the system. This also achieves transparency; consequently every user will be held accountable of any mistake. In addition, having the patient's medical history and profile decreases medical mistakes.

Other systems could be integrated with our system. We could take the benefits of RFID for this purpose. A smart locking system, using RFID could be used in order to limit access to critical rooms in the hospital such as ICU unit. Other applications could be built using sensors and the Arduino chip for measuring diabetes and blood pressure.

Finally, our progress in the project is as follows. We have built the hospital database, using MySQL, which has been put on a Wamp Server using phpMyAdmin service. In order to connect the Android mobile to the database, a php script has been used as a middleware between the database and the mobile. The Android application, including reading the RFID cards and the graphical user interface, has been built for all hospital modules including receptionist, doctor, pharmacist, nurse and lab technician. The final step is to implement the project and test it in a private hospital called "Arab Care Hospital" after finishing the project completely.

E-Menu: An Interactive Mobile Application for Restaurants

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ABSTRACT

Since tablet PCs and iPads in particular are currently dominating the market, it is essential for almost all businesses to support their services and products through having iPad applications and smartphone applications in general. We implemented an iPad application and we gave it the name E-Menu; E-menu is an interactive menu, designed specifically for restaurants and catering industries. The system uses the Apple iPad in replacement of the paper-based menu. So when a costumer walks into a restaurant, sits on a table that has the E-menu, we offer him a much richer experience that allows him to view images of menu items and customize his order in a simple, intuitive way. So it will be easier to use, more attractive, and more personalized to meet the customer's needs.

Figure 1: System Architecture

The E-Menu has four main parts: Categorized menu which includes a list of the main dishes; a smart menu that shows the customer a set of close up photos of the dish as well as a description of the ingredients and a nutrition chart; the cart view that displays a list of the dishes that customer orders; and finally the entertainment section which can include online browsing and some games.

When the customer holds the iPad in his hands he sees a list of the main categories, and once he chooses a category and then a dish, he finds more info about the dish, more photos, a video, and an order button. Every dish that he orders goes to the cart, when he opens the cart he sees a list of the items he ordered as well as the total price before and after he chooses the percentage of tip that he wants and he has a choice to double that particular dish, delete it or customize it by adding notes or comments about it, he can also arrange the order of the items to specify the order that the dishes should be served in. There's a call waiter button that enables him to call the waiter whenever he wishes.

The main goal that we accomplish through this application is that we make the ordering process electronic, once the customer sets on a an order list he just needs to press the finalize order button and his order will be sent to the kitchen screen and another copy of the order will be sent to the cashier screen a long with the table number and the time of the order, to do so we used a laptop to act like a server which hosted the web services and several webpages, and we connected the iPad to the network.The waiters will be using iPhones to register the orders if needed, and monitor the customers' orders.

This application is developed to run on the Apple iPad and we used these technologies to do it: SQL Server, SQLite, Xcode4 Visual Studio 2010, SQL Server Management Studio, Navicat Premium, and Internet Information Services (IIS) Manager to host the website and the web services, but we plan to make the application available for other mobile devices and tablets.

Through the implementation of this application we provide better functionality, usability, more precise, and friendly way that offers the diner a much richer experience that allows him to browse the menu and customize his order in a simple, intuitive way. It also saves efforts and reduces running costs: The number of waiters can be reduced to a minimum since the process of taking the orders will be done electronically and it saves the cost of printing new menus whenever a new item is added all while being Eco friendly.

Pervasive Computing: Towards more Connected Education Community

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ABSTRACT

One of the developing areas in information and communication technology is pervasive computing, which is also known as ubiquitous computing or ambient intelligence. The use of pervasive computing will be possible in people's daily lives because of the growing availability of facilities. It can be applied in many filed from health and home care to environmental monitoring and intelligent transport systems. However, pervasive computing is one of the promising technologies that would make a great enhancement in higher education.

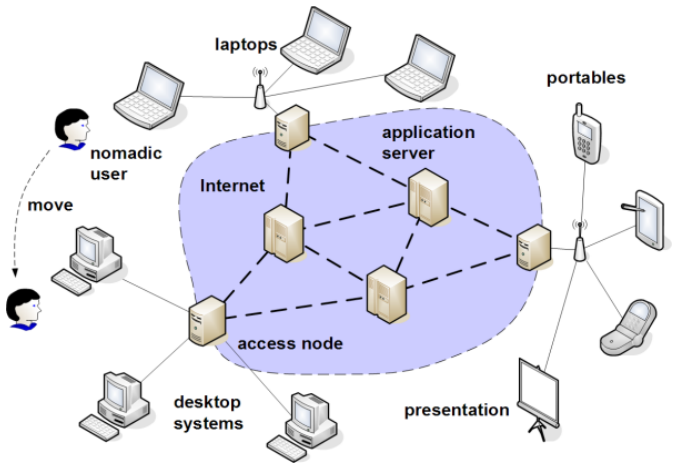

Figure 1: Pervasive computing when applied in a University

There are three main component of pervasive computer system: computing device, communication 'connectivity', and user interface. In details, devices can be from different forms and sizes, varies from handheld (like smart phones) until small near-invisible devices that may use in objects surrounding us that we deal with every day (like furniture, clothes, coffee machine, and microwaves). These devices will be able to communicate with each other. Each device contains three parts. The first part is sensor which is an input device that is able to catch environmental changes, and user behaviors. The second part is processor which is an electronic system that analyzes the changes taken by the sensor and transfers it into input data. The third and last part of the device is actuator which is an output device that actually does the action via electronic or mechanical means according to the processed information. The second component of pervasive computing system is connectivity, which means interlinking of independent electronic devices into external network. Both wired (like broadband) and wireless (like Wi-Fi) will consider a network that can be used by the pervasive computing system. The third component is user interface, which means the point where the user interacts with the system and controls it. Unlike the personal computers, pervasive computing systems use new interface that is capable of sensing and supplying more information about user and his surrounding environment and give it to the computer to process it.

Pervasive computing environment has many characteristics, that will make great benefits for universities' students, such as minimal user distraction, collaborative interaction, user mobility, event notification, and anytime/anywhere. Pervasive computing has positive effects on student's productivity that could be significant, such as improved capabilities for communications, coordination, collaboration, and knowledge exchange. Also, it will remove time and space constraints for accessing information. In addition, it will enhance decision-making abilities based on receiving and processing up to-date organizational data. Lastly, by means of embedded systems and the underlying control infrastructure, new facilities management processes will enable smart classrooms and campus buildings. Although the pervasive computing is not totally applied in Saudi universities, we need to take serious steps to apply it as whole system in all our campuses. Moreover, the benefits of this technology on education overweigh the cost of it.

A Two-Dimensional Computer Based Automatic Sun-Tracking System for Maximizing Output Power of Photovoltaic Modules

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ABSTRACT

Due to the increasing interest in renewable energies as the main source for future energy, an enormous number of researches are now considering renewable energy generation and applications. In all of these researches, increasing the efficiency and decreasing the costs of the renewable energy generation process is a must to compete with conventional energy resources. Photovoltaic cells are considered as important renewable solar energy elements which convert solar energy into electrical energy in an easy, direct, and environmental friendly way. However, the amount of the energy generated from a photovoltaic system depends to a large extend on the relative position of the photovoltaic module (collector) with respect to the sun position. The sun position with respect to the earth is continuously varying with the time of the day and with the season and consequently the amount of generated energy from a fixed photovoltaic module will be also affected. To overcome the previous limitation, movable photovoltaic modules (sun trackers) are designed to follow the movement of the sun to maximize the output power of the module. The cost and the complexity of sun trackers depend on if the tracking is done in one or two dimensions. Although many tracking systems have been designed and implemented in one and two dimensions, the performance of hardware circuits and software programs of these systems can be further enhanced.

The aim of the present work is to design and implement a reliable two-dimensional computer based photovoltaic module sun tracker which is fully compatible with standard platforms and operating system. Our proposed system, shown in fig.1, is not only able to accurately track the sun movement, but also it is able to fully record the data (voltage) generated by the photovoltaic modules using an efficient programming environment (fig.2).

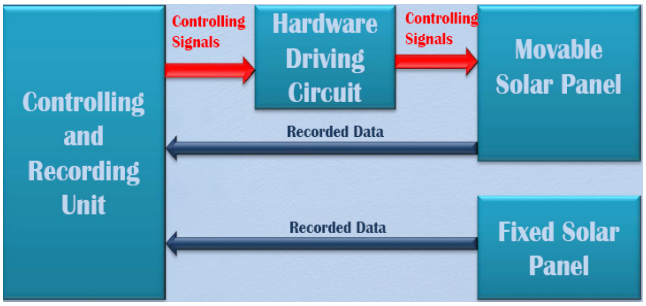

Fig.1The system block diagram.

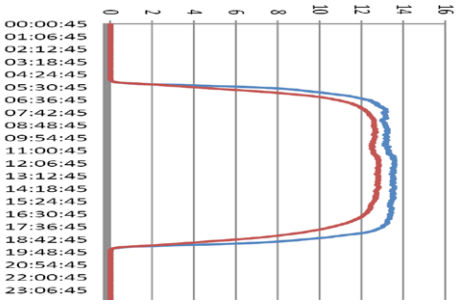

Fig.2 Movable (upper curve) and fixed (lower curve) modules' output voltages

Using the efficient programming environment, the controlling and recording unit controls the motion of a movable photovoltaic (PV) module, based on the accurate sun movement equations, and records the output power (voltage) from the PV modules at the same time in an easy, accurate, and fast way. Two stepper motors rotate the movable PV module in east-west direction and in vertical-horizontal direction based on a specific number of discrete steps which is generated from the controlling program. Each step will rotate the motor with a precise angle which is determined based on the motor characteristics and the implemented mechanical system. To interface between the monitoring and controlling unit and the stepper motors a special electronic circuit that accept control signals from the controlling program and translate it into the desired sequence of pulses to the stepper motors is implemented. The specific driving circuit used in the present work simplifies the programming efforts and without using it the controlling program will be longer, slower, and more complicated. The present system is successfully implemented and tested by comparing the performance of two identical fixed and tracking PV modules under realistic operating conditions.

FireCompass: A Fire Management System

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ABSTRACT

Every year, due to fires, millions of people die, many other suffer physical injuries and several properties get destroyed. Even though the human factor does its best in order to minimize losses, a lot could change by employing machines, making this task easier and faster. This is where the idea of FireCompass came from.

FireCompass is a complex fire management system that aims for a better, faster, more efficient and accurate approach for extinguishing fires. The main goal is to create a system that is capable of calculating necessary information, taking appropriate actions and decisions to minimize losses while maximizing efficiency, time and speed. The project reduces the whole firefighting experience for the fire stations into three easy steps: receiving the phone call, locating the fire on a map and sending the appropriate amount of vehicles and personnel on a mission to extinguish the fire.

All the fire stations are connected to a server. Each fire station is presented with a client that contains a map displaying the needed information. The process proceeds as follows: when the fire is detected (whether by a sensor or a phone call), the firefighter selects the location of the fire on the screen by clicking on it. Once selected, a message with the coordinates is sent to the server. This is when the server works on calculating the shortest paths from the fire location to each fire station as well as the shortest paths from the fire location to the nearest water resources. Afterwards, the server locates the nearest fire station to the fire and assigns the task to that fire station. In addition to that, the server calculates the possible area where the fire might spread, depending on the wind speed and direction. With that done, the server starts selecting fire fighting vehicles depending on the burning material and location (e.g.: if it is a forest, a normal fire truck will not be able to go in, so a helicopter and a wildland fire truck will be needed. In case of chemical material burning, special foams will be needed). Vehicles are selected depending on their current held amount of extinguishing material available. If the vehicles from the selected fire station are enough for the fire to be extinguished, the server contacts that station. But, if it's not the case, the server heads to the second nearest station and gets the rest from there. After the server is done with what has been mentioned, it sends for the assigned fire stations: the license numbers of the vehicles to be sent on the mission, the shortest path to reach the fire, the probable area of the fire spreading and the shortest path to the nearest water resource. Moreover, the server keeps a log for all the fires which could be accessed by all other fire stations.

The results proved that such tasks demand low amount of resources, especially time, in order to operate (~1 sec operating on 80,000 roads), generating accurate, precise and robust results. Thus, this brings more speed and efficiency, resulting in fewer casualties and diminishing the amount of damage.

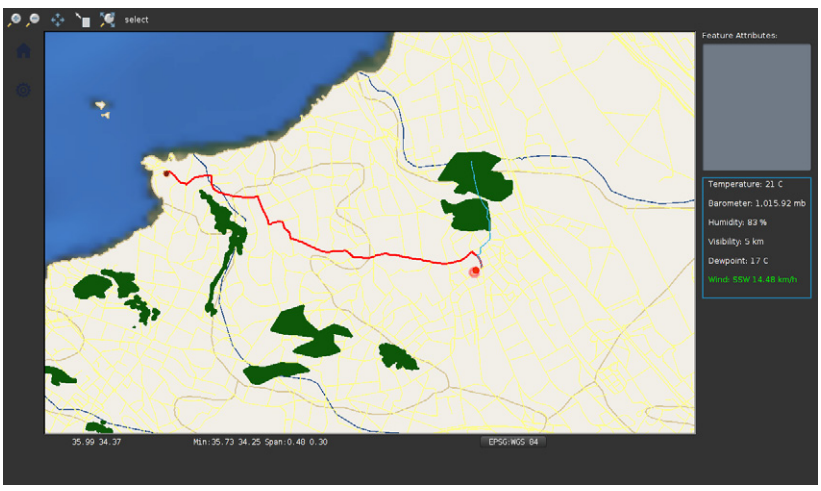

Figure 1: Part of the user interface of FireCompass.

Electronic Patient Triage & Tracking System (EPTTS)

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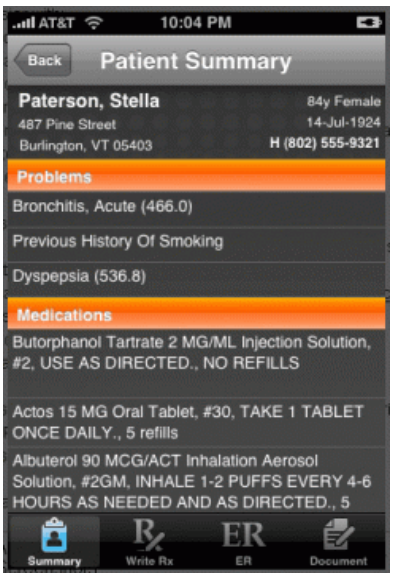
ABSTRACT

Paper based records are still by far the most common method of recording patient information for most hospitals and practices, The majority of doctors still find their ease of data entry and low cost hard to part with. However, as easy as they are for the doctor to record medical data at the point of care, they require a significant amount of storage space compared to digital records. In the US, most states require physical records be held for a minimum of seven years. The costs of storage media, such as paper and film, per unit of information differ dramatically from that of electronic storage media. When paper records are stored in different locations, collating them to a single location for review by a health care provider is time consuming and complicated, whereas the process can be simplified with electronic records. This is particularly true in the case of person-centered records, which are impractical to maintain if not electronic. When paper-based records are required in multiple locations, copying, faxing, and transporting costs are significant compared to duplication and transfer of digital records



The purpose of the "Android-based application for emergency room data collection" is to effectively operate the whole emergency system, so that any incident or accident can be dealt with in a real-time manner with limited delay. The system is a phone based one so that we can achieve speed as well as accuracy in any work provided by the nurse and doctors. This system is intended to replace manual and lengthy operations with high possibility of making mistakes that might happen in the Nursing Emergency Flow Sheet (NEFS).

The main objective for this system is to reduce mistakes that may occur, and save time and make the treatment more easy and efficient. This Android-based smart system have features and properties that will support the idea of our project, and anyone can use it easily so the nurse, the doctor and the lab technician can easily deal with this system from any location within the hospital, starting from the ambulance, and wirelessly synchronizing with the central server.

First of all the patient arrive to the hospital or may be still in the ambulance, the nurse start filling the NEFS on an android phone and send it to the doctor, in the same time it will be saved on the central server of the emergency department directly , the doctor reads the description, after that he writes patient situation and the medical Prescription and if he need some libratory test he requisites them from the lab technician and the lab technician send the result to the doctor and the server, the x-ray is sent as a photo so the doctor can see it using phone and TAB.

We are looking in our system for safe and reliable transitions of data between emergency department component, and data will be saved automatically on a centralized server so there is no usage of papers or traditional sheet that will reduce cost and time and eliminates the errors that may occur. The system raises the quality of using information system in the emergency system

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Ethical and Social Impacts of Nanotechnology

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ABSTRACT

Nanotechnology is a vastly growing field with potential applications ranging from nano-machine assisted surgeries to food processing nano-capsulated flavor enhancers. According to the Nanoscale Science and Engineering program (NSE) nanotechnology is the ability to organize, characterize and manipulate mater systematically at the nanoscale. The scale we are talking about is miniscule; nine hundred million nano-particles can fit on a pinhead. Thus, it is safe to declare nanotechnology as the science of the small, the very small.

As with any new and emerging technology, there are many great challenges to bear in mind. The challenges affect not only the scientists and engineers but also the society as a whole. Many articles and studies have been published in order to highlight the scientific challenges and technicalities that nanotechnology faces as well as proposing plausible solutions. After researching the implications, it has been noted that during the past three years the focus has shifted slightly towards a whole new dimension of problems: the possible societal and ethical impacts of such an invasive technology. One reason why the light has just recently been shed on the ethical aspects of nanotechnology is because a great number of the public assume it is too early to predict the ethical implications of a technology that still has not risen to its prolific state as predicted by its advocates. Also, there is a widespread notion that any new technology is inevitably "good" this misconception stems from the preoccupation with the crucial contributions that technology makes to comfort, health, safety and leisure. In addition, the social implications of a technology are perceived to be a way to gain acceptance from the global community by belittling their concerns and labeling them as baseless without conducting ample research.

When reading about the societal implications and concerns of nanotechnology on the Internet, a cluster of randomly chosen topics appear without a clear idea of the feasibility or significance of each concern. A way to solve this problem is by developing a new guideline, based on several ethical theories such as Rule Utilitarianism, Kantianism etc is proposed in order to act as a collective database by gathering all possible ethical and social implications. Organizing them based on their types: medical ethics, social ethics etc and their status: determinate, immediate, significant and actionable. This guideline simplifies the searching process and shows the status of each ethical challenge. It also creates a special forum where people can gather and discuss possible solutions because unlike the technical challenges facing nanotechnology; one does not need to be an expert in a specific field in order to propose a solution. The database's focus will be primarily on ethical challenges since there are already many web sites and facilities dedicated solely to the physical and mechanical challenges of nanotechnology.

The collective database is a way to organize and filter ethical problems. It is a way for people from all around the world to learn about a new technology. It is a way for people to gather and become active members of their society by coming up with solutions and making a difference. It is a way to be fully prepared for whatever nanotechnology might bring and to avoid a technology shock.

Mathematical Modeling of a Memristor Device

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ABSTRACT

The Memristor is the forth fundamental circuit element predicted by Leon Chua in 1971 and realized by HP in 2008. Memristor is the element that connects magnetic flux to electric charge in the same way that resistor connects voltage to current, capacitor connects voltage to charge and inductor connects flux to current. It is a nano -scale device made up of thin film sandwiched between two metallic contacts (Fig. 1). The thin filament consists of a doped region (low resistance) and an un-doped region (high resistance). Applying a positive voltage as shown in (Fig. 1) will cause the doped reign to expand into the un-doped region. Several mathematical models were developed by different researchers around the world trying to formulate a mathematical description for the real behavior of HP Memristor. The main goal of this investigation is to evaluate and test these models (using the Matlab) in terms of 4 characteristics: the I (current)-V (voltage) curve, x (w/D) and v (voltage) vs. t (time).

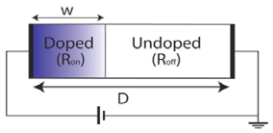
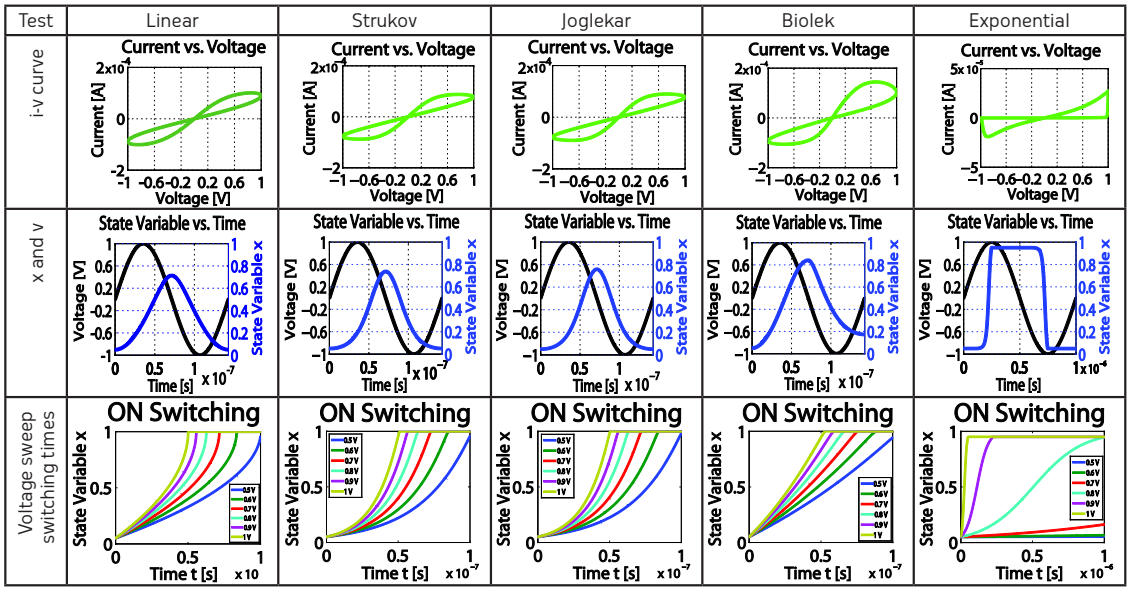


Figure 1: HP Memristor has two main reigns each with different resistance.



Result and conclusion:

Our Matlab simulation results are summarized in Table 1. The first row present the I-V curves for all of the models. The second row shows the state variable x and the voltage across the device vs. the time. The third row demonstrates the affect of the DC voltage on the switching time of the device to the ON state (when x=0.05 it is at the OFF state, when x=0.95 it is at the ON state).

Models	Linear	Nonlinear	Exponential
Boundary Conditions	✖	✔	✔
Window Function	✖	✔	✔
Nonlinear in Electric Field	✖	✖	✔
Voltage ensitivity	Linear	Linear	Highly nonlinear
Switching time	Symmetric	Symmetric	Symmetric (polarity-dependence resistance)

Table 2
Summary of the comparison between all the models

Table1: the result of the Matlab investigation

The voltage sweep of the exponential model shows a sharp transition between the two states. The liner and nonlinear model were not sensitive to the voltage level however the exponential model gives better sensitivity to change in voltage level which provides a better description of the real device. Table 2 illustrates a summary of the comparison between all the models. All of the models have a non- symmetric switching. The table reflected how the exponential model satisfied all of the tests.

In conclusion, based on the above investigation the exponential model is the best among the tested models. It satisfies the physical boundary condition of the device, the nonlinear dependency on the current and the nonlinear behavior for the different DC voltages used for switching. Finally, we recommend the exponential model to be used for any modeling for the device for any kind of simulation.

Intelligent Traffic Light System via Fuzzy Logic

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Dr. Hasan Zidan

ABSTRACT

The traffic crowds seen in intersection of streets are highly influential in development, worldwide. It obstructs productivity and reduces the time of real and effective work. The traffic light helps regulate the vehicles motion but its efficiency is limited in solving the traffic jam problem.

Most often, the common traffic signals cause delay. The traffic lights ensure that vehicles from every direction get a chance to proceed through the intersection in an orderly fashion. Before the traffic lights were invented, there was one street (out of the two that make up the intersection) that dominated. The situation didn't differ much even after the traffic lights were installed, the dominant street shared equal time with its cross street. This leads to congestion on one street during hours of heavy traffic, making traffic delays one of the major disadvantages of common traffic lights.

We have proposed an effective and cost efficient solution to the daily problems of congestion. Our traffic light system includes three operating modes (Dynamic, Emergency & Intelligent). The system's building foundation was the Programmable Logic Controller (PLC) with addition to a visual and interfacing device known as Human Machine Interface (HMI). The HMI allows the user to visually monitor and control the status of the traffic signals. Three traffic sets were created on a model representing the streets of Ajman .The first set represents the traffic junction of the Sheikh Zayed Mosque. The second set represents the traffic junction of Ajman City Centre. The third set represents the traffic junction of the GMC Hospital.

The dynamic mode is programmed to adjust its timing to meet changing traffic conditions. The level of traffic fluctuates with time, therefore we programed three different time periods (morning, afternoon, & evening) in the dynamic mode. The time period of morning differs with that of the evening depending on the level of traffic and so on. As a result the dynamic mode will provide smooth flow of traffic on various time periods.

Emergency mode is quite useful in cases where cars need to be stopped in order for higher authorities to pass through freely without any disturbance. The emergency mode allows the traffic to flow in a desired direction. It has two cases (case one and two). Case one will allow the user to control the green light of the streets in either one of the two directions simultaneously. The direction is determined by route one and route two. Route one will allow the traffic to flow towards Sharjah, while all the other signals will be put on hold. Route two will allow the traffic to flow towards Ajman. Case two is similar to case one. The only difference is that one set would be considered as an emergency while the other sets will be operated in the dynamic mode.

Intelligent mode is an excellent solution when it is necessary to extend the green time as well as reduce the red time of the most dominant street at a traffic junction in order to avoid high level of traffic. It also gives the priority to the streets that are occupied with the maximum number of cars. If however all the streets are occupied with the same number of cars, the first priority is given to the main street followed by other streets. The intelligent mode provides feedback of the traffic status on a street by identifying whether it is low, moderate, or high. Each street contains three IR sensors placed at a distance. If the cars occupy the space between sensor one, the system will indicate the traffic to be low. Sensor two will indicate the traffic to be moderate and sensor three will indicate the traffic to be high. When sensor one and sensor two are occupied together, the system will indicate the traffic to be moderate. When all the sensors are occupied together, the system will indicate the traffic to be high.

A GUI Benchmark system for Assessment and Evaluation of Watermarking Algorithms

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ABSTRACT

Benchmarking tools are used to evaluate the robustness of a watermarking technique against attacks. Several tools are popular in the market such as, Checkmark, Optimark, and Stirmark. Checkmark was developed by Shelby Pereira. It is a benchmarking tool for digital watermarking. It can run on Matlab under UNIX and Windows. Optimark is another benchmarking tool for still image watermarking algorithms which was developed in the Artificial Intelligence and Information Analysis Laboratory at the Department of Informatics, Aristotle University of Thessaloniki, Greece. In November 1997, the first version of Stirmark was introduced as a tool for robustness testing of image watermarking algorithms. Stirmark has been developed by Fabien Petitcolas during his Ph.D. at Cambridge University, UK.

A new benchmark system for assessment and evaluation of different watermarking algorithms is proposed. The implemented system comprises of eight different attacks; additive noise, filters, cropping, rotation, color enhancement, resizing, dithering, and compression. The proposed benchmark system is implemented using a graphical user interface (GUI) to open, select, attack, evaluate and display the results of both the original image and attacked (modified) image. The implemented GUI is much easier for the end users to learn, more than the traditional systems that need commands to be known and memorized.

Stirmark has gained large interest from the watermarking community and it is currently the most widely used benchmarking suite for digital watermarking technologies. Several different sorts of attacks/modifications was applied to the host image at one go, using discrete or default parameters, i.e. the Stirmark system was limited in its potential for impairing complicated image watermarking schemes. However, in the implemented benchmark system the user can tailor the attacks to their choice explicitly to overcome the limitations in the Stirmark system. The user can also blend a range of attacks in successions. For instance, in cropping attack the image can be cropped in four different ways: top and bottom, left and right, top and left, and right and bottom. It is also possible to alter the thickness of the cropped regions based on the user's preference.

The filter attack incorporates ten different types of filters: average filter, Gaussian filter, Laplacian, sobel, prewitt, unsharp, disk, motion, wiener filter, and median filter. Each has different features and different effects on the image. The filter sizes and parameters are in a range for user to choose. The additive noise attack includes three distinct attacks: salt and pepper, speckle, and Gaussian noise attack. All three depend on the intensity of noise which is determined by the user. The implemented color enhancement attack has special features which allow the users to play around with the contrast and brightness of the image explicitly. In the resize attack it is possible to scale up or scale down the image with absolutely no limitations to the scale factor. Dithering attack allows the user to change the intensity of colors from zero to 65536 colors. Rotation attack is another essential attack, in which the rotation angle can be decided based on the users need, the rotation type: nearest, bilinear, and bicubic type can be determined by the user as well. In the implemented benchmark system the compression attack allows the user to change the quality factor of the images from zero to 100, whereas in the Stirmark system the JPEG quality factor is limited to discrete values.

The implemented system has fully overcome the problems engaged with the Stirmark system, since the parameters in the implemented benchmark system are under control of the user's determination. By the end of this project more attacks will be implemented such as, Affine and line removal. The system will also be available online for user's feedback.

Networking Teaching Tools

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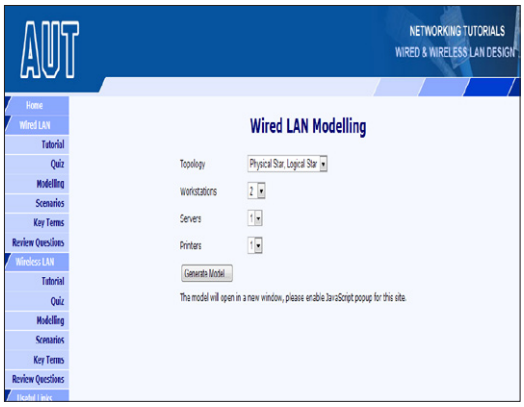
ABSTRACT

Because as William Allen said "Education is not the answer to the question; education is the means to the answer to all questions", this paper introduces one of many ways to answer questions, especially the ones related to the dry computer networking concepts that technical students are compelled to grasp. Computer networking concepts are becoming more and more widely popular in universities, technical colleges and private institutions because of the high demand for people with computer networking skills. The learning by doing approach is an essential component in computer networking courses where students are given practical exercises that explain hard theoretical concepts.

As computer science teaching methods evolve and continue to mature, experiences in mixing theory and application has been always shared in the education community. And, to enable students to value and understand computer networking fundamentals, teaching and learning tools are highly required. However, only a limited amount of material is designed and known and publicly available to supplement the teaching of computer networking and to help students achieve this goal. There are limited tools which are portable, modular, configurable, extensible, and easy to use, and some of them are explained and detailed next in this paper.

This research paper introduces and provides an in-depth treatment of the educational software and hardware tools for computer networks which are designed to learn and teach various aspects of networking and can assist teachers to overcome the cost problem and space constraints in teaching computer networking concepts. It also uses many illustrating figures to clear and demonstrate the main concept behind each interactive tool presented. Virtual networking laboratories, network modeling tools, simulation programs, network diagrams drawing tools, network animations, and related software accompanied by the networking books are all some of the existing tools widely known and used. This research also discusses the benefits and limitations of using them in universities and colleges. Motivation, facilitating the learning process, and livening up the traditional networking lectures are all consequences of applying such tools in the course. Though some financial and technical barriers may arise, they can't be compared to the vast benefits that may be gained when interactive learning tools for the networking subjects are utilized.

Also, a comprehensive discussion of educational tools implementation in universities is provided extensively in this research paper. Moreover, several suggestions and recommendations to implement educational tools for computer networking courses in universities in Saudi Arabia and other gulf countries are presented; a new tool developed recently by the Auckland University of Technology, known as Web-Lan designer is discussed and implementing a similar tool for the coming computer networking students is highly suggested. This research is concluded by a summary and a final note on the main points elaborated. With this paper, we hope we can develop a passion for learning computer networking, and by doing so, future students will never cease to grow, understand, develop, and be technical innovators!



The tool that is proposed as a new tool in the Gulf countries is Web-Lan designer, as mentioned above. This Web-Lan Designer mainly has the important and basic parts of the computer networks course. It has interactive quizzes, key term definitions, and review questions to complement the modelling and scenarios. The main advantages of this tool are that it is cost effective; it does not require much training, and in the same time, it is very effective and useful for both teachers and students.

Secure Communication System

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ABSTRACT

Information is an essential resource today and is the key to growth and success. To ensure that the information's are protected, user need to ensure that the information held on his organization is secure. The loss of sensitive or critical information may not only affect the competitiveness and cash flow but also damage the reputation - something that may be impossible to restore. In most organization, as in universities, the essential files such as the allowance, excuse, resignation, grades and confidential reports need privacy. The problem is that these files may be seen by unauthorized people, making it difficult to transfer it, add to that the fear of modifications.

Secure Communication System (SCS) is developed to provide security in maintaining the confidentiality of the files exchange online during the Internet (via website) or offline (via external storage device as USB) between faculty members at Faculty of Computing and Information Technology (FCIT) in King Abdul Aziz University (KAU). The purpose of SCS is to ensure that information is secure from unauthorized user to gain access, deploy it or make some changes on it while exchanging confidential files between members. SCS website provide services to members to create their own profile consist of favorite list as a social network. Each member can add another member to his favorite list. Then, he can share the essential files with them using the system, files and massages, history of files (Inbox, Sent, Draft), encryption and decryption processes. SCS also provide desktop application that can be downloaded in the member's computer to facilitate the encryption /decryption processes offline. Figure1 describes the online and desktop encryption/ decryption processes. SCS provide the feedback to members when send or approve or pending the friend request.

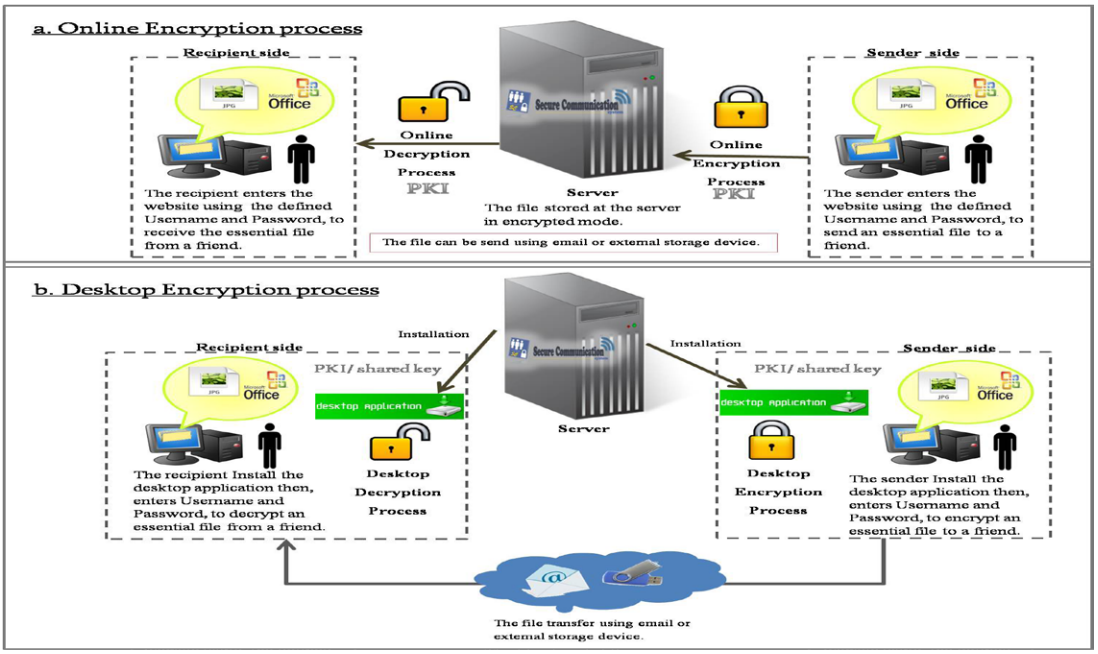

Figure1: The system architecture online and the desktop encryption/decryption processes

SCS is developed using Java to build desktop application, WAMP server that contains PHP to build the website and CSS (Cascade Style Sheet) to design the web site, MySQL data base, Open SSL to encrypt/decrypt comment and Zend Framework to encrypt/decrypt file and public key infrastructure (PKI). SCS provide (1) Authorization: the encrypted files will only be accessible and seen by users who know the key to decrypt; (2) Confidentiality: accessed only by authorized parties; (3) Integrity: unauthorized users can not modify or change because they do not know what is inside the file (encrypted file); (4) User protection: if a user added anyone more than five times and each time the receiver rejected then the user's name is blocked at user friend list who requested; (5) User notification; (6) Security: encrypt user comment, name of encrypted file, and password in database.

Class Attendance System Using Fingerprint

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ABSTRACT

Currently, most universities adopt traditional and manual way for recording students' attendance using attendance sheet. The attendance sheet is a paper that is used by lecturer to take the attendance that include date of lectures, name, ID, serial number and the class number that they should cover in the semester. The students have to put check marks next to their names at lecture sessions or signed during the examination day. They do not using any computerized system to record the attendance. This method has created problems for students, lecturers and faculty due to lack of features and credibility.

In term of students, the manual attendance sheet is not reliable because the student may sign up for another student who did not come to the class. This happen because they want to fulfill a certain percentage of attendance rate in order to be admitted to the final examination at the end of the semester. Another problem is that students who come late can sign up themselves as these students who come to the lecture on time. For the lecturers, they cannot monitor all students who came early or late. They also cannot record and compute the attendance easily and accurately. For the faculties, they have found many errors and problems by using papers. They cannot track students and lecturers attendance easily.

In order to address the abovementioned problems, Class Attendance System (CAS) had been designed and developed. CAS uses fingerprint technology to authenticate both students and lecturers by using their fingerprints in order to record the attendance more accurate and reliable. It allows the students to upload their absence excuses, provide attendance and late rate for both lecturers and students to the faculty's administrators generated different types of reports for both lecturers and administrators and calculates student deprivation. The system device will be provided at each class and laboratory. The fingerprint technology is cheaper and easier to implement compared to other biometrics technology. The system will be a Web-based system that is link to the fingerprint device to record the attendance of students and lecturers and providing a lot of features for them and the faculty via PC or mobile. CAS uses personal computer and screen that is running under Windows 2007 platform and is developed using PHP, MySQL, BioAdmin software of fingerprint device and TBS fingerprint device. The implementation of the project had been set at the Faculty of Computing and Information Technology (FCIT) in King Abdul-Aziz University (KAU). Figure 1 illustrates the system architecture.

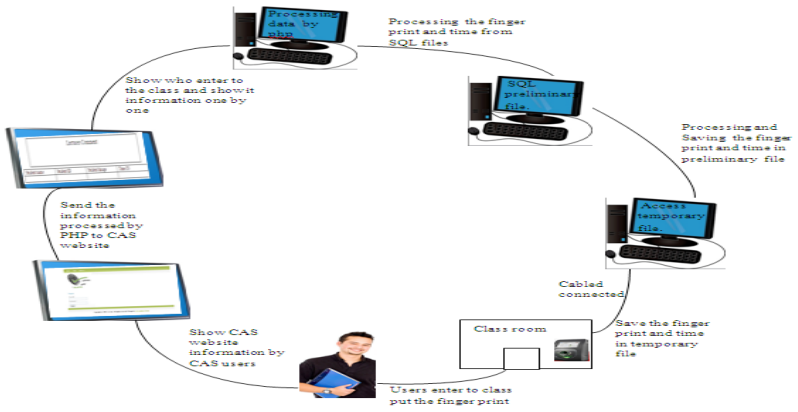

Figure 1: How fingerprint device links To CAS (CAS architecture)

CAS with the fingerprint features can make the system secure because no student can attend on behalf of another student who did not come to the class and no student or lecturer can record their attendance except to be authenticated by the system. CAS provides easy and fast way to mark the attendance and eliminate class attendance sheet. CAS can provide efficiency to administrators by giving the statistics about attendance rate. In conclusion, CAS is important to provide the reliable and efficient record for class attendance.

A Reliable Multi-Parameters Wireless System for Healthcare Monitoring

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ABSTRACT

In the last decade, the performance of healthcare monitoring networks is enhanced by improving their abilities to accurately measure, record, and analyze data. On the other hand, healthcare monitoring network problems became more complicated due to the increasing number of people who still need healthcare services. This makes the development of a reliable healthcare monitoring system which is able to deliver services to anyone, anywhere and anytime with minimum cost and best quality a must. The previous goals are steadily achieved by the continuous research efforts to enhance the performance healthcare sensors, to improve the capabilities of wired and wireless communication network, and to develop more efficient data monitoring and management systems. In today's healthcare practitioners, doctors need to monitor patients who are either hospitalized or executing their normal daily activities at home or at work but in need of persistent medical care. With the ascent and improvement of wireless technologies, wireless monitoring systems can widely increase our ability to monitor situations of patients in healthcare area, to improve the comfort of patients, to eliminate many medical errors, to increase the efficiency of hospital staff by diminishing their workload to exert their time more on other important affairs.

In the present work we present a multi-parameter healthcare monitoring system which can provide medical status of the patients through wireless based systems. Our proposed system is designed to have the ability to extend the number of monitored quantities to accurately describe the status of the patients' health and fitness through real time monitoring. In addition to the previous advantages, alarming and reminding signals about the patient status can also be send by text message or email report to patient mentors to take decision if necessary. The system block diagram is shown in fig. 1.

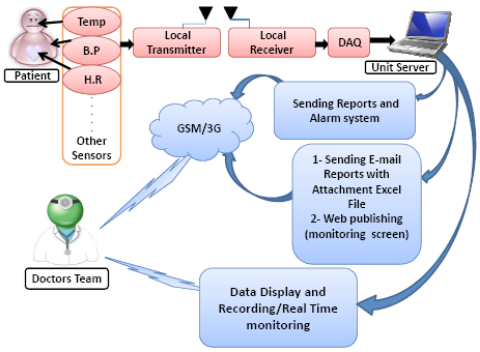

Fig.1 A block diagram of the wireless healthcare monitoring system

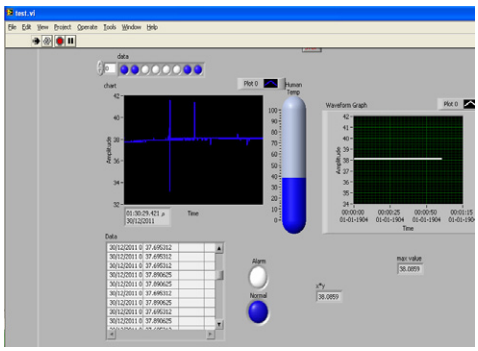

Fig.2 Data display formats on the local monitoring unit front panel

The system manly consists of sensors, local wireless transmitter and receiver, the data acquisition card which is connected to the local monitoring unit, and the programming environment (with the front panel shown in fig.2) which displays, records, and sends data over wireless communication networks and over internet networks. The sensors transform the changes in the required physical quantities into electrical changes that can be measured and recorded. Any transformation function which describes the sensor behavior can be accurately included in our system. Based on the customer requirement, the system hardware can be easily modified to accept any number of inputs from different sensor circuits and the transfer data from the sensor circuits to the local monitoring unit is decided to take place over wired or wireless channels. The flexibility of our programming environment allows the implementation of any monitoring and processing feature on the required measured data. Our system is designed to use mobile communication networking and internet networking facilities to have a zero cost networking infrastructure for our global communication channels. In addition to all of the above features, we believe that our standard hardware and software system components allow the fulfillment of further requirements of any user.

The City of Arabic Letters

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ABSTRACT

This paper describes the design and development of an interactive prototype as part of the software development cycles for an interactive learning system. It addresses the problem of teaching the Arabic alphabet for young children aged 5 to 7, by developing a computer-based application incorporating playing throughout the learning processes. The importance of such applications stems from enhancing the reading activity by considering User eXperience (UX) goals of enjoyable and motivating experiences for children; this in turn can consequently, accelerate the knowledge acquisition cycle.

The adopted Human-Computer Interaction (HCI) Design research method consisted of two phases: analytical and developmental. In the analytical part, structured and non-structured interviews were conducted with target user populations (i.e. a group of mothers and a teacher), in addition to qualitative observation sessions for 5 children in their learning environments. Based on the analytical phase outcomes, the developmental phase was launched following a User-Centered Design (UCD) approach [1]. In this phase, first, a tentative conceptual model was drawn and tested. This pilot application revealed some challenges and considerations, which were addressed in the final version of the model. The methodology of the model is based on (letter to word) model instead of (word to letter) model, which is currently implemented for teaching alphabets for children. Furthermore, the model uses "Anthropomorphism" in order to make the interaction more attractive since it is compatible to the perception of children. The model consists of chapters, each of which contains a story and games dedicated for a letter of the Arabic alphabets. This is to accommodate the variation of children's reading levels that range from children who are familiar with the alphabet while others who are not yet proficient with reading. This prototype was developed using Microsoft Expression Blend tool with Sketchflow. It was concluded that the development of interactive prototypes was effective in improving the design process in UCD cycles. Furthermore, the high fidelity prototype was effective in eliciting requirements from target user populations and conducting usability evaluations. Print screens can be seen in Figure1.

Figure 1: Screenshots of the Learning environment in the Interactive Prototype

[1] User-centered design process (UCD) is also called human-centered design process, ISO 13407 (1999)

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Classification Algorithms Using Decision Trees in Data Mining

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ABSTRACT

In this poster we introduce a comprehensive comparison between three different classification algorithms that are used in the field of data mining. The algorithms are, Iterative Dichotomiser (ID3), C4.5, and C5. ID3 is a simple but effective decision learning algorithm. C4.5 is built on the top of ID3 with more features and is considered the most popular algorithm in data mining due to its significance in the induction of decision trees. C5 is the successor of C4.5. It includes new capabilities as well as much-improvements in efficiency. To the best of our knowledge, ID3, C4.5, and C5 are areas of interest for so many researchers around the globe, but a paper that compares them has not been conducted yet. Hence, our contribution is to provide the researchers with a complete and effective reference that is helpful in deciding which algorithm is better than others in solving a classification problem. Classification algorithms are gaining their popularity in almost all applications of real life. They are applied in many fields like transportation, education, and banking. They are capable of extracting useful knowledge and of providing effective scientific decision-making.

Classification has many approaches when used in data mining. It can be used to predict group membership for data instances. Popular classification techniques include Bayesian classification, neural networks, and decision trees. A Decision Tree is a flow-chart like tree structure where each internal node denotes a test on an attribute. It starts with a root node then continuous by splitting each node recursively according to the Decision Tree Learning Algorithm. The decision trees are constructed based on measures on the given values of the selected attributes in order to determine the appropriate decision tree rules. The tree may be pruned to reduce classification errors caused by specialization in the training set. Decision trees are commonly used for the purpose of decision-making because it is easy to understand and can be easily explained to non-professional users.

In this poster, a comprehensive comparison between the different classification algorithms will be provided. According to our survey, we can conclude with many comparative results. On one hand, C4.5 is the most popular algorithm in classification when used in the field of data mining because it has a lot of improvements as compared with its predecessor ID3. On the other hand, ID3 is currently the most used algorithm which is simply because it was the first decision tree algorithm. Therefore, hundreds of resources for ID3 are available for researchers. We can see that C4.5 provides many useful features such as using the probabilistic approach to handle the missing values. This research is not dedicated to C4.5 only, but will also cover C5, the successor of C4.5. Each algorithm has its own advantages. For instance, C4.5 includes a lot of improvements as compared with its predecessor ID3. At the same time, it inherits all the advantages of the ID3 algorithm with many additional features such as handling missing values, categorization of continuous attributes, and pruning of decision trees, rule derivation, and others. We believe that the latest algorithm C5 has a lot of good features as compared to C4.5 and ID3, but since it is considerably new; there is a lack of resources and support for it.

FRAT: Face Recognition for Automated Tagging

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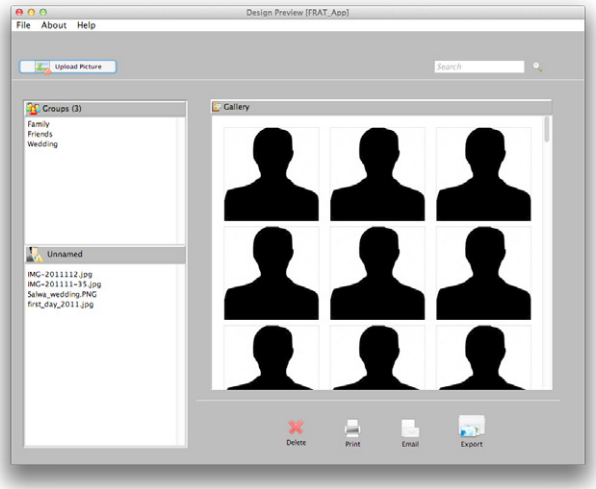
ABSTRACT

The tremendous advancements in digital imaging technology in recent years and the consequent affordability and accessibility of digital cameras either as stand-alone cameras or cameras built in devices such as mobile phones have made it possible for an average person to easily acquire a large number of digital photographs. However, organizing these photographs and searching through them manually to locate those containing the image of a certain person (or persons) is a tedious process. Automatically tagging people in photographs is one strategy for facilitating this process.

The basic techniques that assist in automatically tagging people in photographs are those of face detection and recognition. Face detection methods determine if there are any faces in the image and locate them and face recognition techniques identify the detected faces, which can then be tagged with the correct identities.

Face Recognition for Automated Tagging (FRAT) is an innovative application that enables users to organize their digital photographs based on the automated detection, recognition and categorization of facial images. Users are able to upload photographs, which are then processed internally using face detection and recognition. FRAT employs the Haar feature-based cascade classifier (available as part of the OpenCV Library) for detecting faces in an uploaded photograph. The detected faces are then cropped from the photograph and normalized to compensate for noise and variations in lighting conditions and scale. The normalized face images are then encoded using an approach based on the Principal Components Analysis (PCA) algorithm and finally, the nearest neighbor classifier utilizing Euclidean distance is employed for identifying the encoded faces. If the faces within a photograph are recognized, those faces are tagged automatically; otherwise, users are asked to identify the faces manually.



FRAT is equipped with several basic functionalities such as the following:

- Searching for photographs of a particular person
- Searching for a particular photograph by date, location, name, or e-mail
- Sorting and classifying photographs
- Updating data associated with a photograph
- Printing photographs
- Importing and exporting photographs
- Sharing photographs by either e-mailing or posting them on social networks such as Twitter and Facebook
- Deleting unwanted photographs

In addition, there is a unique option (which distinguishes FRAT from other similar applications) to search the digital photograph database using logical queries such as finding photographs containing both person X AND person Y, or finding photographs containing person X OR person Y.

Real-Time Device-Free Object Detection and Localization System Based on RSSI of Wireless Signals

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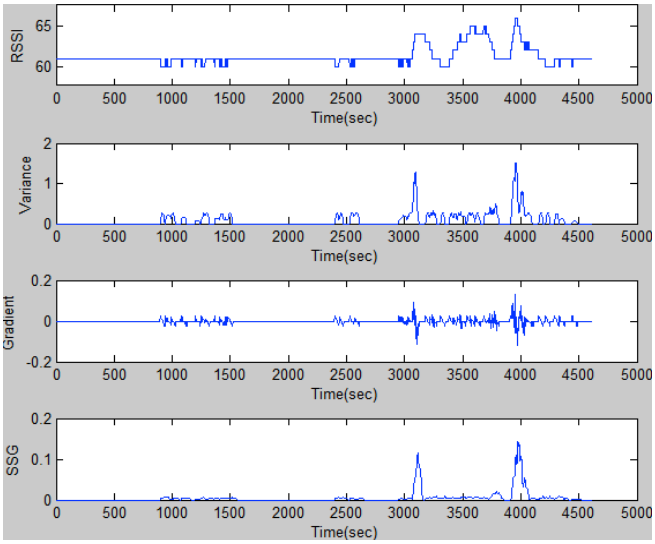
ABSTRACT

Over the past few decades several object detection systems have been developed. Most of these systems suffers from high installation and development costs and corporation needed between a device and the detection system, such systems includes GPS and infrared (IR) based systems. In situations where on-the-spot detection is needed and the detected entity doesn't have a device suitable for communication with the system, such systems fail to achieve the detection goal. Proven high accuracy of those systems is an attractive feature, yet a penalty of high cost and installation efforts sometimes limit the applicability of them. On the other hand, temporal variability of wireless signals in a controlled area were wireless networks are present is dependent on the movement events happening within this area: a feature that can be utilized for object detection, leveraging existing wireless infrastructure, hence creating a cost-efficient device-free solution with high applicability by eliminating the need for detected entity to carry an active device.

In this project we utilize received signal strength indicator (RSSI) of a wireless signal broadcasted by existing wireless infrastructure for object detection purposes. RSSI values are highly affected by changes in surroundings in which wireless signals are broadcasted. Based on this fact, we build a detection and localization system composed of more than one base computers existing in the range of a monitored indoor location. Base computers will collect RSSI values that go through several calculation procedures to produce values describing change in RSSI (including variance, gradient and sum of square of gradients) which will be utilized to take detection decision regarding the area of interest, resulting decision will be sent to a server for further analysis. We also propose the use of multi-access point fusion method to determine an approximate location of the person detected based on the location of the access points. We incorporate the system function into a security or safety application that detects intrusion of a person in a restricted area and alarm the people responsible for it via setting an alarm, SMS, e-mail and provide video stream of the event accessible via ubiquitous web page. The suggested solution is challenged by: High variability of RSSI and great number of noise factors disturbing wireless signals which must be considered while building the system. Moreover, fusing RSSI readings from multiple reading (collection) points increases complexity. Setting up ideal experiment location where almost all factors disturbing RSSI readings to be minimized to ensure accurate testing of system was and still is a great challenge. The investigated solution can be utilized in several applications such as safety and security systems.



Figure(1): RSSI, variance, gradient and SSG in time domain.

Some elementary results we got after implementing a code in C++ responsible for RSSI collection method, detection algorithm and transmission to server are shown in figure(1) representing a snapshot of how values of RSSI, variance, gradient and sum of squares of gradient (SSG) behave in the case of a detection. All figures were generated using MATALB for demonstration only and not in real-time. The experiment was carried in a room for a static period, a person entered the room at two different times. Two events where detected and represented in figure(1) as 2 peaks distinguishing the state of environment of the room during detection event. The detection event is transmitted to a server, this event will invoke the security application to perform its tasks. A hardware circuit is being built to control the state of the security application.

iTrack: a Web Based Tracking System

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ABSTRACT

These days, Companies that have large fleets need to monitor and direct them. Besides, they need them to be distributed efficiently and effectively. Above all, the vehicle misusing culture is a common problem in the area that causes heavy losses for both private and public sectors. For instance, using the vehicle at illegal times or places and breaking traffic rules by drivers. In addition, vehicle theft is a major problem especially for construction companies that leave their expensive heavy equipment at construction sites. Furthermore, lost people and pets cases are growing in a noticeable way "Alzheimer people". A reasonable solution for all above problems is a web-based tracking system.

iTrack is a web-based tracking system that represents a great business opportunity. It provides efficient, and yet cost-effective solutions for the previously mentioned issues. iTrack allows users to track and monitor vehicles, send up-to-date reports to users about vehicles' status.

iMarket's goal is to grasp the opportunity of utilizing modern technologies such as GPS(Global Positioning System) along with GPRS technology (General Packet Radio Service) to help improve monitoring vehicles or people. GPS is a space-based satellite navigation system that provides location and time information in all weather, anywhere on Earth. It transmits the location of the vehicle in the form of Longitude and Latitude values that are being sent through the GPRS medium.

The system is composed of three components: a tracking web server, tracking devices and tracking clients. The tracking device receives its location by GPS and sends it to the web server by GPRS GSM service. The server stores locations of vehicles in a database. Besides, the server is able to generate reports about each vehicle as it stores its tracking history. Then, clients can connect to the servers and monitor their vehicles. Clients can have different levels of privileges, which define the number of vehicles that he can monitor. Also, alerts can be received either by SMS messages to authorized numbers or emails to authorized persons. Different types of alerts can be received such as over speeding, leaving restricted areas and illegal operation. The system is capable of basic control tasks on vehicles such as, cutting fuel and electricity.

As a result, companies, drivers and the society all benefit from using iTrack. For companies, owner and supervisors can keep track of the companies' vehicles and monitor their movement as well as receiving reports about their vehicles status. Also the company can restrict the vehicle movement and cut fuel or electricity. As for drivers they can benefit from the system by receiving instruction from the company through iTrack system that is installed in the vehicle. iTrack is made for the society. Since we have a huge population in Makah and Medina in holy seasons causes crowd of people and vehicle, which is a perfect environment for the system. Also, lots of Saudi families used to have private drivers who misuse their cars and so they need to be monitored.

Over all, vehicle monitoring and tracking has been a problem over the years. However, by adding the taste of technology we will provide an easy method that helps people to easily monitor their property from vehicles to pets.

Volunteering Portal: Connected Arabic Volunteering Community

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ABSTRACT

Volunteering is one of the most valuable experiences of people's life. It helps people to develop new skills, gain information, enhance existing knowledge and get familiar with different jobs and fields, by learning how charitable organizations works and make this person qualified to get a real paid job, which would add pride and satisfaction to the volunteer personality. On the other hand, charity organizations that do not have income usually need volunteers to run their activities and advertise it by giving a positive image of the organization in the community. Although many people have interest towards volunteering work, they cannot find out about opportunities in an easy way. They could miss a lot of opportunities due to the lack of communication. From the organizations point of view , during managing volunteering opportunities they can face some difficulties in gathering volunteers.

In this paper, we present a novel Volunteering Portal that covers organizations within the Kingdom of Saudi Arabia. According to a statistic done by Ministry of Social Affairs in August 2011, the number of volunteering organizations has reached around 610 . However most of charity organizations in KSA do not have official websites where they can post their announcements and activities. In addition, there is no accurate source for campaigns that encourage people to volunteer. Besides, Arabic websites are rare in this field comparing it with the number of English websites in the same field.

Due the absence of an Arabic website that gathers most of whom have volunteering intentions with charity organizations in need for them, we are building the Arabic Volunteering Portal website. The objective of this application is to establish a direct, fast and easy communication between volunteers and organizations and to encourage people to volunteer.

Volunteering Portal provides services that are needed by volunteers and organizations in a simple reachable way. It helps volunteers in finding out about opportunities in the volunteering field according to their interests and personal choices. It also assists organizations in advertising their opportunities and helps them in gathering the largest number of the best volunteers.

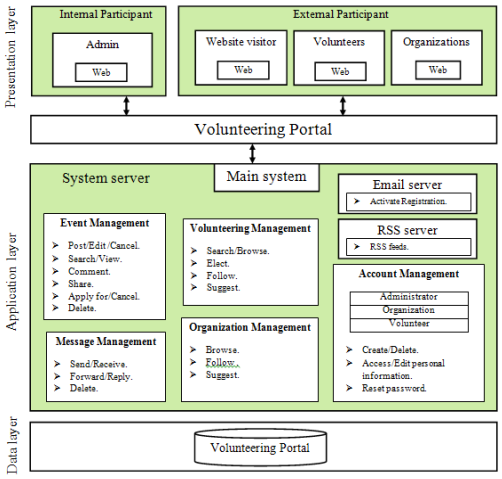

Figure 1 System Architecture of Volunteering Portal

Our system provides a search engine for both guests and registered volunteers but it requires registration in order to use other services provided by the website. The system generates suggestions to both volunteers and organizations about opportunities based on volunteer's interests and about volunteers who is interested in organization fields respectively. The system allows sending private messages between registered organizations and volunteers. It also allows volunteers to apply for many opportunities and allows organizations to elect many volunteers. Also, registered volunteers are able to keep track of organizations' new opportunities and other volunteers' activities. The system increases the rate of popularity of both volunteer and organization based on number of participations in events and based on the number of offered opportunities respectively. The system architecture of Volunteering Portal is presented in Fig 1.

We believe that Volunteering Portal will fill the big gap of communication between volunteers and charity organizations in KSA and it will play a big role in increasing the number of volunteers in society.

Greenovation

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ABSTRACT

In the modern world, technology defines our lives. Today, we see technology being applied in nearly all fields such as the medical and educational fields. More importantly, it is used in the industrial filed to build factories as well as manufacture various products. However, none of those fields utilize technology more than businesses and organizations do.

Along with all these advantages came numerous disadvantages. We must consider the effects the effects that manufacturing, deploying, and utilizing these technologies have on our planet. Increasing heat is only one of those effects. Additionally, the massive amounts of electronic waste that remains after using technical devices is another critical issue we face today. Those devices consist of hazardous chemicals and unsafe materials such as mercury and lead that may affect humans and their environment over time. Due o those concern, the concept of green technology emerged. In his book "Green Computing and Green IT Best Practices", Jason Harris defined green computing as the idea of applying the right practices, which ensure saving resources while using technology (Harris, 2008).

This research proposes various solutions for both organizations and individuals to apply in order to contribute to this cause. Suggested solutions for organizations include cloud computing, virtualization, and recycling. Moreover, this study examines and analyzes the IT environment in Prince Sultan University (PSU), Riyadh, Saudi Arabia and proposes appropriate solution for that specific setting. This study was conducted for the course "Introduction to Information Systems" in order to investigate students' attitudes and motivations toward green computing. Nonetheless, raising awareness about this hot topic and prompting other students to apply it were the main reasons for conducting this research.

In an attempt to complete this research, 80 female students were asked to complete a questionnaire in order to study their awareness level about green computing. Students included in this study were from all majors and levels. Results of this study showed that 89% of students lacked the necessary knowledge about green technology or how to apply it, although 22% of those who took the survey were Computer Information Systems students. Interestingly enough, about 48% of the responders did not think technology was affecting the environment. This indicated the lack of awareness not only in green IT, but also the effects of computing. Furthermore, none of the participants in this survey refused the idea of applying suggested solutions, in fact, 36% responded with "yes" while the rest responded with "maybe".

The study also considered the participants' computing behavior. Evidently, 45% of students use their computer daily for approximately five to eight hours. Astonishingly, 45% to 65% of the responders admitted leaving their computers on for long periods of time when they are not in use. This shows the excessive and unnecessary consumption of power, and implies recklessness in students computing behavior.

Results of the conducted survey only validated the lack of awareness in green computing and emphasized the need to increase people's knowledge of this topic. They also stress the necessity of proposing suitable solutions that are easily applied by everyone. Raising awareness about this topic and applying its methods are the first steps toward saving our environment.

Reference:

Harris, J. (2008). Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting. London, UK: Emereo Pty Ltd.

Zoowey: A Mobile Application for Riyadh Zoo

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ABSTRACT

Zoos around the world are always filled by visitors who are looking for both knowledge and entertainment provided in a simple and attractive way. Usually, zoos have large spaces with so many roads and facilities which enlarge the chance for the visitors to easily get lost or lose their company. This would make it harder to find the places they need to visit, and they might waste so much time to reach a far facility while they have another one closer to them! The visitors' joy may limit if they face some other problems such as insufficient information about the zoo's animals and facilities and not easily be informed about the work time and announcements for events and festivals.

In this paper, we present an underdevelopment mobile guiding application for Riyadh Zoo. Total area of Riyadh Zoo is 161.000 sq mtrs and it contains more than 40 types of animals and many facilities such as restaurants, rest rooms, tea kiosks...etc. The proposed application (Zoowey) helps out the visitors to easily find what they are looking for in Riyadh Zoo. The main themes of the application are to display the zoo map in an attractive way and show location of user, all animals' exhibits, public services and the other facilities on the map. Figure 1 depicts the Riyadh Zoo map that application uses it as a reference map.

In addition to this, Zoowey includes full description of each animal habit, links and animals' knowledge test to enhance the knowledge of visitors. To attract the visitors more, photos and animal videos that shows animal's talents or their special moments are provided. Moreover the application is able to direct the visitor to the nearest facility that the user wants to go.

The one of the boring problem that you may face in the zoo is following your group when you come to zoo with a group of friends/relatives. This problem is solved by adding "locate my friend" feature to Zoowey. The application is able to retrieve user's device PIN. After getting friend's PIN, the application stores it as encrypted. Then the user is able to see friend's location on the map. As an alternative solution, we are trying to implement latitude feature of Google map that has been recently available in Saudi Arabia. Furthermore users of Zoowey can share their experience and thoughts about Zoo with their friends on one of the largest social network sites which is Twitter.

Figure 1 Riyadh Zoo Map [1]

This mobile application is developed to run on the Android smart phones. The software technologies used to implement the proposed solution include J2ME, SQLlite, and Google Maps API, Twitter Map API, Latitude API.

Besides Riyadh Zoo web page, having such a mobile application would attract and encourage more people to live the experience of visiting Riyadh Zoo. In the future, we would like to extend this application on the other platforms.

[1]"Riyadh Zoo web site "[Online].Available: http://zoo.com.sa/riyadhzoo/Default.aspx

Electronic Emergency System

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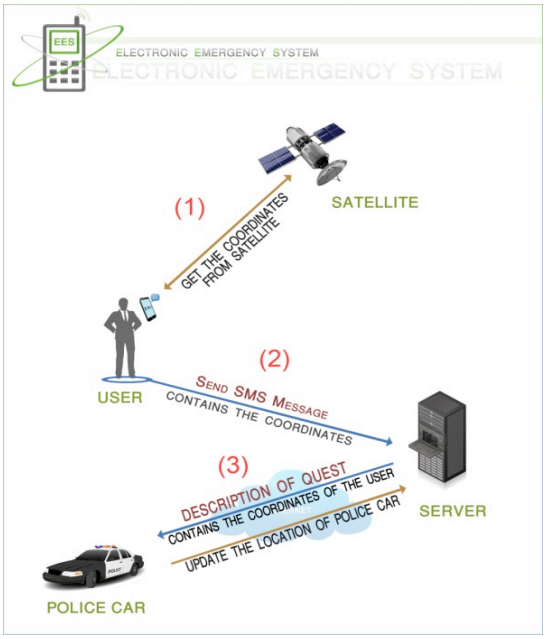
ABSTRACT

Electronic Emergency System (EES) is proposed to solve the problems that people facing with the current emergency systems. These problems include delivery of the information required by emergency provider which sometimes not available with emergency seeker and in other times the emergency seeker will not be able to deliver such information. The information includes the identity of emergency seeker, its location and the emergency service he needs. People use for example a road for the first time they will not be able to give precise information about their locations also people under attack from gangster will not have enough time to deliver any information. From these threats EES is designed to eliminate the manual dictation of the information, to give precise location and to guide the emergency service provider to reach to the emergency seeker as fast as possible.



EES as shown in the figure is designed and implemented by integrating different IT technologies to achieve these goals. These technologies include GPS, GSM and client-server based on TCP/IP protocol. It uses both of the cellular telephone network and the internet. The proposed system can be used for different kinds of emergency services such as police, ambulance, and civil defense.

EES is designed as distributed system of three subsystems which are emergency seeker, emergency server and emergency provider. The emergency server is used to control the service. It has the function of keep tracking of all the vehicles of emergency provider engaged with the service. It keeps their locations in its database. Also, it receives the messages from emergency seekers which include the required information. The server then, processes this information and hence gives order to the vehicle covering the service at the given location to provide the required emergency service. The emergency server also, receives messages from the different vehicles of emergency provider patrolling the streets. Each message includes a new location of its vehicles. The server, in turn, modifies the corresponding location in database.

Mobile-based application is used with the system of the emergency seeker to let him engages with emergency system. The application includes a system communicating with the GPS to get the location to include it in a message and send it to the server when the emergency seeker presses a programmed button on his mobile phone to ask for an emergency.

Each vehicle of the service provider contains another system to receive orders from the server and to guide the service provider graphically using Google maps on the screen of its device toward the location of the emergency seeker. The system also sends messages to the server which includes the location of the vehicle. These messages are sent only when the location of the vehicle changes and this to keep the server informed about its new location.

Communication between emergency service seeker and emergency server take place using GSM and communication between emergency server and vehicles of the emergency providers take place through the internet.

MOVC: Meeting Organizer system with Video Conference

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ABSTRACT

Organizing and attending meetings are a very important aspect of our working lives. For the difficulties that may occur in organizing the meetings such as, problems related to scheduling, availability in terms of geographic location, in arranging co-located meetings. This paper describes a system designed for improving the meetings in a simple and a flexible way through technology, MOVC (Meeting Organizer with Video Conference) is a website which facilitates conducting meetings online for companies and universities. The Functionality of it includes; services to schedule, organize, attend meetings online and archiving them. For more of MOVC's feature compared to traditional method of meeting see table 1.

Aspects	Co-located meetings	Virtual conference
Place	• Located in one place.	• Located in different geographic places.
Time	• Takes much time in organizing and scheduling the meeting.	• Flexibility of scheduling. • Reduction of time.
Administration	• The meeting minutes are written and archived as paper notes which can be lost.	• On-line database for archiving the meetings and meeting minutes.
Resources	• Meeting minutes may not be enough for understanding exactly what happened during the meeting.	• Video for the meeting. • Organize materials with ability to download them.
Cost	• Materials are print out. (cost and not clear).	• Virtual meeting reduce travel expenses. • Increase employee productivity.

Table 1: Co-located meetings Vs Virttual conference.

MOVC is distinctive in a way that it streams video to invited users only, which is secure and private. It also records and archives meeting in a video format such that it effectively serves who couldn't attend or to retrieve information. Accessing the record and materials is simple and provides a better quality. Meeting's summary, documents and handouts are also stored in the online database. Retrieving from the archive is well displayed, showing the attended users, video of the meeting, conclusion, description and downloadable materials as shown in figure1.

Meeting scheduler has the privilege to start the video conference with one video camera in the main room, online attendees could communicate and participate with the other members in the room, and they can all view or download meeting materials. After the meeting is done the website offers " minutes of the meeting" page to the meeting scheduler to fill a summary of what happened in the meeting, video is then embedded in the meeting page and archived for attendees to view it later, and a link is available in the attendees and scheduler's profiles.

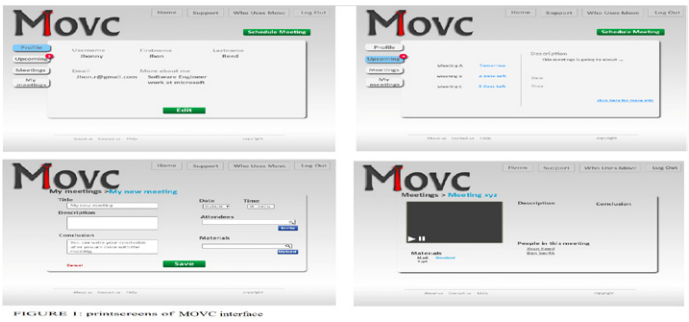

FIGURE 1: printscreens of MOVC interface

Our technical challenges in the project was to program a website that provides live and recorded video streaming ,with two servers; one for the website and the other for live streaming and video storage, there are two databases in each server and they communicate through the Internet. For building such a website, the project team uses HTML, CSS, JavaScript, PHP, XML and java. All these programming language were used to create the website and java was used to program the Application that is responsible for the video conferencing. XML, PHP were used to connect the streaming on the website.

Acknowledgment: This project was partially supported by the College of Computer and Information Sciences in King Saud University.

Cluster Computer Systems

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ABSTRACT

The computer system has been considered the fastest growing and developing systems in the technical field. Every day, we notice new technologies and devices or new developed versions of existing ones emerging in the market. Long time ago, when the computers where first invented, their capabilities such as the processor speed and the memory storage were very limited because the needs and requirements for the computer systems weren't that huge or difficult. But nowadays, new requirements are evolving which need faster, more powerful processors, and larger memory size.

So, developers of computers developed new processors, memories and disk storages to meet those new, more sophisticated requirements. That was enough for a while, but more difficult tasks are required to be computerized which made the needs and expectations of today's computer systems go beyond having the perfect resources, such as the best CPU power, highest memory storage or disk storage. We expect the computer system to be highly available 24 hours a day and 365 days a year. These challenges have inspired hardware and software developers to find solutions beyond just improving system recourses.

One of the solutions found was to create a computer network connecting more than one processor together in such a way that all the resources of this system can be shared between all the processors where a large task can be distributed among nodes so that the computation quality and time will be much better than the work done by one processor only. This system is known as parallel or distributed system.

One of the most important distributed systems that use parallel processing technology is cluster system which is the topic of our research paper. Clusters can be defined as networked computers running distributed applications and tasks and share multiple resources. Cluster systems have many significant advantages that made them applicable for hospital records, market research, scientific images, social network analysis, image segmentation, Amazon.Com, Google News, and many educational institutions all over the world. In our research paper, we thoroughly investigated cluster systems, discussed three of their types which are High Availability Clusters, Load balancing clusters, and High performance clusters, summarized some of their most common advantages and disadvantages, In addition, the architecture of this system was enlightened through two approaches which are Shared Nothing Clusters and Shared Disk Clusters. Finally, the last sections of our research were dedicated to demonstrate how they've been applied in real organizations such as in Google as well as in many well-known educational institutions and universities for making the education process more effective and beneficial.

We have lastly introduced a new way of connecting a great number of low-speed computer nodes to form high-performance cluster that looks like a single extremely fast computer. Being inspired with the various applications academic institutions have tried all around the world, we, as students, began thinking of applying this impressive technology at our college at Prince Sultan University because there is a great number of computers which are thrown away each year, and the college's computers are already connected through a local network. Thus, we can get the benefit of using the computing cluster technology to enhance and speed up the way we search for information to do academic projects that are, indeed, of our interest. Figure 1 is our step by step plan to apply cluster technology in our university.

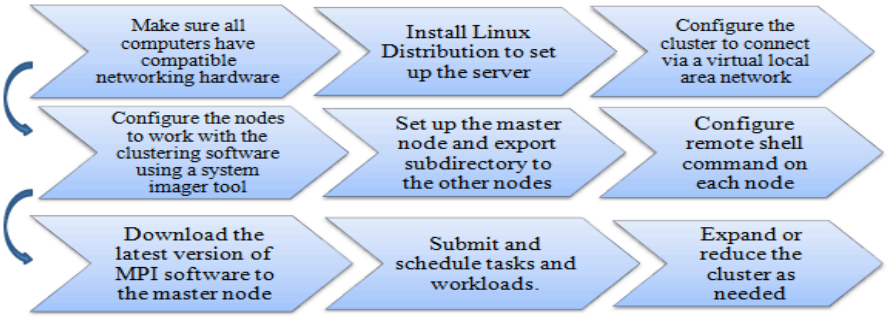

Figure 1: Cluster System Plan for PSU

Personalized-Shop: Personalized e-Marketing Campaign

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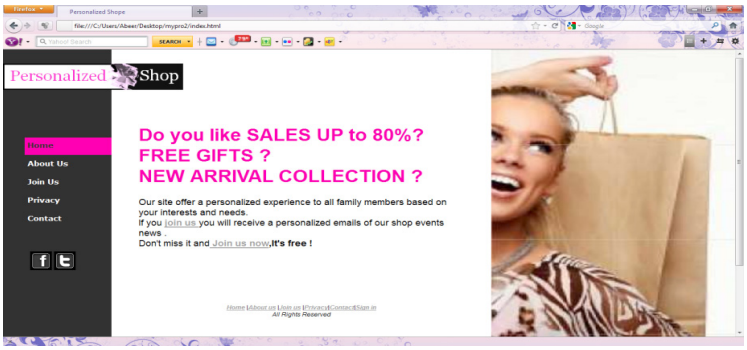
ABSTRACT

Most of the companies and shops nowadays use the traditional ways when it comes to promote their products. Many studies prove that the use of paper and local newspapers, TV stations, radio and other traditional methods cannot match the power of using the web. The later provides access for all people in the entire world within seconds. So, the use of the web becomes the best solution to address the problems encountered with the other traditional methods.

At the beginning when using the web in marketing, online marketing considers that all users are the same. Companies address users in the same way considering that all users are alike without taking into account their own needs and preferences. Consequently, consumers start to see these ads as disturbing methods from marketers and merchants. And a lot of these consumers don't even make the effort anymore to see these ads knowing that these ads are just not useful but annoying. Other consumers went further and classified these ads as unwilling emails.

These behaviors raised a question : how can we let users be interested on the ads and announcements?

Personalizing the ads is the answer for this question. Users will only receive ads based on their interests and needs.



But another question arises here : what is the enhanced way to do a successful e-marketing campaign? Simply, the answer is : understand the needs and interests of each client since all customers are not alike. Indeed, most of the traditional advertisement are not targeted and personalized. Advertisers do not take into account the preferences and interests of each customer which causes a big loss to the companies. Addressing this issue, the main goal of our project is: a personalized e-marketing in a careful and smart way.

Our site is designed to ensure the acceptance from the client by understanding his needs in order to send him personalized e-mails containing the best offers, exclusive sales, new arrivals, and much more, with creative design and different formats (Text Messages, Graphics-based Ads and Newsletters, Rich Media (Multi-Media ads)) It permits shops to increase their benefits by targeting their marketing campaigns. That defiantly will lead to a successful and efficient marketing campaign

The web site that we developed allows visitors to register and enter their data (name, E-mail, gender and interests) in an easy way. It provides the customers with safe advertising e-mails in later time about the special events related to their interests. On the other side, the admin (the shop) has special features such as: permit update information for users; add events or delete it; unsubscribe unhappy customer; register customers if they write their information manually; check the event letting the system to send automatically personalized e-mails to the customers interested by the said event.

However, while our project highlighted the importance of personalization, we tried to focus on a new method that could help both merchants and consumers by concentrating on the special offers and events. By this way, merchants will have a new way to show their sales and offers to consumers while the users will have the chance to receive information about the products and the events on which he is interested. We will not focus on only personalizing the ads but personalizing the special events. Consumers will not miss any sales anymore, and merchants will have the chance to put sales on one or several products without caring about whether it is appealing the user or not.

Guidio: A Multimedia Guide Application on Mobile Device in conjunction with GPS

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ABSTRACT

Today, as mobile phones and PDAs are increasingly being a part of our everyday tasks, a wide range of GPS-based guide mobile applications are released daily, to help people locating their locations and guide them across the earth.

On the other hand, Many of mobile users have varying physical or mental disabilities and many of them for example are facing problems in determining their current location, or getting directions when they want to go from one place to another. For instance, some persons may not be that good at understanding directions, others find it too difficult to read the direction signs and follow it because of reading disabilities such as dyslexia or vision impairments. People with disabilities are suffering the most when they want to travel around or visiting new areas. We can say they are suffering from using several mobile applications.

One of the issues to cope with the problem is how to get benefit from mobile new technologies to help many classes of people. Within this perspective, we are interested in our project in the following problem: multimedia mobile applications and more precisely, interfaces are not enough natural and interactive.

The question is how we can improve such interfaces in order to respond effectively to the needs of many categories of people. And since mobile devices don't have big screens, users ought to be able to just talk to their phone and tell it what to do.

Guidio, is a mobile application that is intended to help this category of people, who have vision impairments or vision loss, by providing Speech recognition to recognize limited Arabic words preferred by the user and a speech-output interface, using the Speech Synthesis technology (Text-to-Speech) to generate the content in audio forms to help users to locate where they are, search for spots on the map that they are interested to know about, and find directions to places they would want to go to.

Many technologies are used in Guidio such as the integrated camera to capture photos, displaying these photos according to their spots, using the Serial Port control for communication with the GPS, search automatically for GPS (with serial port), analysis of GPS NMEA packets to determine the position, and using XML serialization to store geo location.

Moreover, Guidio is connected to Google maps to display the maps and directions to users. Places and spots on the maps can be browsed by users and will be stored and organized into different categories based on their classifications. Each spot in the map will have a full informative textual and vocal description, along with the attached photos that are taken by users.

Guidio aims to be an easy to use mobile application that will be executed on Android platform, with an interface that fully supported in Arabic language.

Clouds and Beyond: An Introduction to Cloud Computing and its Role in Higher Education and Research

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ABSTRACT

Major organizations are facing constant growth in IT needs with a lack of adequate financial resources. Universities in particular are in demand of strong information technologies to support their educational and research processes. Nowadays, in most companies and educational institutions all over the world, Cloud Computing is taking over the entire information technology departments. According to a study conducted by IDC (International Data Corporation), 34% of private and governmental organizations in Saudi Arabia are implementing Cloud Computing solutions, which is the highest percentage among GCC (Gulf Cooperation Council) countries. Higher education leaders are trying to overcome shortages in their budgets and resources by utilizing the cloud computing model at their universities. Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a metered service over a network. The cloud is a computing service that charges you based only on the amount of computing resources you use. There is a variety of types of cloud computing depending on the deployment model and the services provided. It also has several notable benefits including its flexibility, mobility, utilization of time and money and ease of implementation. However, there are some risks and threats associated with the use of cloud computing. There are many successful and unsuccessful attempts to implement the cloud within universities in the Middle East. In order to create a clear understanding of the significance of cloud computing in education, we decided to study an example of using cloud computing in a Saudi university.

In this research, we aim to analyze the usage of cloud computing in education by investigating its main types and contrasting its advantages and disadvantages. Moreover, we examined several e-learning based applications introduced by major companies to help making the learning process more productive and efficient. This research will shed some light on the experiences of Prince Sultan University, with the implementation of a Software As A Service model(SaaS) of cloud computing applications, namely the JUSUR LMS which is an e-learning system introduced in 2007 by the National Center for e-learning and Distance Learning (NCEDL) of the Ministry of Higher Education in Saudi Arabia. The methodology of this LMS is focused on the following functionalities: student registration, planning & scheduling courses, managing the availability of courses, tracking students' performance as well as providing reports. It also enhances interaction and communication between students and their teachers through file sharing, public forums, private forums and emails. Another important function of JUSUR is testing and evaluating students through the use of exams and quizzes. This research paper incorporated the conduction of a series of interviews with instructors at Prince Sultan University, one of whom was behind the project of standardizing the utilization of JUSUR by all courses taught at the university. We also distributed a survey to undergraduate students to measure and analyze their knowledge about cloud computing, in order to get a complete picture about its utilization at PSU.

The interview responses showed that, although the JUSUR system has only been implemented at PSU for about a year, it already helped in improving the educational process and digitalizing it. The result showed that adopting this system was very helpful for course instructors. It helped greatly in terms of organizing and time saving which resulted from focusing on one communication platform for several courses. For example one instructor, who used JUSUR LMS said: "with JUSUR I can follow up with my students' final project progress, monitor their progress and provide advice accordingly without having to waist the limited class time." Furthermore, when focusing on the usability of JUSUR LMS course instructors showed that students were interested and enjoyed the use of the system as they started to use it for learning and communicating with each other. On the other hand, results of the survey that was distributed to 49 students showed that 98% of students believe that the e-learning system is very important for their learning process. 68.8% of them believe that JUSUR was very effective on covering that specific area. In term of usability, 72.9% of students have stated that they did not face any difficulty while using the system and 59.6% use JUSUR for more than 3 courses. We also concluded in this research that in order to make sufficient use of cloud computing in the educational filed, institutions should invest in improving their IT departments and cooperate with specialized cloud service providers. There is also a need to improve the knowledge about cloud computing by training their IT department staff. In addition, institutions need to consider building and implementing a cloud that is suitable for the universities' underlying architecture and requirements.

Arabic re-CAPTCHA

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ABSTRACT

CAPTCHA "Completely Automated Public Turing Test to Tell Computers, Human Apart" is a well known technique used nowadays to protect web sites from automated abuse by computer programs. CAPTCHAs ensure that human (and not a computer program) is the one who fills out web forms such as registration forums, email account creation, online chatting, etc. CAPTCHA displays a distorted image of a text word to users to type in the correct word.

re-CAPTCHA came after CAPTCHA in which users are presented with two words. The first word is scanned from old manuscripts and unrecognized by OCRs. The second word is known and is used to verify the first one. There are so many challenges in this technique the attacker cannot guess the unknown word from the known (control) word; because both of them are distorted. re-CAPTCHA has two purposes: first to prevent programs to automatically fill in forms, and second is to help digitizing old manuscripts.

Old manuscript digitization is one of the most important issues in this project. Scanned old Arabic manuscripts will be digitized using OCR software. A document file with highlighted mismatched words will be produced, which will be saved as it is, highlighted words will be extracted and stored in Database as unknown word. Figure 1 illustrates the extracting technique in more general way. The biggest challenge in this kind of programming is getting support of language, such as using Unicode character set rather than the normal ASCII or Western character set, has been solved some issues.

This paper will illustrate the design and implementation of an Arabic re-CAPTCHA system to support and enhance the accuracy of digitizing Arabic manuscripts. This system will be implemented using PHP server programming language as well as MySQL database management system. When a request is generated, the system selects a random control word's image from the database in addition to the unknown word. The user will be provided with these two words. The user then enters the correct word for the control word the system would assume that his/her phrase for the unknown word is also correct and account records it. Whenever similar phrase is given for the same unknown word then that word becomes known, and its corresponding digitized text becomes known.

Figure 1 Digitizing Arabic Text Words

Emergency Android-based Application for Radiation Evasion in Nuclear Facilities

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ABSTRACT

An android-based system is developed for radiation evasion in nuclear facilities. The application is based on a navigation algorithm having general utility for occupational workers at nuclear facilities and places where radiation poses serious health hazards. This novel algorithm leverages the use of localized information for this task. Hence, this procedure will avoid the need for central processing power and any decision resources are avoided. In order to obtain the information needed for path planning for the purpose of radiation avoidance, a distributed wireless sensory infrastructure is needed, where a main server will be responsible for gathering all the readings from the distributed sensors in the facility, and accordingly distribute this information to all Android-based cell phones with workers in case of emergency evacuation alert.

The algorithm uses a genetic-cultural algorithm scheme where the track is determined via controlled genetic logic; the genetic component eliminates the huge number of computations necessary for the deterministic techniques while the control will reduce the random effects found in genetic algorithms. The cultural part of the algorithm enhances the functionality of this algorithm for serving various individuals in the same area with fewer computations.

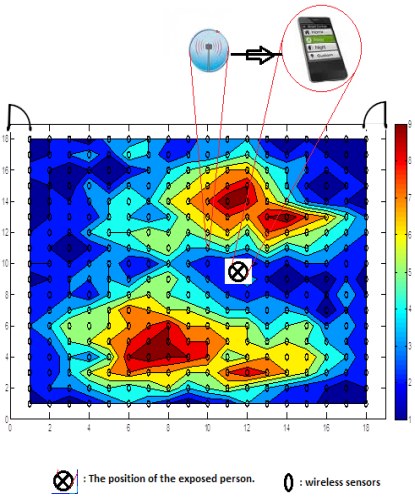

Figure1.The general configuration of a facility that experiences radioactive leakage, with a person stuck-in and with a distributed set of wireless radiation sensors.

A Matlab code was built and run in order to test the logic. The developed code has been applied on an 18x18m building with a certain hypothetical dynamic radiation distribution and considering various scenarios. The results were compared and validated against results from those existing codes that are used for the optimization of such a problem. The proposed algorithm showed an important improvement above those deterministic techniques, in the number of computations and in the computational time which is a very important parameter in the safety of a person who is exposed to radiation. The numerical results indicated an improvement in the performance of 20% over those nearest exist algorithms in use. In addition to that, the proposed algorithm bypassed the danger of stuck-in situation found in radiation evasion criteria codes. Moreover, the concept has been proved using simulation by Rockwell Arena [1-3].

The system provides real-time information on all safe paths at a certain time for evacuating to the “nearest and safest” exit possible. This tool would attract attention in the nuclear safety protection field and may be the base for a whole industry that would replace the reliance on the classical TLD and dose measuring techniques currently employed in nuclear facilities [1].

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A Dual Application Adaptive Watermarking Algorithm for Still Colour Images

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ABSTRACT

This paper presents a dual application adaptive algorithm for digital watermarking of still colour images. The aim of the scheme is to protect the copyright information or to proof the identity by authenticating the image. In general all watermarking schemes satisfy only one application. However, a dual application watermarking system has been implemented which permits users to use the system for both copyright protection and authentication purposes, even though, both purposes have opposing functions. For instance watermarking techniques used for copyright protection are meant to be robust and strong against watermark impairment even with massive alterations, whereas watermarking techniques utilized for authentication purposes have to be fragile and easily impaired via simple modifications. Nevertheless, any of the aforementioned applications can be selected through one system depending on user's protection means.

The proposed technique embeds decimal numbers onto the image. Personal decimal numbers such as Id's, mobile phone numbers, passwords and file number with entry date in hospitals are used as watermarks since they are practical and more informative for representing one's identity. Each bit of the decimal digits is inserted onto one low frequency or high frequency coefficient of one of the DCT blocks of the host image depending on the application selected by the user. For copyright protection the low frequency components of the DCT are utilized whereas for authentication applications the high frequency components of the DCT are utilized. The unique 14 decimal digits (signature) are used as the watermark. The summation of the decimal digits is added to the number to make it 16 decimal digits. This is useful to check that(if) the extracted number is correct or not. A special procedure is applied if the summation exceeds 99. It's worth mentioning that the maximum summation that can be achieved is 126 when a signature with 14 digits and all nines is entered. In such a case the check sum digits will hold 12 and 6. Then each one of the 16 decimal digits is encoded to a 4 bit binary number. Therefore, we will end up with 64 binary bits.

A DCT coefficient selection (DCS) process has been applied to find the coefficient with the maximum or minimum magnitude depending on the application required. This has a direct influence to increase the robustness or fragileness of the system. Therefore, the upper left 16 low frequency coefficients (excluding the DC value) in the 8□8 DCT block were screened and one coefficient with the maximum magnitude was selected for embedding for the copyright applications. Whereas, the lower right 16 low frequency coefficients in the 8□8 DCT block were screened and one coefficient with the minimum magnitude was selected for embedding for authentication. For the copyright applications, placing the watermark in the low DCT coefficients increases the robustness and maximizes the chances of reconstructing the watermark even after common signal distortions. Furthermore, any modifications to these components will result in severe image degradation, long before the watermark itself is destroyed. An attacker would have to add very large noise energy in order to sufficiently remove the watermark and this process would destroy the image fidelity. On the other hand, for the authentication applications, placing the watermark in the high DCT coefficients increases the fragility and maximizes the sensitivity of the proposed method against any modification.

The watermark is embedded in the DCT coefficients of the green channel of the RGB colour image. A shuffle scheme is applied for each binary watermark copy before embedding. This has managed to increase the robustness against vertical cropping attacks. The watermark is further protected by using a secret key. The algorithm used is blind and does not require the original host image for extracting the watermark. Multiple copies of the signature were embedded in the host image. This will increase the robustness of the watermark against several attacks since each watermark will be individually reconstructed and verified before applying an averaging process. The algorithm has been examined using 35 different colour images of size 512□512 with 24 bits per pixel. Two evaluation techniques were used in the experiment with different watermarking strengths, the PSNR and the structural similarity index measurement (SSIM) between the host image and the watermarked image.

BZUCall: A VoIP Android Application

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ABSTRACT

BZUCall is a smart phone based application that improves connectivity between students in Birzeit University through the use of mobile phones.

Students would like to keep connected in Birzeit University, especially when they share some activities mutually. Birzeit university campus is located on a wide area that makes it difficult for students to meet in one place. What we are trying to develop is to save some money for students to cover their basic needs. Therefore, BZUCall will allow students to make free phone calls via local network.

BZUCall is an Android application that uses the network infrastructure and provides many services. Our goal not only to make free calls between students in Birzeit University, we can make this wider to connect students from different universities in Palestine, also in the future many Arab universities could be connected to make the calls easier and cheaper.

Many features could be added to make the application helpful for students in different situations, for example when a student calls his friend through GSM system, and then the recipient has an internet connection, BZUCall will notify the caller with a message to switch the call from GSM to free call through BZUCall to inform him of the availability of Wi-Fi connectivity and that his call can be carried freely.

To accomplish our goal, a method is needed to carry voice over the existing Internet Protocol based network, it turns out that VoIP is the only way to do this. VoIP is a method of delivering voice services across the Internet or other data networks. The mechanism for carrying a VoIP connection includes a series of signaling transactions between the end points, there are several protocols can handle this. Mainly, BZUCall will use the Session Initiation Protocol (SIP).

SIP is a protocol or standard that defines how messages move or how calls mechanisms work, and it needs an environment to be able to its functionality that is a server is needed to handle or route these calls. In BZUCall we will use Asterisk server which hosts the SIP protocol and provides many VoIP services that can be used to support other features that might come to our minds later.

We will evaluate and validate our system (BZUCall) through a comparison with some famous systems as benchmarking, asking students to use the system and give their feedback and test the scalability of the system, by measuring the influence of increasing number of clients using the system at the same time, in this case, the system should give the same performance when the number of users is limited

Finally, our progress in the project is as follows, we have made the connection to the Asterisk server, starting the development process of the client side, and for goodness we made simple calls, between two android clients, the work still in progress and trying to enhance the applications by adding new features, and testing the applications in different network conditions. As a result, Students will use BZUCall to save their money, talk to their friends, and send messages to other students over the local area network at any time.

Using Private Cloud Computing to Maintaining Application Performance: University Systems as a Case Study

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ABSTRACT

Software quality attributes, such as performance, extensibility and cost are the main area of concern for software engineering filed for decades. It was a challenge for software developers and customers to develop systems that use services on demand. Many software architectures were proposed to help in solving this challenge such as Services Oriented Architecture. Recently, cloud computing emerged as an important distributed computing architecture, in which the computing resources are considered as services. Cloud computing treats software, platforms and infrastructures as services requested through the Internet. Thus, software applications, operating systems, and computing utilities become available on demand when requested by the customers. Therefore many researchers and professionals believe that cloud computing will significantly change how the software systems being developed.

Usually, universities build their IT infrastructure to support both educational and administration activities. The IT infrastructure consists of teaching labs, which are not utilized. On the other hand some administration activities are seasonally demanded, such as the demand on the registration system during the registration period. As students at Birzeit University, we have noticed that, the online registration system repeatedly fail during the registration period, as a result of the increased workload on the servers over that period. Since, all students have to register within a limited period of time. Therefore, adding new servers is not the right solution, as the system performance is acceptable during the rest of the year. Based on that cloud computing would be a better solution. The project aims to investigate using private cloud computing to maintain system performance. Private cloud is computing infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted either internally or externally. The project rational is that the educational labs are not in use during the registration period, so a private computing cloud would be built on those labs, and then the registration system will demand the services from the cloud as needed.

The project will demonstrate the Cloud Computing Model; the focus will be on the performance aspect of the software systems that built to use cloud services. The project will be conducted by building private cloud on one of the university educational lab. Then a multi-player game application will be developed as cloud computing application, which allows us to test the performance of Cloud and how we can take advantage of the scalability to maintain the performance of our system. Scalability is the ability of the system to capture recourses when it is needed such as memory, CPU, Disk… etc or release them. The system's (the game) response time should be maintained regardless the number of users. A multi-player game was chosen as a proof of concept prototype, because it is feasible to be tested. The link for the game will be distributed to a limited number of users, and the performance is monitored, then the link will be distributed to team members' facebook contacts, which we assume the number of users will be rapidly increased. In our project we will focus at specific criterias to monitor and testing the performance, we will focus at the scalability time which is the time the system needed to scale up or down through images, the time needed to set up an image depending at the size of the image. We will study how the size of the image affect the performance of our system, we mean by the size of the image is the resources that it takes, for example the small image takes resources as follow 192Mb memory size, one CPU and 2Gb Disk according to eucalyptus, also we can manipulate the image size as our application needs . In addition, we will study the number of hits that system will receive, it's relation to the image size and how image size will help us in serving larger number of hits, in the same time maintain the response time for our system.

In our project we have built a private cloud at one of our university labs using eucalyptus platform, we started testing images provided by eucalyptus and studying how to deal with it. Also we have built our application a multi-player game to start studying the performance of the cloud. We are now in the testing phase of our project in order to get results.

Based on the literature analysis have been done by the team members, Cloud Computing has the ability to enhance performance, and provide a cheaper and more efficient solutions, than adding extra servers which solve the problem temporally. In addition to that the project provide a cheap solution to the University, especially it has an efficient IT infrastructure. The project can be extended, so the university cloud computing could be built using all the university educational labs, which cloud allow the university to provide services to the society and earn income.

LMP: System for Locating Missing People using GPS and

Messaging Services via Mobile Devices

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ABSTRACT

How many people are missing every year? How many of those are reported as missing? And how many of those are returned to their families?

The problem of missing people is not a problem for one person or one family; it is a problem of the whole world. It is growing continually, and sometimes it takes a long time to find the missing person. The matter of missing people is so risky, especially if the missing person is a child, elderly or disabled.

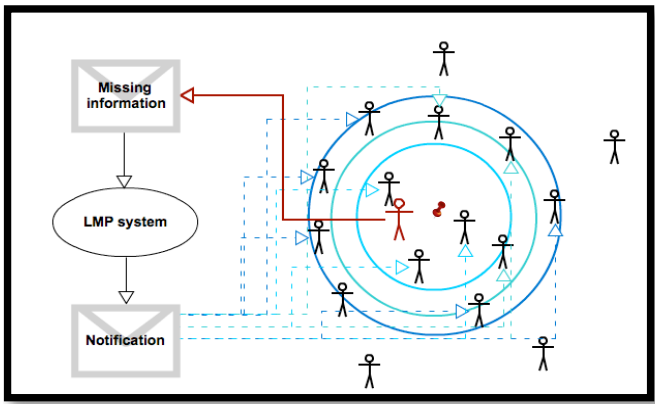

Figure 1 : abstract view of LMP system

The Locating Missing People System (LMP system) does not need from the person to wear anything, available for everyone, everywhere, at anytime and can use the help of the people who are close by the area that the missing person was lost in, aside of some organizations and websites that have been published to find them, special devices were made to be worn to locate people easily, and there are some applications that were created to report missing cases. All of which had limitations and their own disadvantages. The LMP tries to produce an efficient system that helps society in finding the missing people the same time they get lost. The LMP system is for mobile devices and it depends on Global System for Mobile communication (GSM) to use the messaging service as the basic communication method in the system.

How LMP system works: Using LMP to report a case requires installation of LMP mobile application to make reporting cases easy. System works as the following scenario: when the plaintiff want to report a case the first step is filling the report form with the missing person's information – picture (if any), name, age, gender, time of loss and more description (if any) - then the application uses the mobile GPS to specify the plaintiff's location and give him a map to determine the last place he saw the missing person at by putting a pin as the second step, after that the application collects the information and sends it as MMS to LMP server. The system receive the report, generate ID for this case, specify the area that will send the notifications, send this area to the GSM to retrieve the phone numbers of all the people inside it then send MMS to them with the information of that missing person to help the plaintiff, if the people that receive the notification have any information about the missing person they can send SMS to the LMP's number that starts with the case ID then the information, then the plaintiff receives the message from the LMP and he can replay to the helper via the LMP number. After 10 minutes, if the plaintiff still does not find the missing person, he can expand the notification area by sending SMS to LMP that contain instruction of expanding the area via the mobile application then the system will do it. He can expand the area till the time of missing reaches 2 hours then the system will stop this process because it cover huge area and it will put the report in LMP's website and post the report in social network accounts. If the plaintiff finds the missing person at any time he must cancel the case to notify the people who received the report notification and to tell them to stop looking for the missing person.

The main goal is offering a helpful system that can do the best to find the missing person and minimize the effects of the problem, but this system does not offer a complete solution for the problem, where the technologies and media cannot replace police investigative work.

YUSR: Speech Recognition Software for Dyslexics

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ABSTRACT

Dyslexia is one of the reading disabilities or difficulties; it is classified as a learning disorder. Dyslexic children suffer from reading difficulties and face many challenges in their educational life. One of their core problems is the difficulty to learn how the printed word maps into spoken language. According to their needs and the importance of reading generally, our project YUSR is built to be an assistant application for dyslexic children to learn Arabic letters pronunciation. This application aims to develop skills of reading and spelling, it provides an environment for dyslexics to use their senses in learning (vision – speech – hearing). YUSR is an Arabic software dedicated to dyslexics, it is an automatic speech recognition system based on analyzing phonetic isolated Arabic alphabet letters.

Features of the sound signal are extracted using Mel-Frequency Cepstral Coefficients (MFCC).The statistical model used in the recognition process is developed using Hidden Markov Model (HMM) implemented in Hidden Markov Model Toolkit (HTK toolkit). The required files needed to build the system, specifically the grammar and dictionary files, are defined using Arabic language supporting parameter to get the output files as Arabic results.

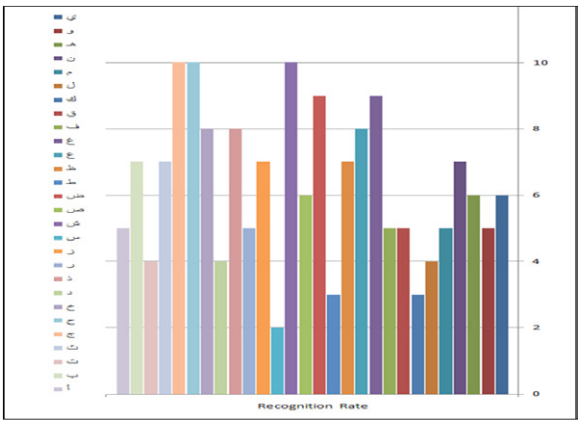

Figure 1: Recognition Rate of Letters

Figure 2: YUSR's User Interface

The sound files used to train the application were prepared and recorded by the developers. The application was trained by more than 500 samples of the Arabic alphabets with different volumes and different sounds of males and females to provide variety. The recognition rate achieved by the application is 82 % (recognition of 23 letters out of 28 Arabic letters).

By testing each letter individually, the system recognized the Arabic letters with different rates; results are shown in figure 1. Some of the letters have high rate of recognition (like the letters Jeem جيم and Ha›a حاء). However, there are some letters with a low rate of recognition (like the letters Dal دال and Seen سين) because of the confusion with similar letters (Thal ذال and Sheen شين).

Furthermore, a kid-friendly user interface was built using Visual Studio framework as shown in figure 2. The interface was designed with the goal of providing the environment needed to dyslexics in order to learn easily. It was tested by seven kids; most of them liked the interface and found it easy to use. Using this interface, a dyslexic person can listen to the correct pronunciation of a chosen letter, see how to write the letter and pronounce the letter which is the main function of the application. The pronunciation will be processed and compared by the application. The pronunciation is either accepted or the dyslexic person should pronounce again the letter.

As a second level in YUSR, letters are displayed in words in different positions, these helps to resolve the visual confusion of dyslexics. This can be further developed by including speech recognition for spoken words in the future version of YUSR.

Touch to Speak: Augmentative and Alternative Communication for Individuals with Autism and Stroke

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ABSTRACT

Verbal communication is of paramount importance for individuals in interacting with others as it is the first tie to the world around us. People with language impairments face difficulties in understanding and using language, but the major difficulty is speaking well-structured sentences, which leads to the problem of making themselves understood. Language impairments are linked to many disorders such as Autism and some cerebrovascular accidents such as strokes. Motivated by the above mentioned problems, we started the Touch-to-Speak project, an Augmentative and Alternative Communication (AAC) system that assists people with language impairments, which resulted from a stroke or were related to autism, in effectively communicating with people around them. The system facilitates communication by acting as a supervised translator that translates a series of pictures to well-structured sentences that are then spoken by the system. The system is based on the Picture Exchange Communication System (PECS) that is often used in manual form by individuals with verbal communication difficulties. When the user needs to say something he/she simply taps a picture from the database of categorized words, the application will then form a proper sentence and read it out-loud. Figure 1 depicts how the system plays the role of computer-mediated communication on a portable platform.

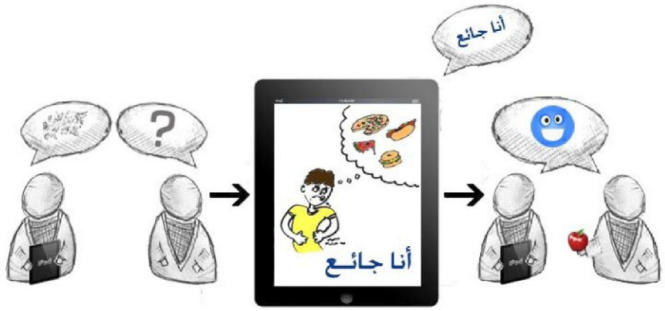

Figure 1 Sketch of where our system will fit in the context of use

Designing an application that supports the Modern Standard Arabic (MSA) and other spoken local dialects was a key design consideration; since they are both intensively used in speech therapy for patients. Due to the different characteristics and needs of our target users, the application contains two separate interfaces, one for children with autism and another for adult stroke patients. Users can customize their accounts and edit the database of images to reflect the words that are essential for their own communication needs. Since the intended users are people with disabilities, we followed the User-Centered Design (UCD) approach in our application development in order to ensure its usability and accessibility. Moreover, to make the application more attractive, appealing, and easy to be used, it is developed for Apple's iPad as touch-screen portable devices have been known to be intuitive to use with non-technical user populations. The system is comprised of image databases, categorized by phrases such as emotions (i.e. I feel...) or verbs (e.g. I want to ...), and facilitates communication either by structuring the sentence with a series of images or by typing for individuals proficient in reading and writing. Users can select whether the words are spoken with an Arabic TTS engine or as audio clips recorded by the user. Testing involved cognitive walkthroughs in which scenarios were presented with low-fidelity prototypes depicting the proposed system to a stroke neurologist and a speech pathologist. Feedback was solicited on the general design of the application, the structure, and the flow of the application. The novel contribution of this system is providing key assistive technologies for Arabic populations that have not been available in the market, and providing the first Arabic AAC system that is based on the iPad platform which includes both MSA and local dialects.

Acknowledgment: This research project was supported by a grant awarded to the Software and Knowledge Engineering Research Group from the Malaz Research Center (RGP-VPP157) and KSU's College of Computer and Information Sciences.

Sada: Auditory Discrimination Therapy Program

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ABSTRACT

The sense of hearing is of paramount importance as it is the first tie to the world around us and our first method of acquiring the skills to pronounce words. Accordingly, hearing loss deprives us from this experience and integration into our society. Based on that, this project involves developing an assistive technology for people with special needs to help improve auditory skills of children with auditory-related problems and learning difficulties, and assist them in effective communication by providing training techniques in Modern Standard Arabic (MSA) and two local dialects. In this paper, we describe the background, motivation, and nature of the problem that this assistive technology, called Sada 'صدى', addresses. The novelty of this system is the contribution towards Arabized technology for supporting speech and language pathologists in our local context as well as the approach adopted in the design cycle. In this project, we rigorously followed the User Centered Design ISO 13407 standard in the analysis and design of the system. Furthermore, we describe the analysis, design, implementation and testing phases conducted in this project, as well as local and global impact of our system.

In recent years, there has been proliferation of technology solutions available for users with special needs. However, there remains a scarcity in assistive technologies for native Arabic speakers, especially people with disabilities. In the field of speech therapy, aural rehabilitation often involves complex programs to rehabilitate disorders of the auditory system. Examples of disorders include cochlear implants, ADHD, APD, Dyslexia, and Autism. This system provides interactive games for children in Arabic with two Saudi local dialects, which will be available for use outside the clinics at home. The goal is to develop a system to improve the auditory skills of children with auditory discrimination difficulties. Sada is envisioned to extend rehabilitation therapy beyond clinics and provide effective solutions for improving their auditory skills in home environments. The system is comprised of three types of activities for child users which include auditory discrimination, articulation, and auditory attention. Complex algorithms have been developed to ensure motivation and engagement of the child in the therapy program. Presentation of Arabic words in activities is based on randomization of selection from a pool of words which were pre-categorized based on the weight of the Arabic word. For auditory discrimination training for Arabic letters, categories were used based on the classification in Cops program developed for Specific Learning Difficulties (SpLDs).

Articulation Game	Discrimination Game (Dialect)	Attention Game
		

Table 1 Samples of System Games

User Acceptance Testing was conducted as a field study with children who have auditory discrimination problems. The results of the testing provided evidence to suggest the effectiveness of the approach implemented in Sada in supporting practitioners in speech therapy with assistive technology for auditory discrimination. The prohibitive costs and the limited availability of specialists have led to limited availability of rehabilitation programs for children who need auditory discrimination training beyond clinical settings. This system aims to bridge this gap with an innovative bespoke solution for our local context.

Acknowledgment: This research project was supported by a grant awarded to the Software and Knowledge Engineering Research Group from the Malaz Research Center (RGP-VPP157) and KSU's College of Computer and Information Sciences.

Monitoring System for Guyed Towers

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ABSTRACT

Guyed towers are a type of telecom towers that uses tensioned cables to stabilize the vertical structure. They are generally guyed in three directions through tensioned cables (guy cables) that are attached to the base of the tower and responsible for the tower's stability. In contrast to other telecommunication towers, such as monopole or self-supporting towers, guyed towers are considered the most cost effective because they provide extended height at a much lower material cost. The main challenge of using the guyed tower is making sure that the aligned antenna, placed at the top of the tower, does not change its direction too much. The tower base is fixed at a certain point that does not change. However, the tower top might deflect because of extreme weather conditions. Simple deflection might be safe but aggregated deflection may disrupt the communication signal causing poor user experience and consequently loss in revenue to a telecom business. On the other hand, severe deflection might collapse the tower and threatens safety. As a result, guyed towers require regular inspection and maintenance which is a time and money consuming process. Hence, having an automated monitoring system for telecom guyed towers will have a great added value to telecom business.

To solve the problem, we propose a system that can monitor the status tower during installation and regular daily operation (Figure 1). The system reads sensory data at the different guy cables (critical points), analyzes the readings to decide the severity of the deflection, and sends feedback to remote operator in a central monitoring unit. The readings of different sensors placed at different critical points at the tower will be acquired by a microcontroller. The microcontroller digitizes these readings, analyzes them into useful information about the vertical alignment of the tower structure and consequently the alignment of the antenna at the top. The microcontroller will implement algorithms to improve the accuracy of the information being reported and sent back to the central station through a GSM device. The operator in the central monitoring unit will be able to inspect the status of each tower and even probe the tower for its status. This should reduce the cost of maintaining uninterrupted service and improve the overall user experience.

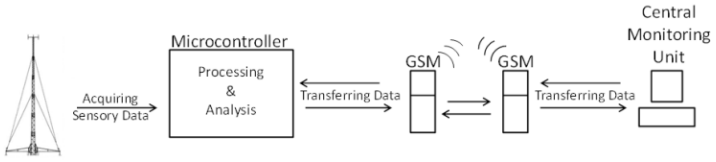

Figure 1 Guyed Tower Monitoring System

We have created an experimental setup (Figure 2-a) where we model the tower mast using a steel rod and the guy cables using steel stripes. We use strain gages that are placed on the steel strips to measure the strain caused by the applied force on the tower. Analog readings from the strain gages are read and analyzed by the microcontroller. Currently, we are in the process of modifying and optimizing the processing and analysis of the sensory data. The CMU (Figure 2-b) displays a map of UAE and contains a number of towers, their locations and the detailed status that includes the strain on each cable and the tower deflection.

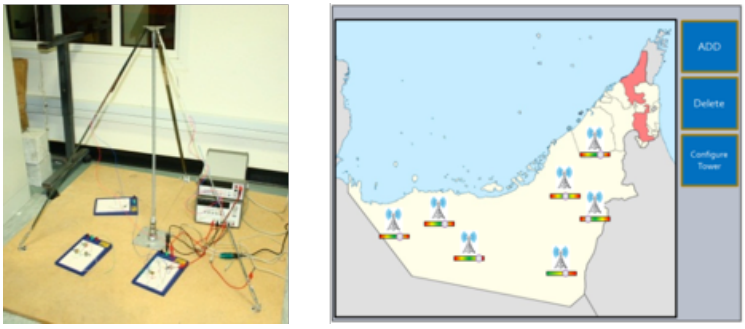

Figure 2(a) Experimental Setup (b) Command and Control Unit (CMU)

Indoor UOS Mobile Application

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ABSTRACT

The University is built upon an Islamic design and houses study halls, laboratories, libraries, computer labs, theatres, clubs, sports complex and other administrative facilities. There are also separate residential areas for male and female students and the faculty. The University is divided into two campuses — a men's campus and a women's campus and is comprised of 14 colleges, which offer diverse academic programs of study at the diploma, bachelor's and master's levels. The University map can be found easily from the university website which is also available in Google maps. Our mission here is to adopt the idea of an Indoor- University of Sharjah (UOS) mapping as a mobile application that can be easily accessed through mobile device.

The problem we face in UOS is when new students or visitors come to the University they get confused and don't know the directions and locations of the registration building or their classes. They rarely find people to help them guiding them to the correct locations. Some new students are shy that they can't even ask for assistance.

An idea came across and we planned to develop an indoor UOS mobile application to make it easier for our new students and visitors to get directions immediately through their mobile phones. Our application has two functions using the location-based services (LBS):

1. The student can enter the name of the building he/she is planning to go and the application will show him/her the current location and the path to the location they want.
2. The application will be alerting the student each moment he/she comes across a building. For example when the student is near the library, an alert message will be informing the student that there is a library a few meters on the way.

Using Geographic Information System (GIS) Technology for the Indoor-UOS mobile Application will help prevent some of the major issues we facing. GIS makes it possible to store information about the world as a collection of thematic map layers that can be linked together to show the spatial distribution of a particular geographic feature or phenomenon. In general, GIS performs six processes or tasks: input, manipulation, management, query, analysis, and visualization. The ability of GIS to search databases and perform geographic queries has become an essential element in a range of workplaces.

Benefits of the application:

1. It is ease of use, you need not waste time in sitting in front of the desktop to access a particular application; all you have to do is download the same one to your mobile and access it in seconds.
2. No need of internet access, your mobile phone allows you to access the application at anytime and anywhere.
3. Gives you the right direction to a specific location immediately.

With this application that is created using Windows Phone (with the help of Microsoft Visual Studio 2010 Express for Windows Phone) students and visitors will not come across the same problem as before. They will be satisfied as they can access it anytime and it's easy to use, as mobile applications are the future.

Decision Trees In Data Mining

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ABSTRACT

A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. It is created in order to help in selecting the best of several alternative courses of action. Decision trees can represent various types of data, but the most popular type is the numerical data type. Data can be also nominal data that is described by a discrete set of symbols.

In our poster we are interested in exploring different Decision tree techniques (numerical and nominal) and in showing their different advantage and disadvantage. We will start by presenting the "big picture" of the model, which can be used to determine target groups and predict the target value for specific cases where we know only the predictor variable values. We also present a complete comparison between all of these techniques and algorithms. We focus on the following algorithms: Hunt's Algorithm, Iterative Dichotomiser 3 (ID3), C4.5, Classification and Regression Trees (CART), Supervised Learning In Ques (SLIQ), and Scalable Parallelizable Induction of decision Tree (SPRINT).

Hunt›s algorithm was introduced in 1966. It grows a decision tree in a recursive fashion by partitioning the training records into successively purer subsets. ID3 was introduced in 1986. It is serially implemented. C4.5 is similar to IDE3, but it allows pruning to takes place by replacing the internal node with a leaf node. Thereby, it reduces the error rate. CART builds both classifications and regressions trees. SLIQ and SPRINT are fast and scalable decision tree algorithms that can be implemented in serial and parallel pattern.

We compare different techniques with respect to: date first applied, how it work, implementation issues, time performance, and accuracy. The first algorithm applied is the Hunt's algorithm and the last is SPRINT. Hunts algorithm partition the training records into successively purer subsets. ID3, C4.5, and CART are all based on Hunts Algorithm. SLIQ and SPRINT are based on Breadth first greedy Technique. All of the algorithms use serial implementation except SLIQ and SPRINT use serial and parallel implementation. Hunts Algorithm, ID3, C4.5 and CART are slow. SLIQ and SPRINT have improvements making them fast and scalable. For large or noisy data, Hunts Algorithm, ID3, C4.5, and CART are not accurate, SLIQ and SPRINT are accurate even for large or noisy data.

Algorithm / Criteria	Hunts Algorithm	ID3	C4.5	CART	SLIQ	SPRINT
Date first applied	1966	1986	1993	1984	1996	1996
How it work?	Partition the training records into successively purer subsets.	based on Hunt's algorithm	based on Hunt's algorithm	based on Hunt's algorithm	based on Breadth first greedy Technique	based on Breadth first greedy Technique
implementation	Serially	Serially	Serially	Serially	Serial&parallel	Serial&parallel
Speed	Slow	Slow	Slow	Slow	Fast & scalable	Fast & scalable
Results	Not accurate if too much data or noise	Not accurate if too much data or noise	Not accurate if too much data or noise	Not accurate if too much data or noise	accurate	accurate

A summarization of our comparison results is shown in the above table. According to our comparison, we can conclude that the best algorithm over all decision tree algorithms under comparison is the SPRINT algorithm. It can be implemented in serial or in parallel. It is fast, scalable, and accurate.

Car Plate Recognition System

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ABSTRACT

Car plate recognition system is an image processing technology used to identify vehicles by their license plates. Car plate recognition systems are of considerable interest, because of their potential applications to areas such as highway electronic toll collection, automatic parking attendant, speed limit enforcement. This project presents a prototype of Car Plate Recognition, an approach to car plate number recognition, built on recent technological advances in object recognition, to create real-time car plate recognition through a mounted camera on a security gate.

One of the most practical uses for License Plate Recognition is in gated communities and other limited access locations. As the car approaches the gate, the license plate reader scans the information and compares it to a predetermined list of those with permission to enter the facility. If there is a match, the gate opens automatically-if the license plate does not match an authorized user entry is denied. This technology can be used in a number of different locations, including sensitive government buildings where security is a paramount concern, laboratories where access needs to be restricted for public safety reasons and intelligence agencies where access is restricted to those with a legitimate need to enter the facility.

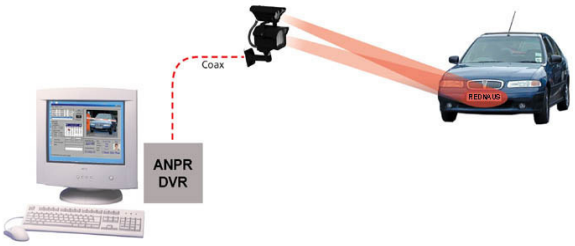

Figure 1: Car Plate Recognition System

Given a database of training set of images representing the set of cars plate numbers, the smart recognition application managing the mounted camera should recognize registered cars as they enter the parking lot. It should also be able to distinguish unfamiliar visitor cars from known cars. The camera will then notify security of any unregistered car enters the lot. The system should replace the process of checking for logos pasted on car glass, using personal IDs used for getting access in a faster manner that is much more organized.

Using image recognition in MATLAB that will extract data from image, it will check database and if we find this it in our database then will open the gate and if not will give the user the red light that means the number are not included for it, and if there is a guest we have to make an exception case to put there plate number to open it.

The system, based on regular PC with video camera, catches video frames which include a visible car plate and processes them. Once a license plate is detected, its digits are recognized, displayed on the User Interface or checked against a database. The focus is on the design of algorithms used for extracting the license plate from a single image, isolating the characters of the plate and identifying the individual characters.

In a car plate recognition system, locating the license plate in the image or video of a car is an important step before final recognition. Our project presents a multiple license plate detection algorithm based on mathematical morphology and component filtering. The proposed algorithm consists of three main stages. The three stages involve pre-processing followed by morphological operations and connected component analysis. The algorithm is able to detect single as well as multiple license plates accurately.

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Improving the Security of Telemedicine

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ABSTRACT

In this work we discuss how computing technology can be a solution to problems associated with telemedicine. Telemedicine is a fascinating and rapidly evolving field that contributes to outstanding improvements in the lives of people. Moreover, the future of telemedicine technology seems to be a race against time; that is why we believe that certain telemedicine issues require special technical features to reduce their negative impacts. The discussions in this paper will focus on ethical problems and provide solutions in an attempt to set clear regulations for the uses of telemedicine.

More specifically, the issues we cover are: 1. Respecting patients' privacy, 2. Securing patients' data, 3. Solving incomplete and transmission issues, 4. Use of telemedicine in wars, and 5. Safety of medical devices.

1. Respecting Patients' Privacy:

Who views the images or videos of patients at the doctor's clinic?

Hospitals have many departments, one of the most sensitive issues for patients is the privacy of their data; in other words, who will have access to the patient's data? To overcome this problem, we apply the Role Base Access Control (ACL) concept by restricting the privileges and abilities to the immediate users, namely the doctors and nurses. Each doctor will have access to the departments he/she is working in. In addition, access privileges to the nurses will be assigned by the doctors or the system administrator.

Securing Patients' Data

Securing videos & images in database:

In telemedicine it is important to store and retrieve patients' data securely. This involves the security of databases that carry all the information of the patients. Any type of data ranging from medical images (e.g.: X-ray) to personal information (name, address, telephone number) must be encrypted and stored in the database using sounds encryption algorithms such as, Triple DES's 56-bits algorithm. In addition, databases should be secured enough to drop any attempt of data modification by unauthorized users. This section covers data encryption and database security.

Solving Incomplete Transmission Issues

Incomplete transmission issues of information / Unauthorized access to submission lines:

The basic idea of telemedicine is the transmission of information from one place to another, which brings the issue of incomplete transmission to the forefront. To avoid any intruders to the connection established between the doctor and the patient, we will encrypt all the data transmitted from one place to another. Another important factor to be considered is the electric shortage that might occur in hazardous situations. As a solution for this issue there should be back-up lines and back- up data centers that could be used to retrieve an up-to-date copy of the data in case it is lost. One last thing we discuss in this section is the importance of testing networks related to medical institutions. A hospital must closely coordinate with the internet providers to assign specific communication lines to the hospital so it can avoid any type of connection delay and to test these lines regularly.

Usage of Telemedicine in Wars

Battlefields are dangerous zones; delivering medical care is hard due to the usually long distance between the clinic and the battlefield,and also the hazard associated with the delivery process. Telemedicine can be considered as the best solution for such cases, as the connection between the soldiers and the doctors is done via high speed satellite connections.

Safety of Medical Devices

Safety of medical devices and techniques used / Trusting machines used in telemedicine processes:

In order to ensure that the machines used in telemedicine are working properly (such as surgery robotics) , technicians must check these devices regularly using trial/error and troubleshooting methods in order to improve the human-machine interaction in terms of accuracy and responsiveness. Troubleshooting sensitive medical devices regularly will reduce the possibility of having errors during severe cases and surgeries. Another important factor is to ensure that most of the devices being used are ISO certified in order to ensure the quality of the products.

MBA: Market Basket Analyzer

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ABSTRACT

Market Basket Analyzer (MBA) is a software-based for Market Basket Analysis that is implemented using the well-known algorithm, the Apriori algorithm for mining frequent patterns. In our project we use the Apriori algorithm and apply it in the market analysis problem so that to detect frequent itemsets for our customers. The project detects how items are frequently purchased together by customers. The application gives the ability to mine frequent itemset of length one, two and three etc. items in a store database. The application has a simple understandable interface (figure1) and the result of all frequent itemsets can be shown in a text file (figure2) . The frequent itemsets of length one are represented by a bar chart for easy differentiation (figure3).

The goals of MBA is to analyze the customer purchasing behavior, help in increasing the sales, and maintain inventory by focusing on the point of sale transaction data, find the frequent item sets that are purchased together, help managers optimize different store layouts, and help retailers develop marketing strategies by gaining insight into which items are frequently purchased together by customers. Also, it enables the vendor to determine the impact on sales, gives a statistical of sale rate ,and corporate profits.

The application extracts all frequent itemsets that the user are interested in. It can focus on itemsets with certain frequency of occurrences or of different lengths, depending on the user point of interest. For example, if the user is interested only on itemsets with certain frequency of occurrence, he can easily set the minimum support (frequency) threshold through the program. He can also decide the length of the frequent itemsets to be listed. The application can be easily extend to find the frequent item in a specific date or time depending on the user interest.

While the need of finding frequent itemsets for a huge database is quickly immerging. improving the search performance and the efficiency of computing for such algorithms have motivated us to implement this application.

Figure1: MBA Interface

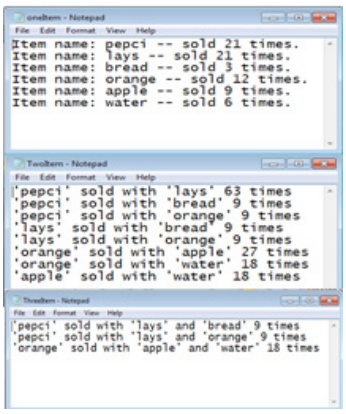

Figure2: MBA Interface

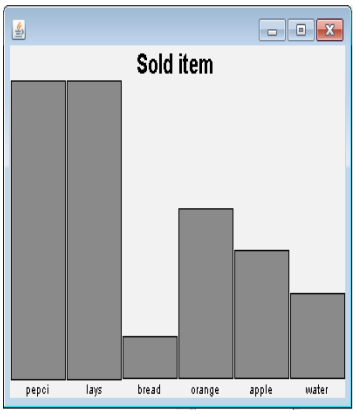

Figure3: MBA Interface

An Intelligent System for Protein Structure Prediction

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ABSTRACT

Since proteins provide the most fundamental information of all living cells and viruses, the ability to predict protein structure and its function is one of the most important goals of bioinformatics research. In the 1980's, an international research effort called the Human Genome Project began to map and sequence all the genes found in the human species. In the wake of the genome sequencing projects, an unprecedented amount of protein data has been collected. However, only a few number of protein structures have been determined, and the puzzle of how amino acid sequences fold into three-dimensional structures is incomplete. To date, it has been observed that the number of known protein sequences is growing much faster than that of known protein structures. There are currently about 52,000,000 known protein sequences in the GenBank maintained by the National Center for Biotechnology Information and only about 78,000 experimentally determined structures in Protein Data Bank. With the completion of further genome projects, it is anticipated that the sequence-structure gap will grow even wider.

The most important goal in protein structure prediction is to predict the tertiary structure from its primary sequence. However, to achieve this goal, the intermediary problem should be resolved by increasing the prediction accuracy of secondary structure of a protein. Accurately predicted secondary structures can be used not only as input into ab initio calculations but also to improve sensitivity of threading and fold recognition methods. Protein secondary structure prediction is also of great importance to homology modeling. Furthermore, it has been shown to be useful in identifying membrane proteins, coiled-coil regions and domains, classifying secondary structure content and finding binding sites. Generally, the degree to which the secondary conformational classes can be determined has become an important benchmark for protein structure prediction.

Several widely used experimental tools like X-ray crystallography and multidimensional Nuclear Magnetic Resonance (NMR) have the capability to determine the complete three-dimensional structure of a protein. However, these tools have some inevitable drawbacks. For example, it is not easy to obtain or develop high quality crystals for X-ray crystallography. In addition to this, the static nature of a protein crystal is inappropriate in representing the dynamic nature of a protein. NMR also has some widely known problems. This is confined to small proteins, as the interpretation of NMR spectra of large proteins is very intricate. They also require a large amount of time, taking months or even years to complete.

Due to the practical limitations and complexities of the aforementioned methods, many scientists are now turning to computer-based methods. Several computer-simulated machine-learning techniques have recently gained much attention, as they proclaimed great performance in diverse protein-related problems. Hence, in this study, we will introduce a novel AI-based protein secondary structure predictor that can show a more accurate and stable predictive performance than the existing state-of-the-art models. The novel predictor is trained using a newly designed compact homology and hydrophobicity profile. The performance of the predictor will be compared to four different machine-learning models on RS126 dataset in terms of accuracy, sensitivity, specificity, and correlation coefficient.

ELDEROID: A Mobile Application to Support the Elders

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ABSTRACT

Elders represent an important segment in any society. As people get older many of their capabilities gradually decline and their needs increase. Elderly people tend to forget more, their muscles deplete and they may have problems with vision and hearing. They would need much help and support from their caregivers to carry out everyday tasks.

The elders' caregivers offer their time to take care of elders. They face many problems as usually they have large number of tasks to support the elders beside their own life tasks. They may not be able to supervise the elders all the time and they cannot leave them without ensuring their safety.

Our aim in this project is to support the elders and reduce the burden of their caregivers by developing a mobile application suitable for elder's use that meets their requirements and considers their limitations. Our application "ELDEROID" will provide many useful functions for the elders to carry out their daily life tasks individually. It has a simple easy to use non distracting user interface. The functions it provides include a reminder for medicines' times and doses, a reminder for important events and appointments. It also provides emergency service so that elders can request help easily by touching a button. In this case the mobile will loud ringing and send SMS to caregivers. It can also track the elder's location and inform the caregivers about it.

There are several systems to support the elders in literature. Examples are: Senior Phone, GPS to EMAIL, Medical alert System and PillBoxie. Some of these are mobile applications while others are stand-alone systems. However, each of these systems focuses only on one service. ELDEROID has the advantages of providing several services integrated in one simple application, so it is easier to use and more cost effective. Moreover it supports both Arabic and English languages and it doesn't need a network connection.

Our application ELDEROID will run on any mobile device that supports Android OS platform. Android is relatively new but it is coming strongly because it is an open source and it offers developers the ability to build extremely rich and innovative applications. It provides rich development environment including a device emulator, tools for debugging, memory and performance profiling. Moreover, Android is available on large number of mobile devices of different makes like Nokia, HTC, Sony Ericsson, Samsung, and many others, so the user is free to choose whatever he likes. We used eclipse to implement all the functions of ELDEROID. In addition to create the database we used SQLite Database Browser.

To summarize, in this project, we serve our society by developing an Android mobile application that provides help and support for both the elders and their caregivers.

Floor Plan Mapping System

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ABSTRACT

Using a vehicle for mapping indoor environments has been well researched in the past few years. Most of the proposed systems use expensive long range sensors such as radar, camera, and lasers, and complex technologies such as WiFi-based time-of-flight measurements. In this project we plan to map an enclosed environment using the least number of low cost sensory devices.

The main component of the system is a land robot that is controlled by a microcontroller and is programmed to follow an autonomous navigation algorithm. The robot uses data from few sensory devices to navigate the surrounding environment. Various sensors could be used, but the aim is to use the smallest number of the most basic sensors in order to reduce the overall cost of the system. Some of the sensors that will be used are infrared sensor, collision sensor, and odometer sensor. The microcontroller that controls the movement of the robot is limited to its computing resources and storage space. Therefore, the sensory data and spatial marker information that are detected by the robot will be communicated back to a PC to help store the data and draw the floor plan. The microcontroller will require a wireless communication device to communicate with the PC. The system overview is shown in Figure 1.

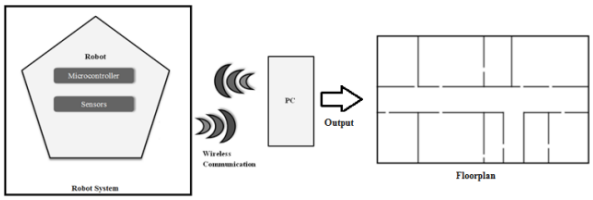

Figure 1- System Overview

We started by implementing a simple wall-hugging algorithm and we assume that the environment has no obstacles. This algorithm lacks the accuracy to build a floor map drawing. The next stage of the project is to optimize this algorithm which can draw a better floor plan and detect a closed loop. The PC will be used also help the robot navigate to different parts of the floor plan and avoid redrawing parts of the floor plan multiple times.

Our current system uses an iRobot® Create®. The iRobot interfaces serially with a KEIL MCB2300 programmable microcontroller. The microcontroller communicates with the PC through a ZigBee device. The iRobot Create has three sensors built in: the bumper sensor, the right infrared sensor, and an odometer. Using theses sensor obtained from the iRobot, the KEIL implement the wall following algorithm. We have built a test environment (Figure 2 – a) to assess the limitations of the current setup and implemented and application that draws a floor plan using the live feed from the robot and interacts with it as well (Figure 2-b).

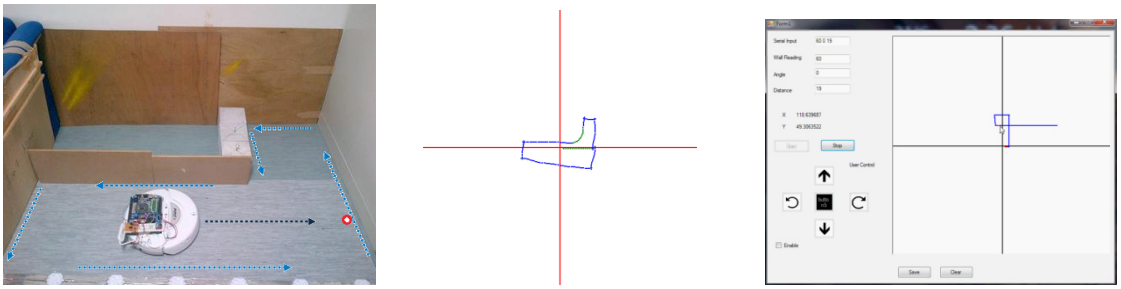

Figure 2- (a) Test Environment (b) Output on the PC (c) Output with error accumulation

We are currently handling a couple of error sources, one caused by door ledges causing wrong odometer readings and another by our closed loop detection algorithm which sometimes result in a wrong floor plan (Figure 2-c). The PC will help solve these problems and direct the robot to a new wall to hug. One naïve method would be to randomly turn the robot and hope it hits a new wall. Adding a low cost ultrasonic range finder and keeping track of the robot surroundings is another method we are currently assessing. We anticipate that the use of an ultrasonic range finder will help us to maneuver through a floor plan with convex-type objects that represent pieces of furniture.

Lost Person System “Mafkoud”

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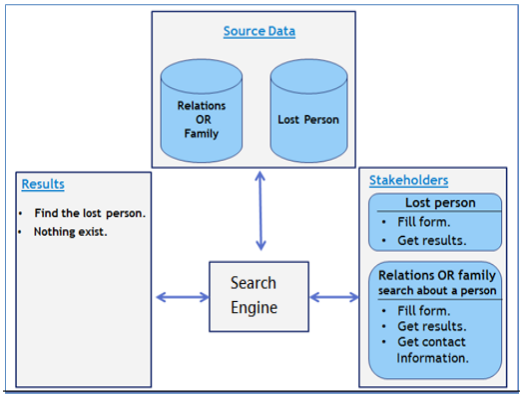
ABSTRACT

Each day we hear or read in newspapers and magazines about cases of family missing someone or a person who lost himself of different ages throughout different countries under different situations. This is a big problem for the family and relations who are worried about the missing person. Many people adult and kids lost themselves and they don’t know how to be in contact with their family. In other hand, many people are missing someone and they don’t know how to look for him. There are some simple attempts to solve this problem by forming groups and volunteer teams to search for missing persons through the dissemination of their descriptions in the newspapers and magazines, or even in social networks, and there is an example of the exploitation of social networks such as “Twitter” by creating account named “@mafgood” and tweet for the missing people. This is not enough due to lack the popularity of social networks in Arabic countries like Saudi Arabia. So we need official solutions that can leads to our goals.

We are pleased to present our solution by submitting this paper which demonstrates our vision and plan for the Lost Persons System “Mafkoud”. In this system we use a searchable database. Searching for text-based content in databases presents some special challenges and opportunities which we resolve in our system by using an approximate matching technology. Our idea is inspired from “Fuzzy matching” algorithm. It enables the search engine of our system to reduce time in searching and retrieving results. We use comparison function as: do first names match? Do first names match approximately using “phonetic matches” as Soundex? Do birthdays match? Do specific physical characteristics match? Do cities of birth match? Are the names the same after translating foreign words to/from English/Arabic? Do countries, phone number, or street address match? Etc. Our actual data matching engine can include any functions from basic string matching, normalization and transformation. When an exact match is not found for a sentence or phrase, Fuzzy matching algorithm attempts to find a match which, although not a 100 percent match, is above the threshold matching percentage set by the application. We improved the results of this algorithm by using English and Arabic Soundex Functions. Intelligent ranking is used to show most relevant results upfront. By these techniques we can assure a very high success rate. Also, we provide different levels of privacy to each type of users’ spatiality in the images of the lost ones. Information are added by the person who lost himself on one hand and by the relations or family who search the missing person, medical examiners and coroners across the country on other hand, increasing the chances that these unidentified persons will be founded or named. Also results will be viewed in simple and clear way, so it will be easy to understand it by anyone. The generating results will create relation between lost person and researchers of that person or other possibilities that will help each of them. When there is matching the system will send email and SMS to the link between the missing and their families. We described the main system component in the figure beside.



In our system, we try to provide specialized support to the relations and families to ease the heartache and confusion, and help search for their missing persons. By using our search tools, you are able to look for missing persons and family, even though you are far from home. At the same time you make it possible for them to find you. As a team we believe that when we help people to find their lost ones that will give a warm and fuzzy feeling inside that’s indescribable and have never charged anything because that feeling in itself is payment enough. We hope that our project is a lifeline for them and their families.

Effective heat management in Computers

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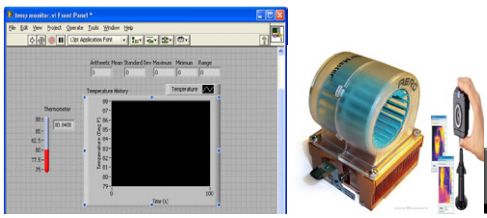
ABSTRACT

From laptops to desktops to large super computers, one of the major issues faced by the computing world today is the issue of heating. The main producer of heat in a computer is the Central Processing Unit (CPU), which generates heat when performing operations and calculations. So how much heat is generated and how to get rid of this heat? As far as laptop users are concerned, many of them make use of cooling pads to get rid of the excess heat. However, the same cannot be said for people who own desktop computers that occupy more space, have a capability to perform more operations and hence produce more heat. Which brings us to supercomputers – and the problem they face in heat management.

The more calculations a computer performs the more heat it generates. When large amounts of computers, performing many calculations, are clustered together (like a server farm for Google or a supercomputer for studying the weather), so much heat is generated that cooling the can become a major challenge. Indeed, many companies have looked to place large computer farms in cold places like Iceland and Russia, where the natural environment is much colder and the heat can be more easily dispersed.

In this project, we are trying to find a relationship between the number of operations performed by a computer and the subsequent amount of heat produced. This in turn will help us to calculate how much cooling power will be needed to keep the computer core and processing units at a safe temperature. The project makes use of two different LabVIEW Vis; one that relates the number of operations being performed by the computer to the amount of heat produced; and one that relates the heat produced to the cooling required. Different tasks and operations will be performed on the computer and thermal infrared sensor will detect the amount of heat being produced by the computer. The heat readings will then be used to send signals to the motor of an external cooling device and the speed of the motor will be proportional to the amount of heat produced.

The results of this project will help us calculate how the number of the task, or the intensity of a given task affect the computer and its inner components and how they can be kept at a safe temperature at all times. The results can also be scaled to estimate how much is produced by supercomputers and subsequently, how much cooling power will be needed to keep them at a safe temperature.



External cooling device

Thermal infrared sensor

Instant Global Money Transfer – A Paradigm Shift in Money Transfer Technology

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ABSTRACT

The global remittance volumes have crossed $800 Billion in December 2011. United Arab Emirates (U.A.E) has more than 75% expatriate population. UAE boasts of a hi-tech wage protection system deployed and is the third largest remitter worldwide. Most leading international money transfer operators like Western Union, MoneyGram, Coin Star, etc. are having their presence in U.A.E and elsewhere in GCC. This presence is with a view of dominant expatriate population who traditionally repatriate approximately 50% of their monthly earnings to their beloved ones in their home countries. Existing style of remittance involves the remitter walking into one of the exchange or money transfer outlets where the remitter has to handover physical cash with the beneficiary contact details. The money exchange or the transfer agent uses one of the transfer platforms provided by likes of Western Union to send transfer instructions to the beneficiary country money changer. Though sufficient controls are built to mitigate money laundering; there is every possibility of camouflaging dirty money (terror money, drug money, etc.) transactions as clean transactions. The paper presents new methods using cutting edge technology to provide instant global transfers. The proposed new methods will be more secure & minimize money laundering by usage of established formal channels like banking distribution network and money exchanges companies, and by congregating the methods such as - communication, banking, e-Commerce, modern authentication and other remittance technologies. Such proposed applications employs would e-Wallet, Pre Charged cards, Debit/ Credit cards etc. which can be used by deploying a customized application in the ATM/CDM/kiosk machines for ubiquitous usage as well as using smart phones or internet from the comfort of their home. A systematically established cross border relationship amongst the banks & exchange houses will allow anytime money withdrawal by the beneficiary, using local ATMs, or have their debit/credit cards charged in their country and also by means of “E Top Up” of their smart phones which can be subsequently cashed. This will bring a paradigm shift in remitting technology as the use physical cash will gradually be eliminated. This technology is currently in conceptual stage and work is being done to verify feasibility in its implementation and other issues.

This paper presents the mapping of the proposed technological concept of Instant Global Money Transfer to the existing eCommerce business model framework. The e-Commerce business model framework consists of eight ingredients namely Value Proposition, Revenue Model, Market Opportunity, Competitive Environment, Competitive Advantage, Market Strategy, Organizational Development and Management Team. The proposed concept of Instant Global Money Transfer has been presented in terms of the eight ingredients mentioned above.

Two-Dimensional Gait Analysis based on Color Detection and Image Processing

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ABSTRACT

Gait analysis is the systematic measurement, description, and assessment of quantities that characterize human locomotion, more simply it is the evaluation of a subject's walking pattern.

Gait analysis has been found to be of great value in many areas, especially cerebral palsy, in which assessment of locomotion, is very useful for preoperative assessment and documentation, operative planning, and postoperative evaluation. In addition, Gait analysis is useful for evaluating the effectiveness of prosthetic limbs, including their alignment, design, and performance, and for assessing orthotic designs and modifications. Furthermore, Gait analysis is used to assess, plan, and treat individuals with conditions affecting their ability to walk.

To acquire data, measuring devices such as active or passive reflective markers, electrodes, or foot switches or a combination of these, are attached to the subject, and force-plates are built into the floor of the laboratory. Tracking systems include videotaping. electromyography telemetry and optical detection of active or passive markers with use of specialized cameras, information from which is automatically digitized and fed to a computer. The data collector and reducer is the computer system and its algorithms.

Our approach is based on "colored joint detection» in which the subject wear a black uniform with different colored markers placed on each joint. Video recording of that person walking is performed and stored into a personal computer. Each video frame is processed to capture the colored markers placed on each joint, and then extract positions in each frame. Computations all the gait components are performed. Different image processing techniques are implemented in MATLAB to produce our final output of gait cycles. These techniques include color detection, edge detection and boundary determination. The description of those algorithms well be described and explained in this project.

In addition, computation time and computation complexity are also presented. The current method provides a simple, cheap, and accurate way of extracting gait data. some examples of the obtained result are shown below.

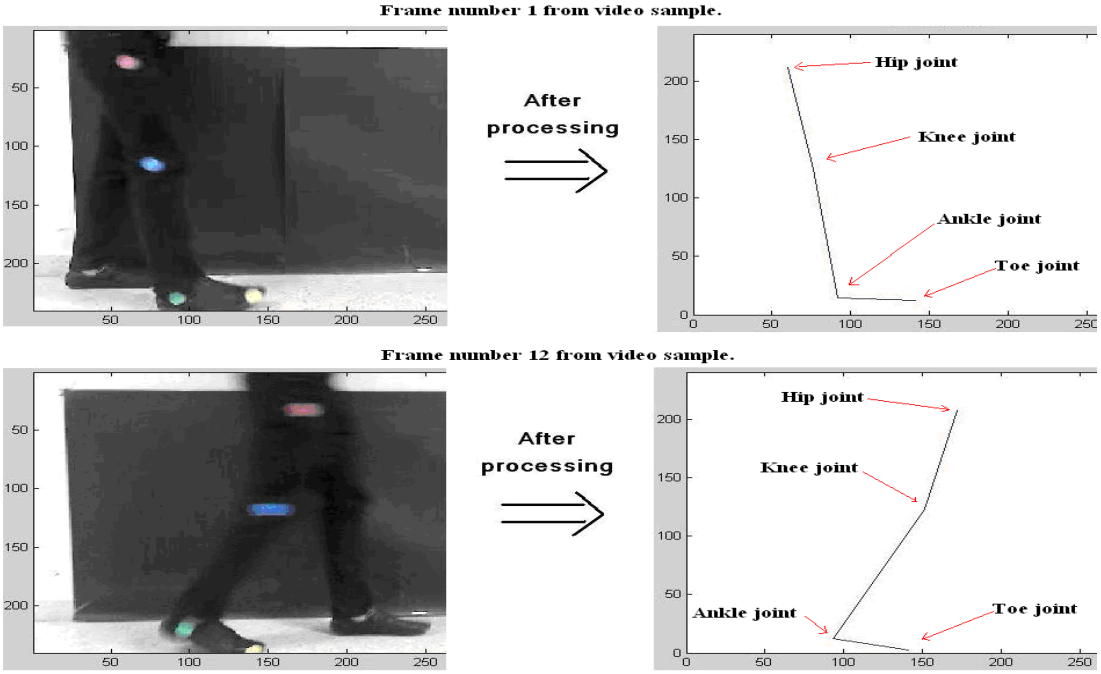

Figure1: Examples of the obtained results.

Knowledge Repository Model for Intangible Heritage of Northern Iraq "Kurdish People"

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Supervised by
Dr. Oras F. Baker

ABSTRACT

Cultural heritage is identity of any country, nation, community or group of people. Intangible culture is a common expression, practice, knowledge, skill or representation in the community. This intangible cultural heritage passes from a generation to generation as inheritance. Since it is intangible, then the only continuity of this inheritance is in memories of its performers. However, cultural heritages can only continue if people have the appropriate conditions to produce and re-create them. This study tries to identify the factors of contributing archiving intangible heritage for Kurdish people. Then a repository model is developed to demonstrate archiving intangible cultural heritage via Information and Communication Technology exploitation. A web based application model will be developed using web2 technology.

This region is rapidly developing that many factors are affecting the intangible cultural heritage of Northern Iraq Among these factors are modernization, globalization, mass media, internet and international educational institutions. In the 2003, UNESCO Convention it is made obvious that Intangible Heritage is endangered and needs safeguarding.

This standard model as a kick-start of intangible study and also as guidelines for culture institution in the region to archiving their intangible heritage and make it available for researcher and the future generations.

This research is an exploratory study on proposing knowledge repository model for intangible culture heritage of Kurdistan preservation. Hence this study will provide the fundamentals for further research on intangible heritage in this region. It will elaborate on the culture in Kurdistan and exploring different segments of intangible heritage in Kurdistan. The result of this research will be new knowledge regarding archiving intangible heritage and useful indicator to take into account in preserving intangible heritage or intangible study. The outcome of this research will allow preserving the intangible heritage in a proper manner, and as well as a user guide systematically in archiving the heritage based on ICT perspective. For this purpose interview is inducted to collect data from experts and senior citizens. As a result it was found that many participants have valuable intangible heritages items to be archived. As this is an exploratory study, therefore this is the main reason why we have chosen to carry out the research in this area, and this will underscore the importance and the novelty of this research. There are no similar studies about intangible cultural heritage preservation in Kurdistan region, it is unique, and not only in Northern Iraq may be in all of Iraq. As this region contains many cultures with a very rich history that needs to be preserved before it is lost, this study will ignite the start of cultural preservation in Northern Iraq region. Consequently, this will raise awareness about cultural heritage being endangered in the region. The main objectives of this paper are to analyse preservation and ensuring the continuity and continued relevance of intangible culture heritage in the community using ICT technology, and to develop knowledge repository model of Northern Iraq Intangible Culture and Heritage.

Gesture Recognition & Manipulation in Phone Applications for Projected Surfaces (GRAS)

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ABSTRACT

People evolved our millions of years to sense the world around them, through which they perceive the information around them using their five natural senses. Although they mineralization of the computing devices allows us to carry computing devices in our project, keeping us connected to our digital world, there is no link between our devices and our interactions with the physical world.

Our project focuses on facilitating this interaction by gives a direct link between the digital world and our physical interaction with the real world. Gesture recognition & manipulation in phone applications for projected surfaces (GRAS) is a wearable gestural interface that arguments the physical world around us with digital information and lets us use natural hand gestures to interact with that information. The system is been modified and geared towards applications like: capturing & manipulating thermal images at hospitals in a portable manner where they get immediately stored on the phone memory. Another application is customizing architectural CAD designs via hand gesture recognition (This is intended for enhancing the way students perceive instructions on the basics in their introductory design courses). The latter application will enhance the way through which students perceive the model and interactively generate and amend sequence of modules for a project in an immersive environment.

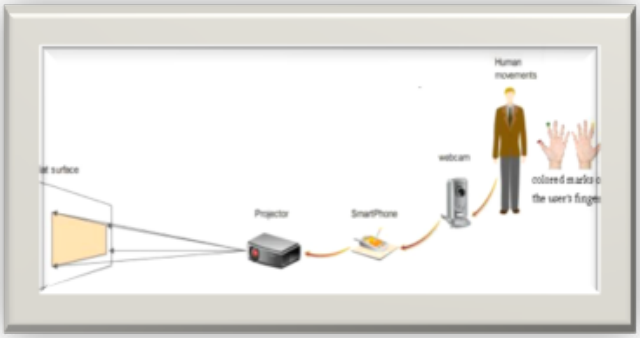

Figure 1: Architectural diagram of the proposed solution

The project prototype is comprised of packet projector (laser or L.E.D projector), a mirror, colored marker or infrared pens, a mobile computing device, a camera with fine resolution and a Thermal Cam for Thermal images. The camera, mirror and projector are connected wirelessly to Bluetooth Smartphone device that can easily fit into the user's pocket. The Phone application then processes the data that is collected by the capturing device and produce analysis. The projector projects visual information enabling surfaces, walls and physical objects around us to be used as interfaces; while the camera recognizes and tracks user's hand gestures and physical objects using computer-vision based techniques.

Application equipments contain from colored markers on the user's fingers are recognized with colored tapes on them by the camera. The camera captures the user in view and tracks his hand gestures, then sends the data to the smart phone which processes the video data, to identify the object. Where there will be a tiny projector (with a mirror) displays data sent from the smart phone on any surface in view like wall, or person. Just put the last paragraph before the one before it so it becomes the one before last and then send

The software program processes the video stream data captured by the camera and tracks the locations of the colored markers at the tip of the user's fingers using simple computer-vision techniques. The movements and arrangements of these fiducials are interpreted into gestures that act as interaction instructions for the projected application interfaces. The maximum number of tracked fingers is only constrained by the number of unique fiducials, thus GRAS also supports multi- touch and multi-user interaction inherited from phone features, but on a more flexible projected surface.

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Password Management System

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ABSTRACT

Recent developments in the technical field led to the observed expansion in the provision of services such as many sites provide services requiring passwords protection. So, the beneficiaries of such sites users must remember many passwords when they visit to these web pages/sites. It is highly recommended for the users to select a strong password that includes mixed combination of numbers and letters that should not contain personal information. For security reason, we suggest not to write password on paper or note, where it is easy to be seen by Intruders. Remembering all these passwords and link each one of them to the specific service seems to be hard. A solution we are establishing a system that controls all these passwords and make it easy to use.

We did not find any project similar to ours providing comprehensive solution of the said problem mentioned above. The main weakness, that of existing programs, is unavailability information for users, so they cannot reach to their information from anywhere in case they need it. Some examples of these types of programs are (KeePass program).

What we plan to do in our project is to introduce a system that provides possibilities and characteristics that helps users to protect their information. Our goal has been to preserve users information and privacy and make it easy to store and retrieve whenever the users need them. Therefor, our program will assist users to remember one password instead of multiple passwords. We will use advance tools that are appropriate to solve these issues that we mentioned, by using different type of technologies such as (Secure Network, Database, Security, Mobile tech., programming) and strong technique in encryption, which is the RSA algorithm.

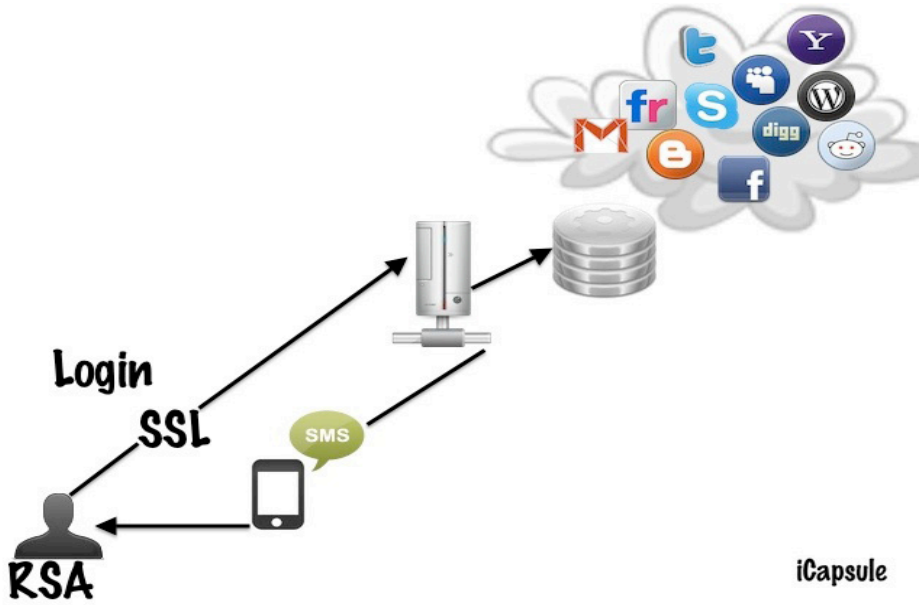

Figure 1: System Architecture

We did the first prototype, which introduces the interface of the system. For the Second Prototype, we connected the interface with the database and created the registration and login action. In third prototype on which we are working, we will include the RSA algorithm for encrypting the information in the system and we will include the SMS codes for login validation.

PSCW Toastmasters Club Management System

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ABSTRACT

The increasing need for information processing has caused information systems to become an essential part of everyday life. They have become the driving force behind the success and growth of institutions as they are aimed to solving business problems. As information system analysts, our role is to investigate where problems are and attempt to solve them through an information system. This information system manages the Toastmasters Club at Prince Sultan University College for Women (PSCW).

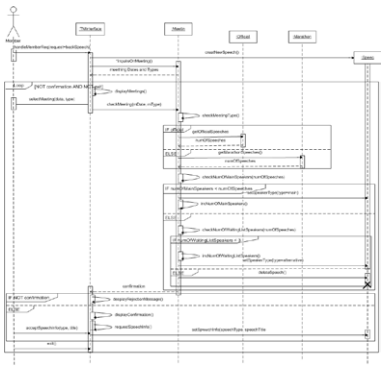
Toastmasters International is a nonprofit organization specialized in enhancing public speaking and leadership skills of its members and has grown to become a world leader in helping individuals become more competent in front of audience. Established as a major club at PSCW, Toastmasters (TM) Club objectives complement PSU's mission of promoting lifelong learning and enhancing students' career opportunities through the acquisition of practical knowledge and communication skills. Participants develop skills by giving prepared speeches or impromptus filling meeting roles. Moreover, members may become officers and hold management positions in the club executive committee.

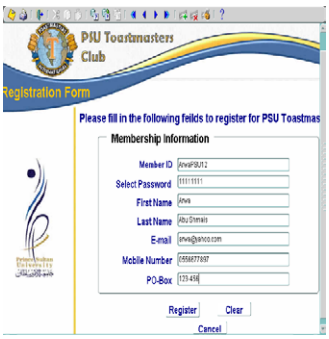
As members and later on officers of PSCW TM Club, we recognized difficulty for members to communicate and keep track of their progress in the club. In addition, officers themselves were unable to track members and faced much difficulty in assigning roles and preparing club meetings. Members and officers felt isolated and lacked access to the vital information they needed to function efficiently. Therefore, we decided to develop a system for managing club activities.

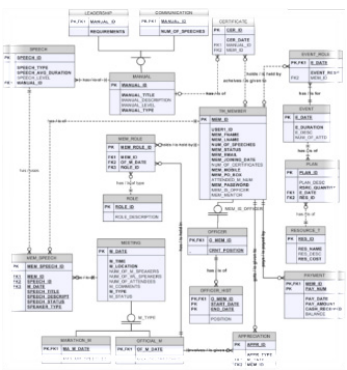
Through interviews and surveys targeting club members and officers, we were able to gain sufficient understanding of the current procedures and desired features of the proposed system. Then, we came up with a set of system functionalities which we discussed and validated with potential users. In general, the system will enable the officers to organize meetings, update membership profiles, and fulfill their roles efficiently. Members will be able to track their progress and share their knowledge and speeches. Moreover, the database of the proposed system will keep up-to-date information of all members and meetings and will help managing membership processes by adding and removing members or updating their profiles.

After getting consent for the functionalities and user interface from the users, the analysis and design phase began. The analysis and design of the system was carried out in two parts. We first applied a function-oriented approach by modeling with Data Flow Diagrams and structure chats. In the second part, we took the design to another level by rethinking the system in object-oriented concepts and modeling use cases, class diagram and sequence diagrams.

Finally, we started the implementation of the system using Oracle 10g-SQLPlus for building the database and Forms Developer for designing the user interface. We met specifications by writing advanced SQL and PL-SQL queries and implementing them in the user interface. This project was targeted towards achieving the most efficient design for a system to manage PSCW TM Club. The implementation was only partial to get the feel of the functional system and is still to be continued in the future.







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MATLAB Modeling and Simulation of Photovoltaic Modules

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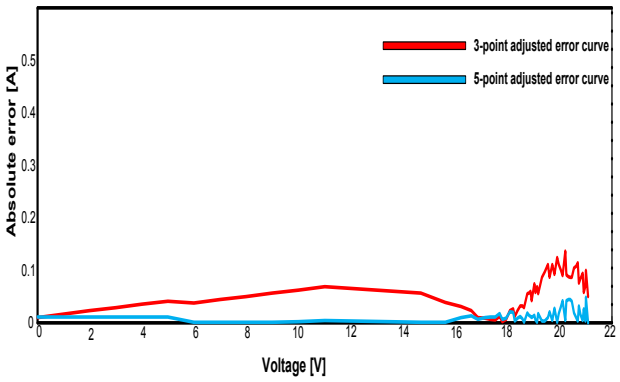
ABSTRACT

The direct conversion of sunlight into electricity can be done using PV systems. Lately, many researchers have investigated this topic showing how promising this field might be. Learning the basics of the PV system is stepping stone to carry out a PV model. Manufacturers of PV modules provide only a few experimental data regarding the electrical and thermal characteristics of these modules. The parameters provided in the PV datasheets, which are obtained under nominal conditions of temperature and solar irradiation, are not enough to build an accurate PV circuit model with any circuit simulator using basic math blocks. Therefore, a modeling method should be investigated that would find the rest of these parameters in order to obtain the desired PV model using any circuit simulator. Different techniques have been developed in the literature regarding this issue. One particular method finds the non-linear equation parameters by adjusting the I-V curve at three remarkable points: the open circuit voltage, the short circuit current, and the maximum power point [1]. Three models will be investigated using this technique namely, the single-diode model, the two-diode model, and the three-diode model. The developed models will be suitable to simulate several homogenous or/and heterogeneous PV cells or PV panels connected in series or/and parallel. An evaluation study of the accuracy of these three models will be carried out in order to obtain the best possible results.

MODELING

The modeling of the three models is implemented by finding the unknown parameters in the nonlinear I-V equation using the three remarkable points [1]. The parameters to be found are the light current (I_L), the saturation current (I_o), the ideality factor (n), the series and shunt resistances (R_s, R_{sh}). For the two-diode and three-diode models, the saturation currents of all diodes are set to be equal [2] for fast computations. Furthermore, the accuracy of each model was obtained by comparing the parameters obtained from the modeling algorithm with the experimental data of a specific module. An improvement of the accuracy of the model was done through adjusting the I-V curve to more than three points depending on the number of unknowns in each model [3].



The error curve of the single-diode model

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Smart Parking System Using RFID

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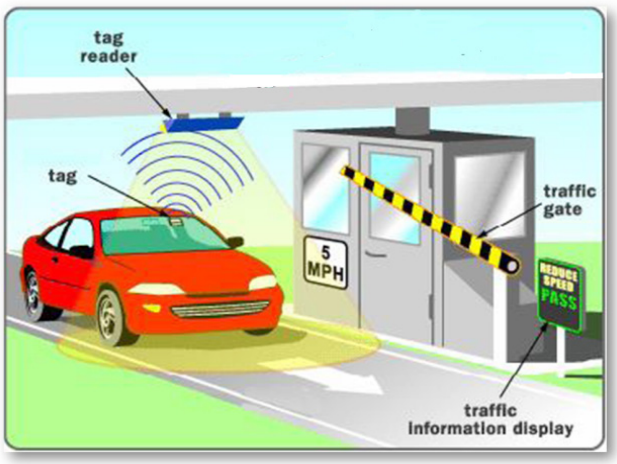
ABSTRACT

Finding a parking for your car is a headache especially when you are going to a place that you know about its difficulties to find a suitable area to park your car. One of the reasons that made these difficulties is that the number of cars is over the parking capacity, this leads to make drivers park their cars randomly, and difficulties of car flows will arise especially at peak times of morning and afternoon. The use of smart parking solution will help in reducing these problems and will help drivers know where to park their cars in a smooth way. With smart parking solution image processing will be used to identify free spaces. A display terminal will be fixed in parking gate to show the recommended parking available and its destination and direction. The parking problem is addressed by using Radio frequency identification (RFID) technology with a control system to identify which of the parking slots is available to park the incoming cars. Tag number is allocated at each driver and RFID device will be placed of the entry point parking area. It will read the tags until maximum limit of parking capacity is reached. In addition, parking area will appear in the graphical user interface (GUI) terminal. A driver can query the status of the position and number of available parking slots using interactive Short Message Service (SMS) and the driver will know the specific available position through image processing technique using a fixed camera. The result of the system will be avoid overcrowded and random parking inside the parking area then the number of car will equal the number of parking areas no more .

By these steps the system will lead us to the solution:

1) The driver should be registered in the parking system database of the organization.
2) The driver will be given “Tag” from the data entry of the parking system area.
3) RFID technology will be used at the entrance to the parking area of the organization to control the capacity.
4) When reading the” TAG” by the reader there are two cases:
   a) Allowed (if there is available area to park).
   b) Not allowed (if there is no available area to park).
5) Providing graphical user interface (GUI) screen” before the entrance of parking area so that the driver will know the situation before entering into the domain of RFID.
6) Interactive SMS to show and provide the deriver with the parking situation.



System Architecture

SmartCashier: Self-Checkout using RFID Technology

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ABSTRACT

This paper provides an introduction to the multidisciplinary nature of Radio Frequency Identification (RFID) application as well as the complexity of radio frequency (RF) and data exchange for RFID-associated data. We propose the use of Self-Checkout using RFID Technology. Now with the noticed improvement in technology and communication, the world has become a small village where the people share information in an easy way. So, the time aspect is more important than ever and the people care about saving each and every second. Of course, everybody has been to markets in order to buy some items such as cloths, food, etc therefore the customer needs to find an empty cashier to complete the purchase process. The research is focus to fix this problem, here is the problem. There is a lot of time wasted duo to long queues, and effort on the Cashier consumption to deal with all the items one by one. All the existing solutions are using barcode technology to characterize by using a unique set of integer number for each product or items. This unique number is kept to restore the data of the products by passing the item's barcode to a code reader. This step is rebated until the last item in the cart, and the system will calculate the total price. The research will implement RFID technology in order to replace the current system's. will help to reduce the waiting time. With this system, customers fill their carts as usual, but instead of going to find an open cashier, they walk past an RFID reader gates on their way out the door. The reader reads all of items in the cart in a matter of seconds, and the customer pay the total amount to the cashier worker and gets the receipt and resource saving.

The proposed solution is designed and implemented by using UHF-RW-MP-232-V1 RFID reader. Therefore, the proposed system for the Smart Cashier includes tagged objects (Items), read object (RFID-Reader) and the computing system is implemented using Java platform. Different resources are needed such as RFID-kit (Reader and Tags) as well as associated items like ID-tags that will contain information about products. The reader will be embedded and installed at the gate. The installed hardware with the related software and database is used to handle this situation when the cart move through the gate. The reader sends UHF "Ultra High Frequency" radio waves to the tag (Passive-Tag). When the tag receives this signal it will convert it to energy to resend back the signal that will contains information about items. The reader will receive the signal from tag and will process the information by the program then will display the result on a monitor. All these Operations will be done in a matter of seconds.

The Impact of ICT on Women Workforce in Northern Iraq

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Supervised by
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ABSTRACT

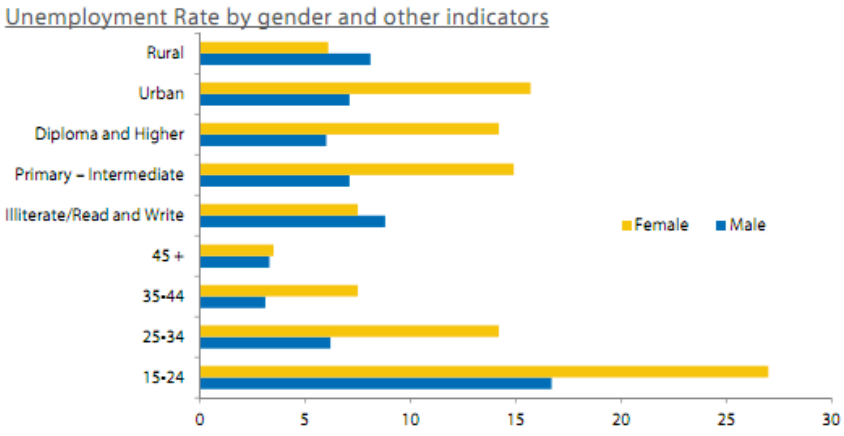
ICT is a highly dynamic field as it keeps changing very rapidly over time. Due to its dynamic nature, the manpower involve in the ICT field need to be trained and retrained to be able to cope with the changes. Women represent 16% of the Iraqi workforce according to official statistics. The empirical findings in this study reveal that the majority of the women employees indicated that they need more training to handle ICT. This study will find out the impacts of the ICT revolution on the women workforce in Northern Iraq.

Like elsewhere in the world today, Iraqis are opening up to the idea of ICT technology. Iraq citizens have begun to experience the reality of the Information age, whether they realize it or not. However, the main problem IT companies in Iraq and the government will face is the shortage of manpower in deploying new ICT technology. This is because ICT technology keeps changing; companies in Iraq will have to find skilled ICT staffs that can assess to meet the challenge of this fast emerging filed. The objective of this research is to examine the impact of information technology on women's employment in Northern Iraq and to investigate the factors that affect women participation in the Information technology in Northern Iraq region in particular based of some assumption and findings in previous works. Northern Iraq now in developing process and information technology is an area that has been newly introduced in the region. There is a large gap between men and women workforce in Northern Iraq and this have a significant impact on Job inequality and job offers for women as many of businesses, private sectors and even public sectors asks for good and highly skilled workers in technology.

And while more women are entering professional sectors, this is largely restricted to nursing and the teaching professions. However, without the adequate and skilled human resources the implementation of Information Technology in all sectors will lead to failure. Recognizing this fact, for developing countries like Iraq, the development of human resources is as critical as acquiring the hardware, software and other systems components in order to utilise the full potential of Information Technology for the nation to progress.

A survey was conducted and based on the response of the survey; it was found that lack of knowledge, skill and difficulties in keeping up with the technology is the main problem to implement ICT. Furthermore not all organisations and ministries provide training to their employees. Therefore, it is recommended that every organisation have a structured training program that follows a planned training guideline, as the acquisition of specific skills in ICT is essential. Thus, it is hoped that training guidelines will be formulated by the organisations involved and the related agencies.

According to The Iraq Knowledge Network (IKN) which is a survey that has been done by Ministry of planning, if we look at the unemployment rate of men and women we can see that there is a large gap between them. . The total number of employees in Iraq is 7.3 million. Females comprise 15 percent of all workers.(Ministry of Planning.2011). Below figure is the unemployment rate by different indicators.



Geographic Information Systems as a Supporting Tool for Erbil City Tourism Industry

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ABSTRACT

Geographic Information Systems (GIS) is now acknowledged broadly as an important tool for managing, analysing, and displaying large volumes of data relevant to all kind of life activities. Tourism is one of the world's largest industries and has historically been an early adopter of new technology. GIS is a computer based tool for mapping, GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes, and planning strategies.

For the past two decades Northern Iraq region have been witnessing a revolutionised development almost in all aspects of life socially, economically and technologically. The technology using in this region is growing day by day, Both tourism and IT increasingly provide strategic opportunities and powerful tools for economic growth, redistribution of wealth and development of equity around the country, Erbil city as the capital of Northern Iraq region has witnessed a tremendous changes and tourism is one of the effective factors that played crucial role in the economic improvement in the city. GIS applications in tourism have been confined to recreational facility inventory, visitor impact assessment, and recreation-wildlife conflict; and have been limited by lack of funding, and uncoordinated and ad hoc data collection procedures. Due to the complex nature of tourism planning issues and facility providing, the potential of GIS in resolving these issues is increasingly acknowledged. This paper will discuss some of the problems and potential of GIS applications in tourism planning and services providing in Erbil City and will discuss some methodological limitations in applying GIS in tourism; and identify some potential areas of applications in Northern Iraq , finally we propose a web based system to promote the development, standardization, dissemination and sharing of GIS data at national, sub regional, and regional levels through appropriate information networks and infrastructures.

Generally, In this research we concludes that; The significant value of GIS technology therefore, is in its ability to provide desk-top mapping through the graphical display and manipulation of data in order to identify patterns or relationships based on particular criteria. In this way enhanced (value-added) information about tourist attraction and placeless in Erbil becomes available for further analysis or to assist in a decision-making process for the tourist as well as for the local people in the city. GIS applications in this field will grow significantly and that will result in enhancing both the quality and the quantity of services provided to the tourists and as Tourism is an activity highly dependent on environmental resources. The strength of tourism industry in Iraq can be enhanced by GIS applications.

Moving Objects Database for University Buses Location-Tracker

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ABSTRACT

In the past three decades, Object oriented databases had grown widely, opening a new horizon for different categories of applications; one of the most important among them is Moving Objects Databases that enabled as well a very wide variety of applications.

A moving objects database is a database that can represent and query moving objects as their location changes over time continuously, but according to the limitations and gaps of the current database management systems, it is required to create a Special database that can handle the essential properties of Moving Objects; like the Spatio-temporal property. And this was somehow facilitated by Object Oriented Databases.

Classical database are suitable for a relatively small business application E.g. a relational data model for a company that stores simple information (employees names, ID numbers, addresses, business transactions...etc.) with non-advanced data types (integers, float, characters). So in order to widen the scope of the database to include new data types; images, geographic maps, music, videos, data from scientific experiments, meteorological measurements, and to include a wider range of queries; Retrieve images containing shapes similar to a given one, to formulate those queries in a simpler manner and to process them efficiently, an extension to the data model and the query language is needed.

This idea of the project was mainly derived and triggered from the multiple occurrences of the same situation; where many university students miss the shuttle buses because they don't know the exact time of arrival of the buses, since the buses might be hindered by the traffic jam or any other circumstances that might occur in the road from/to the university. And this would be accomplished by creating a MODB that receives information from a bus tracking software and updates the stored data within automatically.

It is expected from this project to satisfy its purpose by solving the problem that faces many of the university students, and not only The British University in Egypt, has it served many other universities in Cairo and the other cities. This will be accomplished by creating software that helps in solving the problem and creating a database that stores all the information obtained by the software, and also satisfies the requirements needed by software and the type of data that will be stored in this database, and this is the main scope of the project. Additionally, the objectives are not only limited to the previously mentioned ones, the idea behind this project is more educational; in which it provokes the creation of something challenging that requires loads of research, hard work and creativity to be achieved.

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Private Cloud Load Balancer (CLB)

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ABSTRACT

Current software are more demanding than it used to be and current platforms aren't capable of running them while maintaining a reasonable level of performance. Low performance platform and outdated hardware are the two main reason why they can't run today's software which lead to a noticeable latency regarding response time, on the other hand some software need specific requirement to be fulfilled, such as add extra memory. While it may be an obvious solution to just upgrade whenever needed; it is unfeasible solution due to its cost implication. Therefore a need for a feasible and scalable solution arises and must be answered.

Some of the common existing solutions as discussed above include upgrading the current system, grid computational [1] and use of public cloud [2].

In our approach to solve the problem mentioned above, we are going to use a Load Balancer application inside private cloud architecture to achieve a less processing time and a more cost efficient solution.

Using simulation for data to analyze results and compare it between varieties of situations according to our solution. In this solution there are some important variables we have to control, which make the difference in processing time i.e. the size of program and running time. We will setup as an experiment a dummy 8 loops "jobs" program "task" to simulate demanding software. After every set of time our application (the Balancer) will take 25% of the entire task. If the client device does not finish processing all the tasks by its own, it will get the cloud assist in processing the remaining task. Having a server at one side and the clients at the other side is the first step towards the Cloud structure. The aim of our project is not just to setup this structure but to balance the load between the servers and the client by using a Round Robin Algorithm to evenly distribute the processor time at server side, among the software accessing it (from more than single client). while using client's processor to take some of the load for maximum usage of the two processors. A flow chart is given in Figure 1 to demonstrate the mechanism behind the load balancer after connecting with the server "cloud" through a client's profile.

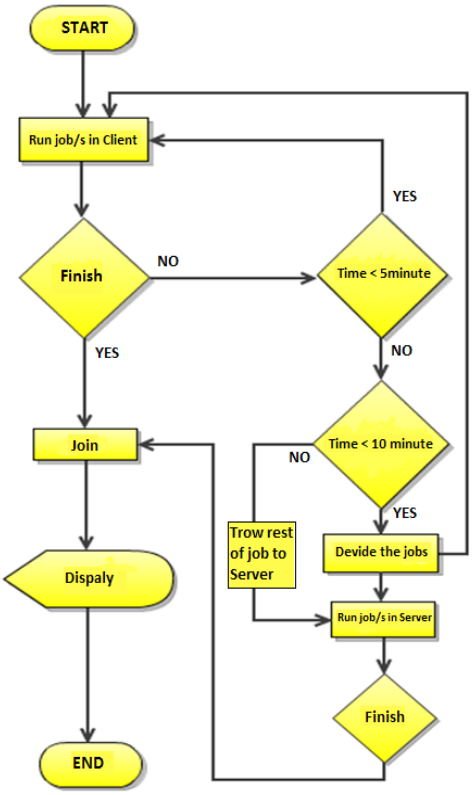

Figure 1

References:

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2) Load Balancing in Cloud Computing System by "Ram Prasad Padhy & P Goutam Prasad Rao".

Automatic Detection of Accidents with Street Light Bar System

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ABSTRACT

Government assets are very important to be protected from damages. As a result, the Saudi government has a manual strategy to check the assets and monitor them which leads for long process and efforts. They reported that most damages of government assets caused by car accidents and street light bars have the highest percentage. Two cases are formed for car accidents with light bar. First, the driver escapes after he knocks a street light bar which cost the government to pay for fixing of the light bar damage or changing it. Second, the driver waits the police officer to come and register the accident case. Most drivers in Saudi Arabia have complains about after accident producers. They informed that they had to wait for police officers for a long time. Sometimes they could not describe the location of the accident correctly to the police station and paper based procedures took a long time which irked the drivers. These are the main motivations for building a system that will detect car accidents with street light bars and notify the police station system automatically.

In 2011, there are approximately 100 cases of accidents with the light bars in Jeddah. 40% of them are recorded as anonymous. Statistics shows that, 5% of the accidents cause slight damages and 1% causes complete damages. For the anonymous cases, it costs the government from 80,000 SR to 100,000 SR each year. The municipality employs employees for periodical tours around the city twice a day to check the street light bars conditions. The checking process requires incur operation and maintenance cost for transportation.

Automatic detection of accidents with street light bar system is a system for monitoring and managing the accidents related to light bars on the streets via digital camera network that are connected with light bar sensors. Automatic detection will be enable to detect the driver who caused the accident and responsible for the cost of damage. In addition, automatic monitoring of light bars will eliminate the manual checking process that will reduce the governmental extra costs. Indirect profitability will be increased because the government will enforce any one cause damages to the asset to pay the damages. The indirect benefit of the system is minimizing the fast drives which lead to minimize the accidents with light bars.

The system needs sensors and digital cams that connected to the municipality system through fiber network. First, to detect the accident vibration sensors at the top of each light bar will be needed. Second, these sensors are connected to cameras placed on the roads in each direction. Once the car knocks the light bar, the sensor will send alert to the cameras to capture the car's plate number and the whole scene of the accident and send it to the police station system. Automatic accident identification will be created and from the plate number image the driver's information will be extracted from data base. After that, Municipality employee evaluates the accident and estimates the charges for the damages. Finally, an SMS will be sent to the driver's phone number that contains an accident ID with the cost of damages. The architecture of the proposed system is shown on figure 1.

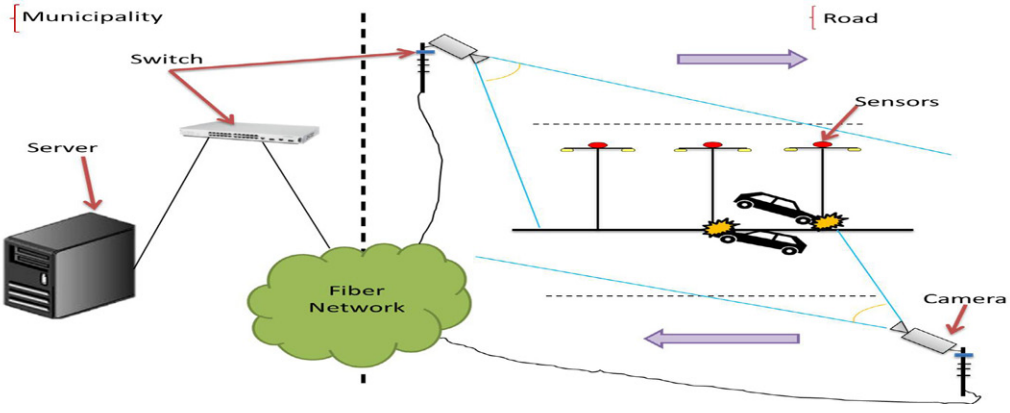

Figure 1: Architecture of Automatic Detection System

Autonomous Path Following Robot

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ABSTRACT

The dependency on robots has undoubtedly increased sharply in the past, and it is expected to increase in future. In the last couple of decades, it has become extremely difficult for businesses to manufacture and assemble their products competitively without the use of robots. Special function robots are built to accomplish specific task in order to meet the requirements of a particular business. Accordingly, robots could be found in many application areas, for example, robots are used in the airport baggage handling systems; they are used in the production lines of many products, and also are sometimes used in hospitals the operation theaters.

Robot is a device that includes a very smart system which is embedded inside the robot's body; this smart embedded system acts as the robot's brain, and is used to control the robot's body in order to make it accomplish specific tasks required by specific business field. The autonomous path following robot is a robot that has an embedded system mounted inside its body, just like any other robot, however, this smart embedded system controls the robot's body in order to make it follow different kinds of tracks.

The objective of this project is to build a robot that has the ability to follow different shapes of tracks with the highest accuracy possible and at the maximum possible speed. What are meant by different shapes of tracks are the loops or the circuits that the robot follows during its journey to the finishing point. There are many options on how to build tracks for line following robots, one very common option is to use a masking tape, with a given colour, mounted on a ground with a different colour than the masking tape's colour (i.e. white line on a black floor, and vice versa). Some of the tracks could be easy and simple to follow, such as circle-shaped or square-shaped tracks, while others could be extremely difficult and complex to follow. Complex tracks may consist of turnings that have an angle of less than $90°90°$ degrees. Complex tracks could also include a two lines intersection, which may confuse the robot on which decision to make and which path to follow.

The system incorporates a collection of units such as; firstly, appropriate sensors i.e. an infrared or light sensors, which act as inputs into the system, secondly, suitable motors with the required specifications that meet the project's requirements such as speed and accuracy, thirdly, smart algorithm is developed in order to control the processor, which acts as the system's brain and leads the information processing circuitry, however, the processor receives, via it's inputs (sensors), the required information regarding the configuration of the line underneath the robot, then, the robot makes the correct calculations and decisions for managing the robot's behavior, after that, based on the results of the calculations made, the processor sends commands to the motors so as to change its speed to the desired value and to accomplish the required turnings with the highest speed and accuracy as possible.

Leveraging Online Social Networks for a Real-time Malware Alerting System

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ABSTRACT

1. Introduction

Online social networks (OSNs), such as Twitter and Facebook, allow users to post relatively short update messages online. Users usually post messages reporting on their activities, or even on their feelings. With OSNs' users reaching hundreds of millions around the globe, their update messages, although are radically very diverse in topics, represent a fertile environment for mining useful information. Previous studies exploited OSNs to obtain early alerts about earthquakes, to infer websites and online services availability, and to predict stock market moves.

In this project, we utilize OSNs to alarm against the spread of new malware attacks, such as viruses, worms, or Trojan horses. Currently, network administrators and operators use manual and traditional ways of communication, such as phones and e-mails, to warn one another against such attacks. Instead, we build an automatic platform that mines Twitter posts to provide real-time alerts of malware propagation.

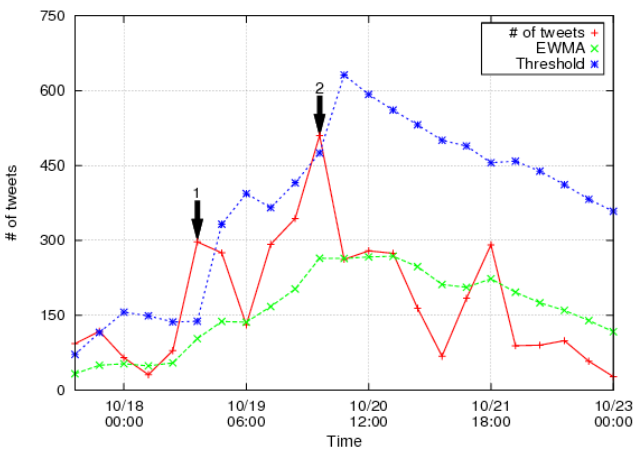
2. System Overview

This social approach of detecting viruses and malware events treats Twitter's data (tweets) as signals that a malware is spreading. The system consists of the following five stages. First, the system uses the Twitter APIs to continuously and periodically collect tweets. With use of the APIs, we retrieve only those tweets containing the three keywords: Malware, Cyber attack, and Backdoor. Twitter results are retrieved in JSON format. Second, the text of each tweet is parsed and stored into a file for next steps. Third, the tweets are filtered to extract only the relevant ones. Even if a tweet includes one of the keywords mentioned earlier, it may not be suitable for detecting malware and virus events happening now. Examples include a tweet such as "Could malware kill QR code?" This and other similar tweets truly include the keyword malware, but they are not useful for the real-time alert system. Therefore, we implemented a simple yet an effective filtering algorithm to extract tweets that are appropriate as event triggers. The idea is simple: we extract the tweets that contain one of the following phrases: computer security, new, discover, hit, infect, warn, and watch out. In the fourth step, we use an Exponentially Weighted Moving Average (EWMA) to further low-pass filter the number of tweets. In addition, we use a an Exponentially Weighted Moving Variance (EWMV) to monitor and to detect the increase/rise in the number of tweets. Finally, a malware alert is triggered when the actual number of tweets exceeds a threshold value that is computed based on both EMWA and EWMV. (Calculations of EWMA, EWMV, and the threshold value are omitted for space constraints.)

3. Representative Results

The figure to the right shows the number of tweets (in red), the EWMA value (in green), and the computed threshold (in blue) for the `Malware' keyword in the period 17–23/10/2011. Our system triggers a malware alert whenever the number of tweets crosses the threshold line:

- Event #1 on 18/10/2011, and
- Event #2 on 20/10/2011.



According to security-related news websites, there were two malwares: Mac malware on 18/10/2011 and a Malware related to Gaddafi's death on 21/10/2011, which both have been correctly detected by our system earlier than those websites' posts.

We obtained other sets of results for the other two terms, `Cyber attack' and `Backdoor', in the same period above, and for the three terms in other time periods that all validate our proposed approach (we do not show these results because of space constraints).

Home Photovoltaic System modelling using MATLAB / SIMULINK

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ABSTRACT

With the increasing awareness of the greenhouse effect, and because fossil fuels are a relatively short-term energy source, these traditional energy sources are being substituted for by renewable energy sources such as wind and solar power. Photovoltaic systems provide an alternative means of achieving the energy requirements of today's society in a manner that is non-polluting, reliable and extremely flexible in terms of its applications. Renewable energy has emerged as a feasible, practicable and sustainable alternative thanks to the increasing amount of interest and research being conducted in the relevant technologies.

In this paper we describe, and investigate the design of a home photovoltaic (PV) system simulation model, for non-technical users through SIMULINK, to simulate the performance of the system taking into account the effect of the irradiance and temperature. The PV cell is represented by a simplified equivalent circuit model as shown in Figure 1 and or by the following equation:

$$I = I_L - I_o\left(exp^{\frac{q(V+I.R_s)}{n.k.T}} - 1\right) - \frac{V + I.R_s}{R_{SH}}$$

Where V and I are the cell voltage and current respectively, IL is the photoelectric current, I0 is the saturation current of the diode, q is the elementary charge 1.6x10-19 Coulombs, k is a constant of value 1.38x10-23J/K, T is the cell temperature in Kelvin, n is the diode ideality factor, and RS and RSH represent the series and shunt resistances.

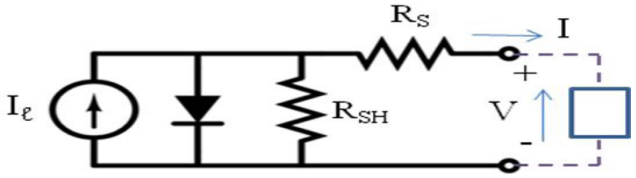

Figure 1: Equivalent Circuit Model for a Photovoltaic Cell

Figure 2 shows the main component of the entire PV system.

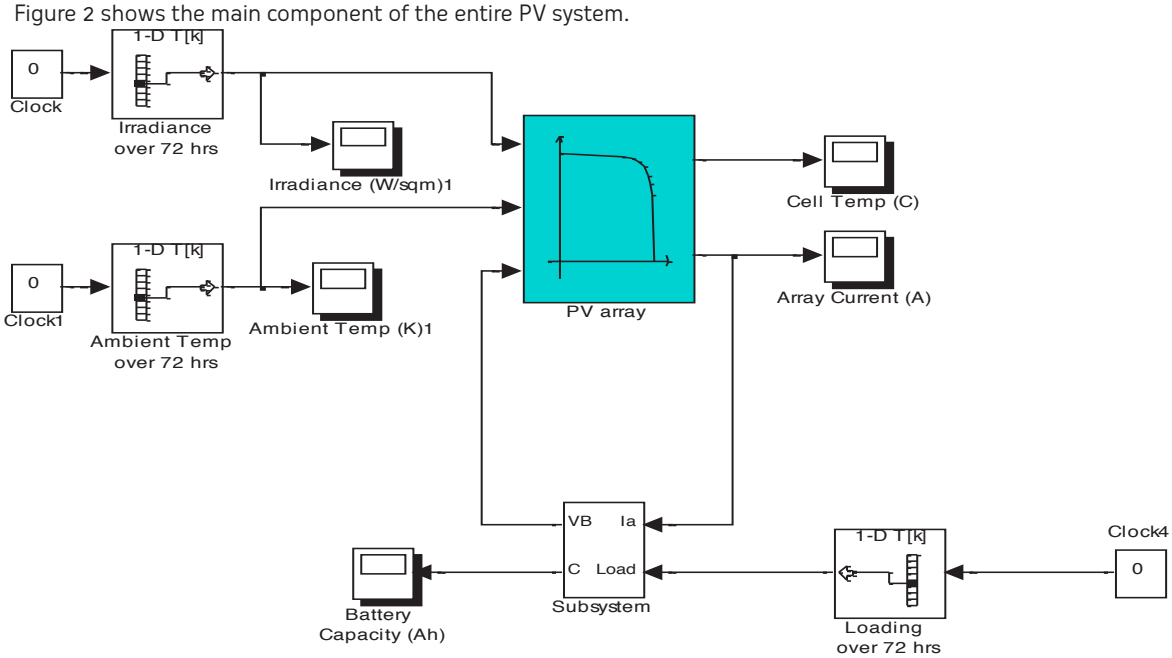

Figure 2: SIMULINK Home PV Simulation model

Electronic Health Records on Virtual Smart Cards

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ABSTRACT

The traditional paper-based approach for patients' information profiling has been found to be practically inefficient in a variety of scenarios. There are several incidents where patients' data have been compromised. Such disastrous cases charged millions in internal investigations, patients' notifications, and compliance expenses. The financial aspects that resulted from these incidents are of high importance; however, a bigger concern is the unauthorized disclosure of patients' personal identities and private information. Moreover, a patient's information profile which is held by paper records of all visits throughout the patient's lifetime can never be portable nor easily accessible. This means a new profile has to be created every time a patient visits a hospital for the first time. Traditional patients' profiling shows evident ineffectiveness is in emergency situations, especially when the patient's life is at stake and he is unable to interact with anyone. In such cases, urgent action must be taken immediately.

Confidentiality, integrity, availability and portability of patient's information are few of many other requirements which are not provided by some of the current solutions available to store and retrieve information. All of the above issues with medical profiling have generated a loud call for faster, safer, portable and more effective alternatives. A solution that transfers and accesses medical record from various repositories securely and at real time is definitely needed. In response to these requirements, our proposal aims to keep patient's medical information electronically, stored in a portable storage media, such as USBs/smartcards, secured by means of powerful and efficient cryptographic tools coupled with strong two-factor authentication (e.g. PIN/fingerprint). Data to be stored mainly would include past doctors' reports with associated scans, analysis and prescriptions in addition to personal and family medical history. An interface application is also provided so that the receptionist or doctor at the hospital can read from and write to the storage media. In this way, the patient can visit any hospital, present his USB/smartcard, to the doctor who, in turn, will read about the past medical status of the patient and append new data about the recent visits as well. Also medical emergency crew, for example, can quickly learn about allergies and current treatments of the patient and hence apply the proper first aids.

Our approach is currently implemented using a USB memory stick to hold encrypted data files. We have an interface application developed in Java programming language with MySQL database, being multi-platform standards. We will be using both symmetric encryption and password/PIN authentication. When the USB is plugged in, the application will run, prompting for PIN. This PIN is set only once when the application executes the first time and in presence of an empty USB. If the authentication succeeds, data stored in the files is ready for decryption and then dumped into the database. The data is now ready for search and retrieval. In case of inserting and updating, data residing in the database will be written into files; those files get re-encrypted and are saved on the USB. The reason behind the use of database approach is mainly to facilitate fast and random access of data rather than the slow linear, sequential, file-based alternative. Our solution is flexible and customizable, thus can be implemented as a smartcard health information application. In the near future, we plan to implement this solution on smartcards. For now the USB is mimicking a smartcard that holds all the patient's information and history but at a later phase we will have all that information on our smartcard where one will be able to read and write back to the smartcard at any time. Patients will simply start to carry smartcards!

Figure 1: Workflow of our electronic health records on virtual smart cards

Contrast Enhancement of Digital Image Based on Fuzzy Logic Algorithm

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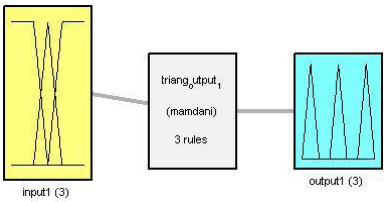
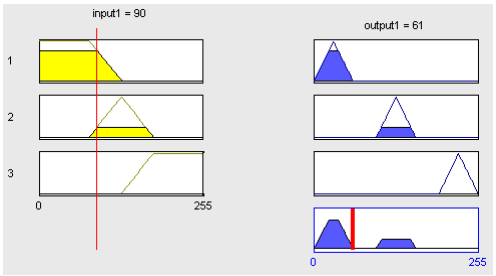
ABSTRACT

Recent developments in the artificial intelligent algorithms (AI) like fuzzy and artificial neural networks algorithms have emerged as promising tools for digital image processing. Digital images are used in several applications; several traditional algorithms have been developed to process the digital image in the spatial and frequency domains but sometimes they do not give good results due to several reasons. Image contrast is one of the important features of the image and sometimes digital image suffers from low contrast due to several reasons and it is important to enhance the contrast of this digital image to improve the quality of this image.

This paper presents contrast enhancement of the digital image which is one of the important processing in the field of digital image processing. The aim of this paper is to design and implement an algorithm based on the Mamdani fuzzy logic algorithm to enhance the contrast of the digital image to make it clearer and sharper than the original image. All the membership functions, rules base and defuzzification method of the fuzzy logic system that are used in the contrast enhancement defined and implemented practically to be used on the real time processing of the contrast of the digital image. The results are compared for different membership functions that are used for the input and the output variables of the fuzzy enhancement system. The effects of each one of the membership functions are explained and the best functions for the contrast enhancement of the digital image are selected. The results show that the digital image processed by the proposed fuzzy system in this paper has been enhanced, its contrast has been increased and the quality of the output image is made better than that of the original one. This processing is very useful in the medical and a space application where the digital image suffers from several problems and the contrast is one of these. All the system software has been implemented using MATLAB package.



Block diagram of the fuzzy system



Rule evaluation when input level of the image is 90

Original image

Contrast enhanced image using fuzzy system

Smart Chef: Cooking Website

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ABSTRACT

As these days we are living our lives in a hurry, we sometimes face scenarios related to cooking when we need a fast and satisfying solution. Sometimes, we do not have too much ingredients or enough time to cook a dish. So, we need to find a way to accomplish and resolve such cases.

One of different helpful solutions is using a web site that contains different recipes to satisfy different people's tastes. So, we created a website that contains many and different recipes, facilitates searching the recipes and gives the user many choices to choose from. It also allows the user to upload his/her own recipes and share them with other people. Moreover, the user can find many helpful cooking tips. Furthermore, the website provides units conversion function.

Figure 1: Smart Chef Homepage

Our website is designed with user friendly interface to serve the user who are interested in or having issues with cooking. The goal of this project is gathering, displaying many recipes, facilitating searching them and simply making cooking easier.

The objectives of the website are: Firstly, finding the cheapest, the fastest, and the lowest calories recipes through sort by lowest cost, least required time and lowest calories function for the recipes. Secondly, searching for a recipe with given name or ingredients through a smart search function, that can find the recipe(s) that contains specific ingredients and/or doesn't contain some others. Also, uploading recipes, adding comments and assessing other recipes can be done through simple steps. Furthermore, each user can have his/her personalized electronic notebook to save the favorite recipes and cooking tips he/she likes. Also, converting units which is very helpful function to convert between the units. Finally, finding many cooking tips by providing a cooking tips section.

Thus, the people who will use our website will be pleased as our website gives them what they need in cooking in a very simple and friendly interface. It will aid them in finding the best recipe to cook based on the people rating, most visited recipes and the recipes that could be made based on given ingredients. In searching by ingredients, the user is able to enter what are the ingredients he/she wants to find them and/or excluding them from recipes' search results. The website will be as an electronic notebook for the users because it allows users to add recipes and cooking tips to their favorites. The website interface is displayed and its functions are working well and similar in the most popular browsers; Mozilla Firefox, Internet Explorer, Chrome, Safari and Opera, and also on most used smart phones.

As a conclusion, the website displays various recipes to satisfy different tastes. It facilitates the searching of recipes and gives the user many choices to choose from. The searching is as simple as opening the fridge and finding the recipe that contains the available ingredients. It allows the users to share their own recipes and cooking tips and save them as favorites. Moreover, the users can convert units used in a recipe.

At the end, we performed different strategies of testing to decide whether the project meets the requirements or not. The most important testing strategy we performed was the user acceptance testing which helped us to confirm that the system is ready for operational use. The results of the testing were satisfying. As Table1 shows, the tasks we asked the participants to perform were mostly with zero errors.

Task#	Average of Errors
Task 1:	0.1
Task 2:	0.1
Task 3:	0
Task 4:	0
Task 5:	0
Task 6:	0
Task 7:	0.1
Task 8:	1.4
Task 9:	0
Task 10:	0.2
Task 11:	0
Task 12:	0

Table 1: The Average of Errors for each task

Contamination Detection System (CO & CO2)

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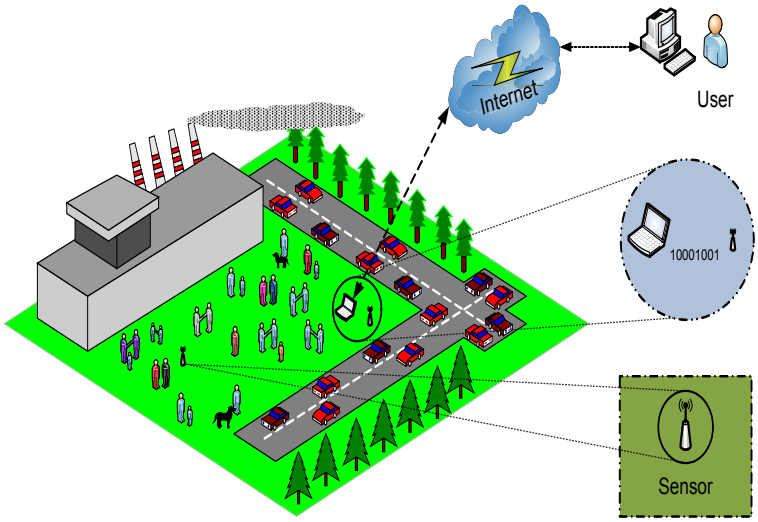
Our responsibility and duty towards society require us to participate in solving problems that we are facing during our daily life. From that perspective, we drove our project idea to help society avoiding the harmful effect of Carbon Monoxide (CO) and Carbon Dioxide (CO2) on the human health. We have searched about health problem that caused by CO and CO2 gasses. Here are some of those problems such as asphyxiation and toxicity. For example, if the ratio of toxicity reaches to 5% that will affect and motivate the respiratory center and if it reaches to 8% it will affect the vision, hand shaking only after incurring to these gases for 5-10 minute, brain acidity.

Regarding existing solutions, we found a similar research that used an infrared CO2 gas detector in the water. We found that this solution is insufficient today since infrared light has a limited range.



Our idea is to implement a wireless sensor network that detects the ratio of CO and CO2 gasses to notify people about places that have a high ratio of these gasses. These ratios of both gasses are calculated during different times to generate an accurate report about the percentage of these gasses during a certain period of time. We will distribute multiple sensors within one area. These sensors will gather the value of CO and CO2 in the air. The data are sent to the base station for processing. The base station will receive the data from multiple sensors to store it in the database for later processing. These data will be retrieved for processing to generate accurate report of the percentage of these gasses in the air. Each sensor has its own Global Positioning System (GPS) module to locate the place of contamination exactly. We will add a feature that help people to be notified against placed that are contaminated with Co and CO2. The user should register in our system to get advantage of this feature. After registration, the user should select the place of interest (A place that he wants to be notified if it is contaminated). Users can be notified either by Short Message Service (SMS) or Email.

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The Use of Brain Wave Sensors for Stress Analysis on Students

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ABSTRACT

Project Overview

This project was undertaken by the students of Texas A&M University at Qatar as a way to determine the most efficient learning environment for a student by observing the brainwave signals and estimating the most responsive and active periods in which the brain can function. A brain wave sensor, in this case the Neurosky Mindwave sensor is being used to collect brainwave signals of an individual. These signals are then recorded and analyzed using LabVIEW.

Project Significance

The aim of our study of the human brain activity and wave patterns is to provide a better understanding of the human brain and its activity under stress, attention, and meditation modes through information and results acquired through tests and examinations. Our project currently aims at understanding how students cope and respond to stressful situations by observing their brainwave signals. The attention span of our subjects will also be measured to get an idea of the average attention span of a student in a class or during an exam. The results of our research will determine the maximum efficiency of the brain to respond to stressful situations such as tests and examinations. The results of our research could be applied in any university to help students cope better under these situations.

Device Description

The Mindwave headset takes decades of laboratory brainwave technology and puts it into a bundled software package. The device itself is a portable EEG brainwave headset which is extremely light, wireless and utilizes safe passive biosensors to measure the brainwaves. It safely measures brainwave signals and monitors the attention and relaxation levels of students as they interact with their surroundings and respond to stimuli using the ESense algorithm associated with the software application that comes with the sensor.

ESense™ is a Neurosky proprietary algorithm for characterizing mental states. To calculate ESense, the NeuroSky technology amplifies the raw brainwave signal and removes the ambient noise and muscle movement. ESense algorithm is then applied to the remaining signal, resulting in the interpreted ESense meter values. ESense meters are a way to show how effectively the user is engaging Attention (similar to concentration) or Meditation (similar to relaxation)

Progress Made

The project is currently in its preliminary stages. As of now, the device has been successfully integrated with LabVIEW and data has been collected. Amplitude vs. time graphs have been plotted based on the data obtained. The graphs display high peaks for both attention and relaxation, but these peaks slowly decrease as time wears on. We thus concluded that the brain is most responsive initially and this ties in with our theory that the higher the peaks the better the brain functions. Essentially, the goal of this project is to obtain high peaks on the amplitude vs. time plots for attention and meditation under different situations that will be tested soon.

Towards Better Polarity Mining: An Ontology Based Approach

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Supervised by
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ABSTRACT

A huge amount of user-generated content has appeared in websites. This is not only due to the massive growth of social networking, but nearly every website now has space for users to express their opinions whether this website is dedicated for reviews, companies, or even newspapers.

In order to benefit from these opinions, some websites have used star reviews or scale reviews as a way to overcome the large number of reviews. This might seem vague to some of the website users who would like to know more about the pros and cons of the reviewed item. Polarity Mining is one of the techniques used for extracting features from online-text based reviews and determining the positive and negative features; hence it possible to automate the extraction and classification of reviews rather than going through large amounts of data to obtain the needed results.

This is very helpful and enriching especially if it is applied to e-commerce systems. In addition, studies have shown that the use of ontologies improves the performance of information retrieval in polarity mining. An ontology is mainly the conceptualization of a domain; it could aim at creating a world of understandable language between developers and machines. Therefore, this project proposes an ontology-based technique for mining and defining polarity of reviews in terms of positive and negative recommendations. It also produces keywords that represent the reasons behind these recommendations. This is achieved through combining parts-of speech tagging, ontology development, feature identification and sentiment analysis. It is implemented using OWL (Web Ontology Language) and mining techniques using the C# programming language.

It is expected that using ontologies in polarity mining would lead to more accurate results and would decrease computational time needed for parts-of-speech tagging. In addition, benefits include saving time for online consumers allowing them to focus more on a product's features rather than having to read through lots of reviews and therefore keeping them product oriented and assisting them in purchasing decisions and enhancing the E-commerce process.

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An Intelligent Computer-Aided Pronunciation Teaching System for Arabic Alphabets

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Supervised by
Dr. Fahed Awad and Dr. Omar Banimelhem

ABSTRACT

In this paper, we introduce an Intelligent Computer-aided Arabic Pronunciation Teaching System (ICAPTS), which provides the first essential step in learning the Arabic language using Automatic Speech Recognition (ASR). ICAPTS is a speaker independent engine system that teaches the standard Arabic alphabets pronunciation. This system brings Arabic language to today's high-tech market. ICAPTS attempts to eliminate the old dictation methods of teaching and make it fun to learn.

ICAPTS was implemented using the CMU Sphinx engine, which is an open source platform that is written in C language. It uses the Hidden Markov Model (HMM) as a searching algorithm. HMM is a probability-based model that takes the input as a wave file then applies many filtering and feature extraction methods to find a vector that represents the wave file. Then it tries to find the best path in the phonemes tree which represents the best matching for the extracted vector that depends on the probability values that have been calculated during the training stage.

The system was trained using a database composed of 37 male and 22 female speakers. Each speaker was asked to pronounce each of the Arabic letters in the standard way (Classical Arabic). At the end, the database contained 57-minute worth of recorded samples, taken in normal indoor environments. For the purpose of testing the system, another database was created in the same environment which is composed of 57 samples from 3 speakers: one male and two females. The testing samples contain all the alphabets. Then, the training of HMM is done by sitting the weights between phonemes using forward-backward algorithm. The performance evaluation of the system demonstrated an accuracy of 73.7% this value represents the overall accuracy of all the alphabets which is considered relatively high due to the difficulty of the Arabic language and the relatively small database used. Another alphabet-level accuracy test was also performed in order to measure the accuracy for each individual alphabet. It was found that some alphabets (e.g.; ع, خ, أ, ق) achieved 100% accuracy, while some alphabets have achieved very low accuracy ranging between 1%-20% like the (ح, ك, ظ, ط, ف,). The reason is that the pronunciations of these alphabets are very close to each other's or to other alphabets.

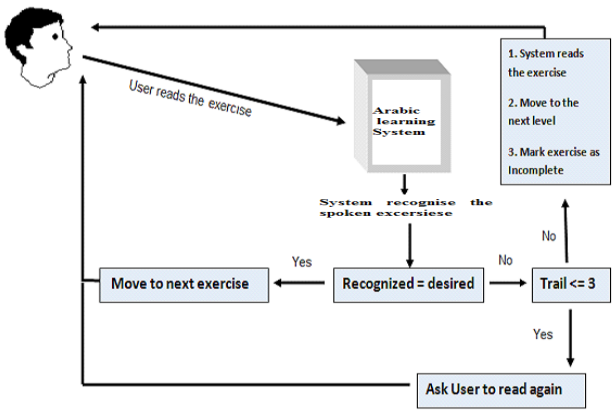

Figure 1 : The dataflow of the teaching system

The system works as follows (see Figure 1): first the user is asked to pronounce a specific letter via the microphone. The spoken letter is recorded and passed to the recognition system. If the result matches the target letter, the user advances to the next letter. Otherwise, the user is granted three chances to re-pronounce the letter. After that, the system moves the user to the next level and marks the current letter as incomplete for later trials.

The main difficulty faced in this project was the lack of existing open-source tools to build Arabic-based dictionaries for the database. In order overcome this problem, English phonemes were used to create the database. Another difficulty was in collecting the training samples of standard correct pronunciation as several people miss-pronounced the letters. To overcome this problem and to be able to generate a standard database, a manual filtering on the samples was performed in order to further enhance the database.

The structure and tools of the teaching system were all based on the C/C++ language, which makes it portable to be used with any platform and makes it possible to be implemented in smart phones, PADs, and laptops.

In-Vehicle Safety Box

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ABSTRACT

As the statistics suggest, an average of 83000 accidents per year were due to drowsy driving. Other statistics show that 31% of all fatal crashes involve speeding as a contributing factor. The numbers will most likely increase given the surge in people commuting and the increase in driving distances. Several systems have been researched and developed in the past few years to implement a drowsy driving warning system including rumble strips, Mercedes Attention Assist System and SAAB's Driver Attention Warning. If any at all, these systems are available in newer cars and not for the majority of cars.

In our research we propose an In-Vehicle Safety Box (IVSB) that is designed to detect and alert drivers before they fall asleep as well as report accidents and provide parental control features. We plan to transform this project into a product that is packaged in a single box that is easy to install, use and maintain. By doing so we hope to spread its use even in older cars and help save lives.

The system (Figure 1-a) performs the following functions:

- Detect drowsy drivers: using a webcam the system and will detect if the driver is about to fall asleep and sound an alarm.
- Report accidents: sending the car's location information to relevant parties (Ex. Police, family, etc.) when the vehicle gets involved in major accidents. A similar on-demand service will also be provided using an SOS button.
- Parental control: using the information collected about the vehicle, such as speed and location, alert messages can be sent to the parents if the vehicle's speed exceeds a certain value or if the vehicle leaves a certain area. This information can also be downloaded to a parent's computer to keep a record of the vehicle use.

The system (Figure 1-a) collects data using a webcam, GPS and GSM modules, and feeds it into an embedded controller (Beagle Board xM) that runs a Linux operating system. The webcam feed is used to detect drowsiness utilizing algorithms that are built using an open source computer vision library. The GPS and GSM modules are used to collect geographical location and ground speed and, using a text message, alert interested parties when the car leaves a designated area or its speed exceeds a set limit.

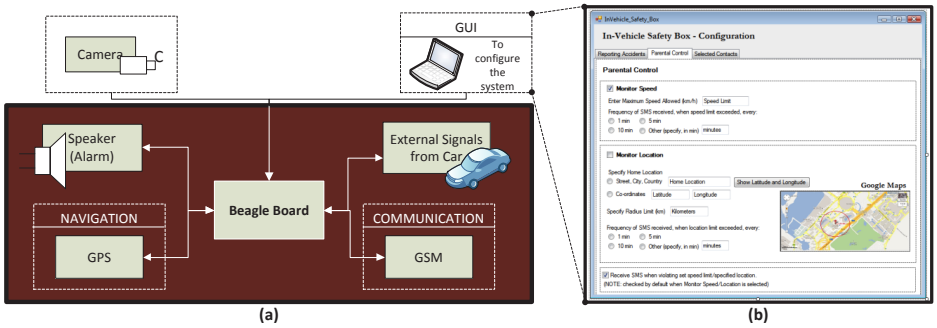

Figure 1: (a) IVSB System Architecture (b) Configuration Application

Currently, the prototype is being developed on a PC running Linux Operating System (Phase 1). Once all functionalities are successfully implemented, the system will be moved to the Beagle Board (Phase 2). The GPS and GSM modules have been successfully integrated and are able to perform the needed tasks. The basic functionality of the parental control features have been also tested and verified. We're finalizing the details of the sleep detection algorithm which will be eventually implemented and run on the microcontroller. The system is configurable through an external PC (Figure 1-b) that is used to set the system parameters (e.g. distance and speed limits).

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2. US NHTSA - Traffic Safety Facts (November 2009). Online - http://www-nrd.nhtsa.dot.gov/Pubs/811218.pdf
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Identifying Crimes Using Audio Cues

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ABSTRACT

Introduction

Nowadays surveillance cameras are widely used in big cities and metropolitan areas to combat crimes. For example, there are 500,000 security cameras installed in London for monitoring streets, government buildings, tourist attractions... etc. There is a need to develop fast and efficient algorithms for processing these recording to identify possible crime incidents.

This paper studies the problem of identifying crime incidents using the audio tracks of the surveillance recordings. The algorithm detects audio cues that usually occur with disputes and crimes like gunshot and screaming. One of the challenges is identifying incidents using audio is the background noise. In real life, sounds from different sources are mixed together. In this research we develop techniques for separating foreground sound from the background noise then identifying the required cues.

Research Methodology

To be able to spot target sound, one has first to separate it from other background unwanted sounds. After separation, the signal needs to be compared with a known glass shattering sound. If the two signals match with a percentage more than a predefined threshold, the unknown signal will be considered a glass shattering sound. The threshold can be determined empirically using various types of glass shattering sound. The process is implemented in the following three phases:

Detection Phase: Detection is considered the simplest step in identification procedure. Yet, there are some challenges, like, removing background noise. The detection procedure must be tolerant to background noise. There are several popular techniques available for detection. In this research we chose to use the "Detection using threshold on the power sequence". When compared with the other methods, "Detection using threshold on the power sequence" is fast and has low miss and false detection rates[3].

Signal analysis: The analysis stage depends on choosing good features, which is also critical to success of the classification phase. The analysis will cover three sound classes that are considered in this project for crime detection. For each sound class, we will select a set of features suitable for the class, e.g., Zero Crossing Rate (ZCR)[7], Short Time Energy (STE), spectral moments, loudness, sharpness or Mel Frequency Cepstral Coefficients (MFCCs)[4], LPC Spectrum Flatness, FFT Spectrum Flatness, harmonicity, and Weighted Average Delta Energy[1].

Recognition: In this step we need to classify the sound signal to one of the target classes. There are several techniques, which are well-known in classifying and recognizing audio clips. Since the goal of this study is to differentiate between three classes (screaming, gun shots, and glass shattering), two methods are counseled to be used which are HMM (Hidden Markov Model) and GMM (Gaussian Mixture Model). We will use one classifier (HMM or GMM) for each class moving away from using one classifier that uses separation techniques[1][4].

The architectural model for our system is shown in Figure 1. We will build a simulator that uses HMM or GMM to test the proposed system to test it on real sound samples for screaming, gun shots, and glass shattering. We will measure the correct identification and miss rate. We will further measure the response time of the proposed algorithm.

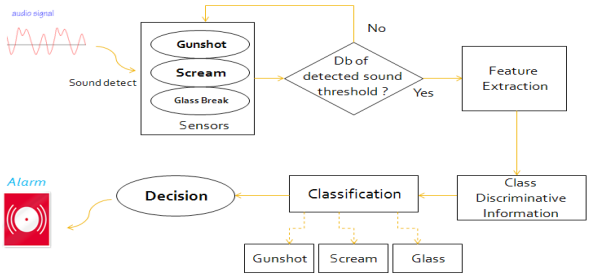

Figure 1: Activity model of ICUAC

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Radiksa: Teleradiology Management System (TMS)

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ABSTRACT

Local healthcare institutes in Saudi Arabia and in particular the primary and secondary care centers, lack quality advanced healthcare, medical services and human resources that are usually found it in hospitals in major cities. Doctors and specialists, who are working in medical centers, are isolated from the advanced medical technology. And usually they do not have the enough experiences to diagnosis the difficult cases. This leads patients to be transferred to hospitals with appropriate facilities and capabilities for diagnosing and treatment. Transferring patients from primary or secondary care centers to hospitals for getting a proper diagnosing and treatments, costs money and time. In addition, hospitals are overcrowding with patients that have been referred to it. That led to decrease the efficiency of work and the quality of healthcare deliver.

To solve the problems that have mentioned, hospitals need to connect with primary and secondary care centers in rural or cities in Saudi Arabia. So, we built a system for connecting medical institutes together and enabling the management of accessing and exchanging x-ray images and cases through the system for diagnosing and consultation.

Figure 1: Radiksa Teleradiology Management System

In the hospitals where Teleradiology Management System (TMS) is applied, most of the cases that were handled by the system were the cold cases – non emergency cases- with their diagnosis can be delayed. In addition, most of the hospitals do not support Teleconferencing technology and loses the chance to exchange experiences between radiologists and consultants for high quality diagnosing and interpreting. Another problem is that there is no system in Saudi Arabia to connect the local medical institutes together.

The main goal of RadiKSA is to serve the medical institute in rural and cities of Saudi Arabia, by introducing management services and support integrations of other softwares in a way to facilitate physician and radiologist work in radiology department, in order to improve the quality and efficiency of diagnosis in regular and urgent cases. This is achieved by connecting the physicians and radiologists together through the system.

We built a user friendly system that handles the hot cases – emergency cases that required to be diagnosed as soon as possible - and cold cases with real time method and store forward method of implementation for hot/cold case. Any medical institute in Saudi Arabia that needs the system services could join and utilizes the system. RadiKSA TMS will differentiate in using priority for the cases, search with many criteria and using video teleconferencing to enhance the quality of diagnosis and treatment by exchanging experience between radiologists and physicians through the system. To achieve our objectives, the integration scenario is adopted to meet the highest value goal, lowest cost, and fastest deployment time. A variety of available solutions were carefully studied and evaluated to perform the following; real-time communication (video, audio, and text), high quality display of radiographic images and audio reporting feature. Integrating with existing tools allow to share information and features between applications. We take the advantages and powerful of existing tools which saving time and effort in implementation phase. Increase efficiency of system work and eases managing system. Integrated Skype with RadiKsa gives the system strength in communication. Getting advantages of features that Skype provides such as group teleconferencing. Using special image viewer allow user to manipulate and view x-ray image more professional. Integrated MS Speech Recognition allow radiologist to edit report more easily and faster. Few words will modify than long pages. It increases efficiency work. Enhance performance rather than using transcriptionist.

Examining the Market Behavior during Boom and Bust using Artificial Neural Networking

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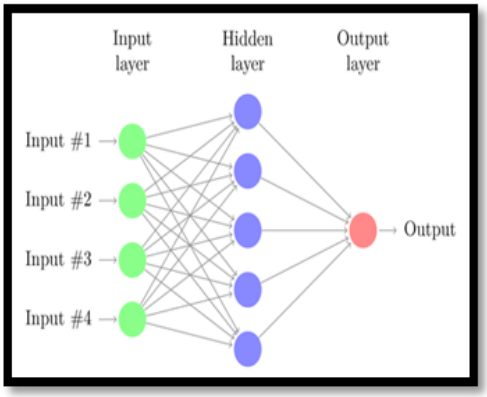
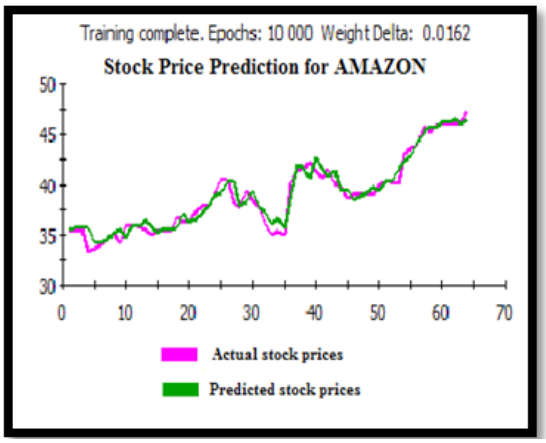
ABSTRACT

The stock market has always been an attractive area for researchers since no technique has been found yet to predict the stock price behavior precisely. However, an examination of market behavior as a whole, during periods of economic stability and downturn is amongst the topics that have never been researched before. Stock market carries a higher risk than any other investment area, due to its high percentage of uncertainty and instability, thus making the stock price behavior difficult to forecast. Moreover, predicting stock data using traditional time series that follows a random walk has proven to be difficult both when investigating them statistically and when looking at various evaluated results to form prediction algorithms. To overcome the addressed problem, different techniques are used among traders and financial professionals for predicting the prices in stock market. In recent years, the Concept of Neural Networks has emerged as one of them.



Artificial neural network (ANN) is a computation model enthused by the structural and functional aspect of the biological neural network. They are mathematical models simulating the learning and decision making processes of the human brain. It is applied to problems ranging from classification of cancers and recognition of genes, to prediction of stock market prices. ANN is mainly used to solve artificial intelligence problems and is highly capable to deal with uncertain, fuzzy, or insufficient data which fluctuate rapidly in very short periods of time. In this study, common stock market analysis theory such as technical analysis, fundamental analysis and regression are discussed and compared with artificial neural network performance.

The main objective of this study is to investigate whether Artificial Neural Networks can be successfully implemented in predicting stock price behavior during the periods of boom and bust and whether it can be used as a decision support tool in a real trading situation. Artificial neural networks approach is a comparatively new, dynamic and promising field on the prediction of stock price behavior. Because of their nature of easy adaptation to noisy data, and solving complex and nonlinear problems, they fit into the area of prediction of stock price behavior. It for this reason, Artificial Neural Networks have been chosen in this research to determine the possibilities of solving the fluctuating Stock price behavior.



A standard neural network learning software is followed in these experiments. Stocks such as AMAZON, IBM, P&G, and MERC are scrutinized for three consecutive months during different economic periods to construct the training patterns for the network in order to predict the stock price for the following two months. Moreover, the selection criteria are based on the behavioral patterns investors exhibit during different economic periods. Training of a network involves obtaining values for learning rate, estimating the hidden layers and number of nodes in each layer. A learning rate of 0.3 and the momentum rate of 0.6 produced the best results. On the basis of the results observed during these experiments it follows that the effect of learning historical information is substantial on the prediction accuracy for stock market returns.

Smart Office: IT Outsourcing Self-Service Portal

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ABSTRACT

Today, a business need a datacenter with office space, power, cooling, networks, servers, storage, complex software stack and expert team to run the business operations. These requirement will cost the business a lot of time and money, and from here comes the idea of outsourcing the core IT infrastructure using Cloud Computing.

Smart Office is a solution for providing self-service portal to enable small businesses to outsource their core IT infrastructure over the Network. Smart Office is a web based solution; it is a way to deliver IT-enabled business services to businesses. The solution provides an interaction web, which allow tenants to rent IT infrastructure that includes storage, network and virtual machine and manage them online through Smart Office portal. This solution is referred to as (IaaS) Infrastructure as a Service, which gives the tenant the capability to subscribe to a service, manage and pay or utilization online; also they can upgrade or downgrade the services as needed. The Solution is composed from two integrated systems, one is the smart office system and the other is the Cloud System "HP Blade Matrix". Smart office side serves two users, tenant and the system admin; the tenant can controls his account, manage his services and payments. The system admin job manages the tenants account. The Cloud System serves two users; one is the designer and the other is the Cloud Admin. The designer manages the template by designing, editing and publishing it, and the Cloud admin can manage the resource pool by adding resource and editing their information. In addition, the Cloud Admin is responsible for monitoring the system. The design of the system takes into consideration mirroring data for retrieval efficiency. The system architecture is shown in Figure 1.

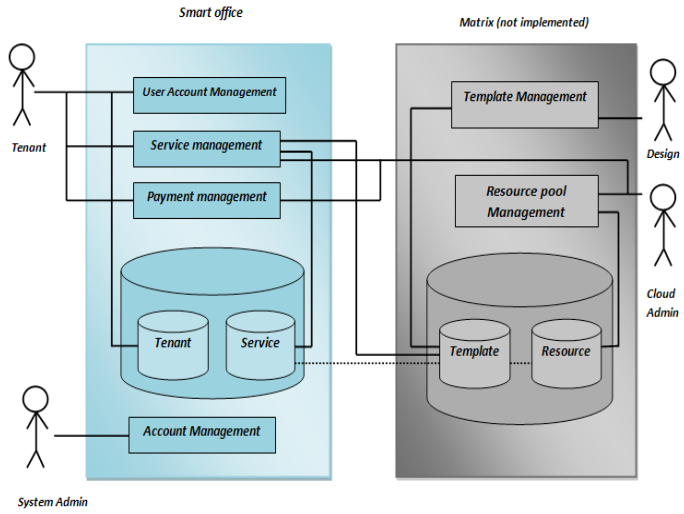

Figure 1: System Architecture

The solution is a portal to the cloud system(HP Blade Matrix), it's allow the tenant to choose a service with payment management interface, also in the smart office side there's system admin to check from the tenant credential. Smart Office solution has two databases, first one contain the tenants information, and the second one contains the services details and it's mirroring from the template database in the Matrix side; the template is the inactive services and its construct from the resources which is the Storage, Network and the Virtual Machine.

Touch-Free Kinect Assistive System for the Physically Disabled People

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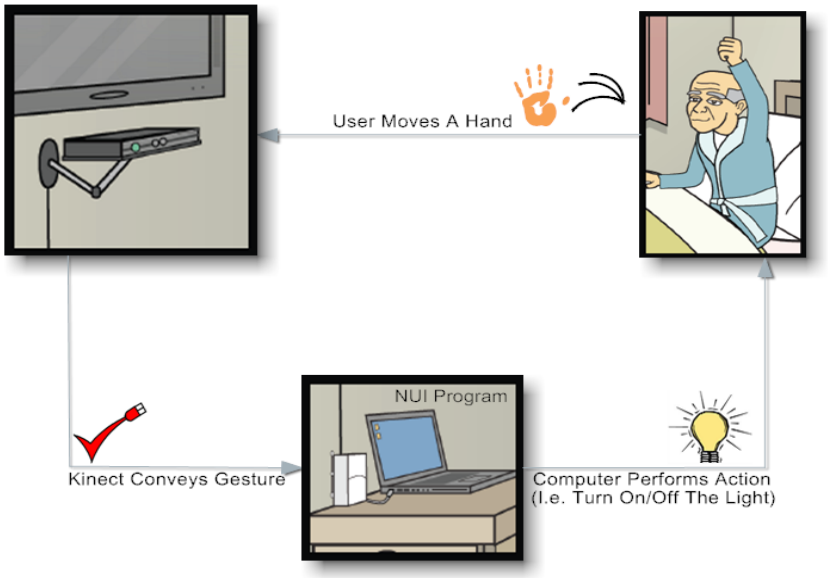
ABSTRACT

Recent statistics show a rapid growth in the number of aged people and persons with physical disabilities. Surely, they need outer help to carry out their daily tasks. The problem of taking care of those people will become serious in the years to come when a substantial part of the increasing global population will be in the 65-or-above age group. Obviously, this problem cannot be solved by increasing the number of Health Care Assistants (HCAs) because they have an impact on economic growth and public finance. So, there is a pressing need for a more economical, safe and user-friendly automated solution. The main motivation, behind resolving the problem, is the nobility and honor of providing the physically disabled and old people with a service that would make them as comfortable and satisfied as they could be. The available solutions for people are controlled remotely by pressing a button or flicking a switch or picking up a controller. In other words, there has to be a physical contact between the user and the intelligent assistive system. In addition, most of these solutions have control algorithms that are not based on a small number of commands relevant to the user's motions and they are awfully expensive and need to be imported. The objective of this project is to build a more assistive system to increase user's comfort and pleasure. The proposed system is currently under development and it removes the need of physical contact to operate it using Microsoft Kinect for Windows SDK beta. Prototyping technique is used to implement the proposed system to show how an actual light bulb will be turned on/off with just a user's hand gesture detected by Kinect sensor device that is connected to a microcontroller with a program running on it. The light unit, to be manipulated, is chosen based upon results of a field investigation questionnaire that targeted a sample of people with movement disabilities at a hospital in Saudi Arabia. After analysis, the overall results indicated that for controlling surroundings 83.33% of the patients want to control the lights, 41.64% want to control the curtain, 8% want to control the door, and 8% want to control the window. And for wanting to have the proposed Kinect solution 80% of the patients want to use it. Regarding the findings, they are all about usability. First the Kinect sensor has a limited viewing distance, maximum distance is three meters. Second, Kinect sensor is very sensitive against the objects it sees, if an object is closer to the sensor than the user, it starts focusing on it instead of the user. Third, to best utilize the usage of the Kinect sensor, user needs to follow the 90˚ rule in sitting in front of the sensor, and if sitting degree is from 90 to 140 degrees, sensor will be less responsive, and if sitting degree is more than 140˚, sensor will become nonresponsive. All in all, Kinect has great operation stability that compensate its few usability constraints.



Detection and Analysis of Medical Image Blobs

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ABSTRACT

The analysis of medical imagery requires skilled medical specialists with appropriate background in medical imaging and digital image processing. However, in specific instances and due to the poor quality of the medical images under investigation, the human ability to accurately assess these images is hindered severely. In such cases, automated imaging systems and tools provide an efficient and cost-effective means to the support the medical experts. These automated imaging systems and tools provide various enhancement features that will ease the tasks carried out by the medical experts. Image enhancement (mainly noise reduction/removal and contrast adjustment), segmentation and feature extraction of region-of-interest (RoI) constitute the basic layer of these automated medical imaging systems and tools. The "fusion" of the human expertise/knowledge with the automated pre-processing tools drastically enhances the medical diagnosis and will therefore affect all subsequent medical decisions which will hopefully reduce the error rates known as the false-positive and false-negative rates. In this work, an automated medical imaging system is developed using the open-source platform known as the Aforge.net framework. This framework has been successfully adopted in several high-profile open-source applications in the fields of digital image processing/analysis, machine learning and data mining. The Aforge.net framework consists of a rich software libraries and packages. More specifically, in this work an extension for this framework is proposed to build a system that "explicitly" detects the blobs in medical images and their associated labels. State-of-the-art segmentation algorithms are seamlessly integrated with the proposed system to automatically segment magnetic resonance (MR) images into a set of regions where each region is classified as an organ. Then, each region is represented by a unique color. To measure the similarity/dissimilarity between the labeled organs, a metric based on the Euclidean distance is used. It is hoped that the functionalities of the proposed system will enable the medical specialists to extract refined information from the subject imagery which will enable these experts to base their diagnosis, and therefore their decisions, on improved versions of the medical imagery under investigation which will in turn reduce the error rates known as the false-positive and false-negative rates and consequently contribute to saving the patient life.

QuranQuote

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ABSTRACT

Throughout the Internet there seems to be a lack of websites that provide reliable and detailed information on the Holy Quran. While there are websites that offer complete versions of the Quran book and its various translations, they do not primarily provide a detailed breakdown of each verse in an explicit manner.

An Islamic scholar had made an outstanding contribution to the Quran understanding (tafseer) by exploring the phrase into segments (مقطع). Such an approach is unprecedented in the field of Quran understanding and the related literature. This seminal work consists of 55,000 handwritten pages. At first glance, it seems that converting this rich manuscript into a digital format will be a daunting task. However, the benefits and advantages of the digital version, if made available, are obvious and will be beyond any expected cost. The digital version of the manuscript will serve the noble cause of shedding the light on a new dimension of the miraculous abilities of the Holy Quran to a wide audience crossing the physical and geographical constraints. The proposed work aims at developing a dynamic website that will serve the functionalities of the new Quran description wiki where Internet surfers are able to retrieve reliably the appropriate information and knowledge about this manuscript. The developed website represents a special type of wiki since regular users are not able to modify the information pertaining to the manuscript. However, privileged users are able to do so, but their modifications will undergo some validation steps in order to maintain the integrity, accuracy and veracity of the manuscript content. The developed application consists of two parts: 1) the administrative control module; and 2) the public view module. The development of the administrative control module involves creating the necessary algorithms for entering data in a consistent and efficient manner. The process of data entry evolves through three main steps where each step involves a distinct user type performing a specific action. The process is defined as follows: a content manager first enters the data to be added. Secondly, a validator is required to check that the entered data conforms to the physical copy of the work. Finally, an authorizer verifies that the data is consistent with the Islamic rules. In addition, concurrency control is implemented in the system to allow multiple content managers to simultaneously manage the data. The control is achieved through a locking. Also, all the fundamentals functionalities of editing, deleting, and log keeping are implemented to ensure proper data management and administration. The public view module is currently under development. The public view module is intended to display the data (Quran descriptions) in a highly dynamic and interactive manner. The developed website has the merit to represent a new dimension of the Quran interpretation and understanding based on the phase segments which is the core of the seminal work done in the digitized manuscript. Also, users interested in specific aspects of the Quran verses are able to extract the corresponding knowledge related to that aspect such as Fiqh (فقه), Ethics (أخلاق), or even Old Nations (قصص).

The Radiologists Lounge: a Professional Online Community

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ABSTRACT

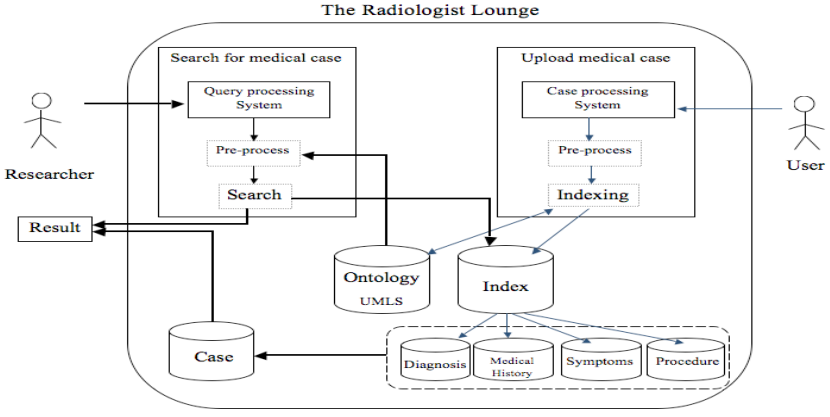
With rise of networked technologies, communities appeared to gather people from around the world to share their interests, goals, and professions making them feel as they are living in a small village. Interestingly, online communities took place in lots of people everyday life. Having their voice heard publically, making new friends who share the same interest while they are at home, office, or any place of the world is an enjoyable experience. Professional Networks, which are a type of social networks, had spread over the world. It centers on making a business based relationships and interactions. Professionals in the radiology field needed such technology to discuss and share medical cases between each other. Tele-radiology is a technology that is used in transmitting medical images between hospitals. This technology is limited to a number of hospitals and lacks feedback. As communities rise, they actually lack the semantics in the process of retrieving radiographic images and data. Besides, the radiographic images are unstructured documents. This resulted in the computer blindness retrieval of information without the knowledge of the meaning behind the information or its relationship to other data.

Radiologists Lounge: a Professional Online Community, specializing in connecting professionals in the radiology field around the world, has proposed the use of semantics in data retrieval and in structuring radiographic images, with the aim of retrieving these images on the basis of their semantic content. To facilitate this technology, samples of user queries generated by radiologists were analyzed in the biomedical field then the conceptual model is adopted. It is composed of three layers:

1. Physical layer: is the raw data, which contains objects.
2. Semantic layer: is an abstract layer where the physical layer contents are linked into the real world using medical ontology to represent the meaning of those physical objects.
3. Logical Layer: is a representation of the overall organization of radiographic information in the medical domain generated after studying radiographic image reports from domain experts and analyzing potential queries from end users. The suggested logical elements to represent the logical structure of a radiographic image include: patient demography, clinical procedure, symptoms and diagnosis.

The semantic layer and a logical layer are built on top of the physical layer of a radiographic image to provide a semantic abstract view of the image content. The semantic indexing is achieved by extracting biomedical terms from the Unified Medical Language System (UMLS) Metathesaurus, biomedical ontology provided by the National Library of medicine (NLM), as follows:

As this ongoing project establishes radiographic images retrieval system based on semantics, it brings a new trend to the online communities that Tim Berners-Lee dreamed of, which can support Semantic Web data by being the sources of people voluntarily connecting things together. In result, professionals will benefit from the meaningful and relevant data.



ArCaptcha: An Online System for Arabic CAPTCHA

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ABSTRACT

The term CAPTCHA refers to the use of human-only recognizable picture to differentiate between humans and computers. It is an acronym made from "Completely Automated Public Turing test to tell Computers and Humans Apart". CAPTCHA tests are widely used across the Internet to overcome the usage of Internet bots, software applications that run automated tasks, by spammers and unwanted crawlers. In this project, an Arabic CAPTCHA system, called ArCaptcha, is developed. Also, a web-based solution is implemented that uses Arabic letters to generate Arabic CAPTCHA. Therefore, this application alleviates the restriction of using non-Arabic settings and languages for those users who are strictly Arabic-readers and speakers. Also, the proposed system is a web-based service for developers and websites. In summary, the system provides the means and tools to make Arabic CAPTCHAs usable, simple, and human-readable. ArCaptcha system consists of a server and a client-based script. The server hosts the whole web service, the authentication process, the ArCaptcha database, and the API for developers. It is robust and scalable. Moreover, the images used as ArCaptcha are uploaded automatically using a dedicated script. The Client-based scripts issue requests to the system server carried by unauthenticated parameters. This client script is divided into a script in the HTML file or any application and a script file in the developer server to contact the application server. Then, the server sends automated replies to such requests according to the parameters. ArCaptcha system is characterized by the following features:

The system web service has enough Arabic CAPTCHAs to be secure.

The system web server is secured against turn-around attacks that try to bypass the CAPTCHA to spam the application.

The system web service is reliable and has the best availability since other applications depend on the web service to interact and receive data from end-users.

The system server is secure against denial-of-service attacks.

The system is able to customize its CAPTCHAs to satisfy the requirements of customers.

The generated Arabic CAPTCHAs are secured against Arabic OCRs at least 90% of the time.

The generated Arabic CAPTCHAs are easily readable by humans.

The system is well-documented and well-coded for future phases like integrating Arabic OCRs to help with digitizing books.

The system web service is publicly available and well-documented for developer's sake.

The system web service displays help pages that explain to end-users the purpose of CAPTCHAs.

Finally, ArCaptcha system serves any web application that is using CAPTCHAs to secure their website from bots and spammers. It mainly provides web application developers with an Arabic CAPTCHA web service so that they can fully customize any web application to serve its users. This helps all Arabic blogs, forums, news sites, social networks, forms, surveys, and smart phone applications. As a result, all Arabian Internet users benefit from the project since they will see less spam and would be able to use CAPTCHAs in Arabic, their native language. The ArCaptcha official web page is hosted at:

http://www.arcaptcha.com/

Orthogonal Frequency Division Multiplexing Techniques for Long Term Evolution Fourth Generation Mobile Systems

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ABSTRACT

Long-Term Evolution (LTE) is the project name of a new, high performance air interface for mobile communication systems. Developed by the Third Generation Partnership Project (3GPP). LTE is the evolution of the Universal Mobile Telecommunication System (UMTS) towards an all-IP broadband network. LTE's evolved radio access technology—the E-UTRA— provides a framework for increasing data rates and overall system capacity, reducing latency, and improving spectral efficiency and cell-edge performance.

In this paper, a comparison study of both Multi-Carrier Orthogonal Frequency Division Multiplexing (MC-OFDM) shown in Figure 1 and Single-Carrier Orthogonal Frequency Division Multiplexing (SC-OFDM) shown in Figure 2 is presented. First, a study of MC-OFDM system is discussed. Then a study of the SC-OFDM system is presented. Then a comparison of both systems is presented. The problem of Peak-to Average Power Ratio (PAPR) in both MC-OFDM system and SC-OFDM system is discussed and derived. A MATLAB simulation of PAPR performance of both systems is developed and implemented. The simulation comparison shows that MC-OFDM system suffers from high PAPR while SC-OFDM system has much lower PAPR showm in Figure 3. This is the reason why SC-OFDM has been chosen for the uplink of the fourth generation cellular system known as Long-Term Evolution (LTE) system. This will save power consumption (i.e., prolonging the battery life of the mobile unit) and increases the efficiency of the power amplifiers. A simulation of three different Frequency Division Multiplexing Access (FDMA) techniques for SC-OFDM system is also presented. These three subcarrier selection techniques are called Interleaved Frequency Division Multiplexing Access (IFDMA), Localized Frequency Division Multiplexing Access (LFDMA) and Distributed Frequency Division Multiplexing Access (DFDMA). The simulation results shown in Figure 3 show that the IFDMA provides the best PAPR performance.

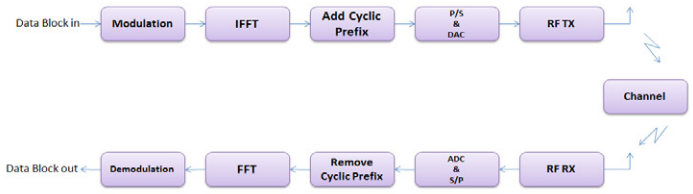

Figure 1: Block diagram of MC-OFDM transmitter and receiver.

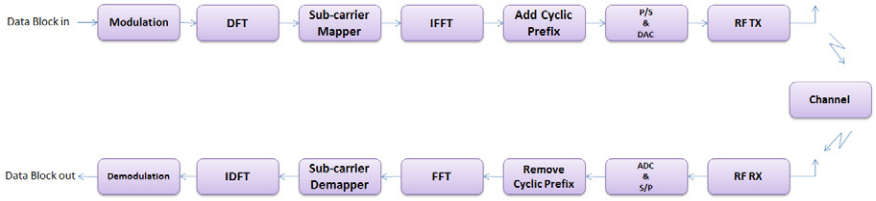

Figure 2: Block diagram of SC-OFDM transmitter and receiver.

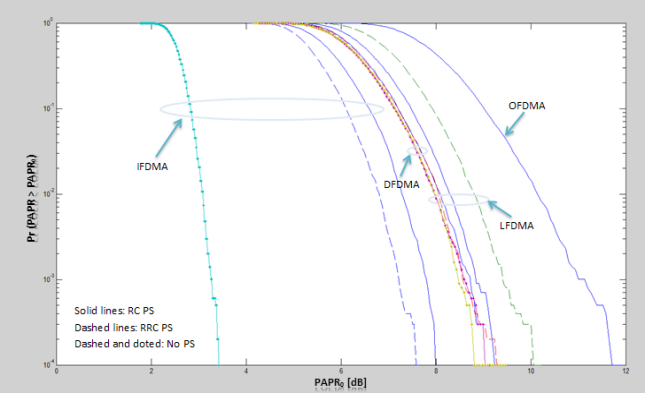

Figure 3: Comparison of CCDF of PAPR for IFDMA, DFDMA, LFDMA, and OFDMA with total number of subcarriers N = 512, number of input symbols M = 128, IFDMA spreading factor Q = 4, DFDMA spreading factor ˜Q = 2 , (roll-off factor) = 0.22,and used modulation type of 16-QAM.

Enhanced Ontology-Based Semantic Keyword Search Over Relational Database

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ABSTRACT

Querying relational database systems (RDBSs) requires the user to be aware of relational schema and SQL language. This issue is considered as a problem for naïve users who are not expert in SQL language or ignorant to the relational schema. The solution for such problem is keyword search. The basic idea of keyword search over relational database (KSORD) is that the user retrieves data just by entering keywords rather than knowing query language or the underlining structure of the data. Work done in this area is classified into two main categories: full text keyword search and structural keyword search. Full text keyword search depends on the exact matching and does not concern to the interconnection between tuples that hold the same keywords. In structural keyword search, in order to retrieve related tuples, the RDB is viewed as a graph, where nodes represent relational entities and edges represent the relationships between these entities. Structural keyword search has two main types: schema-free keyword search and schema-based keyword search.

In schema-free keyword search systems, the RDB is materialized as a data graph and the structures of interconnected tuple are explored by graph-based algorithms. The main benefit of schema-free search technique is that once the data graph is implemented, the underlying database is not accessed by the search system. As a result, the search time is decreased. However, schema-free search technique is not scalable when the RDB is too large, and any update in RDB requires updating the data graph. In schema-based keyword search, the RDB is viewed as schema graph in which tables are represented by nodes and relationships are represented by edges. Although, Schema-based search technique is more scalable than schema-free search technique when the RDB is huge, it performs a significant amount of database computations at search time to find the connected tuples that contain the required keywords.

Although existing keyword search systems have empowered users to search relational databases using keyword queries, they are still suffering from several limitations. One of these limitations is that they do not exploit the semantic relationships between keywords such as meronym, hyponymy, and antonym, so the recall rate and precision rate are often dissatisfactory.

In this project, we are aiming to develop a keyword search engine that supports semantic search over relational databases. The capabilities of the existing schema-based techniques are extended to provide ontology –based semantic matching features. It is expected that using ontologies in keyword search will retrieve more accurate results with increased precision and recall rate. Moreover, it will enhance the problem raised from abbreviations and typos in relational database.

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Virtual Employer: The Next Generation Employer

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ABSTRACT

Due to the global technological advancements many organizations have adopted automation. Automation has helped the organizations to see improvements in its processes and products by cutting costs, improving quality, and saving time.

Virtual Employer is a software designed specifically for Human Resource purposes of an organization to cut the monotonous recruitment process short. The candidates fill up the virtual forms (either on website or company computer system) with close ended and open ended questions related to personal information and job, along with some pictorial and graphical images associated with the selection tests. Then, the software smartly compares candidates' answers to job specification, person specification, and other appropriate answers obtained from selection tests (such as, psychometric, aptitude and personality) stored in the data base; each candidate is then awarded with points by the software that is varying accordingly. Just by one click, the software then short lists and selects the minimum best candidate choices with highest points. Since, the software serves the purpose of Curriculum Vitae (CV); it saves an organization's Human Resource Employer the trouble of manually scanning through numerous CVs, by short listing them with just a click. For final results, the organization will only need to call the best selected candidates for a face to face interview in order to make the final decision of selecting the most appropriate employee for the job.

After the identification of a job vacancy, recruitment process goes through a series of steps, fair comparison between the traditional process (figure 1) and new process (figure 2) is shown below:

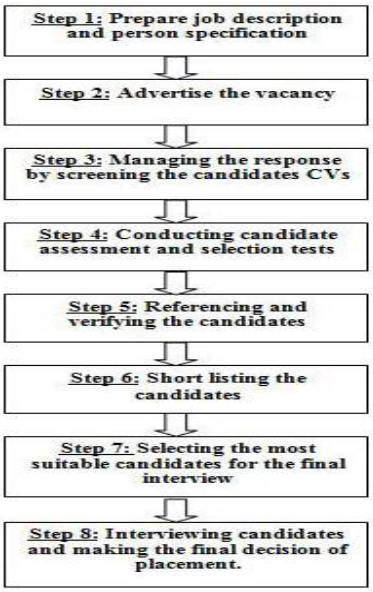

Figure 1: 8 Step Traditional recruitment process

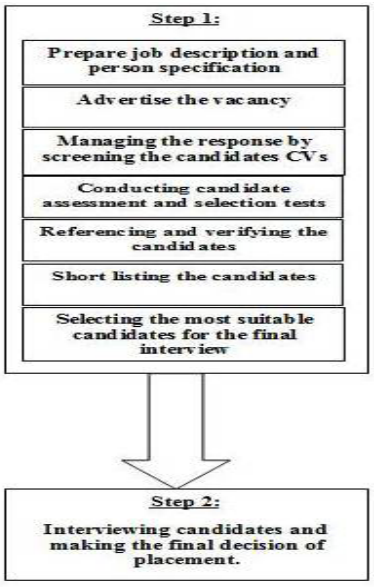

Figure 2: 2 step next generation recruitment process

Therefore, the comparison shows us that, Figure 2 simplifies 'the first seven steps' of the traditional recruitment process in 'one step', leaving only step 2 of figure 2 which is step 8 of figure 1 to be done manually, saving the organization an ample of time.

There is a major difference between Virtual Employer and other existing employer websites. Virtual Employer not only aims to serve the purpose of advertising job vacancies for the applicants, but it instead acts like a second party employer (e.g. a recruitment agency, employer website) without a second party getting involved in the recruitment process.

Remote Sensing and Control Using Thuraya Satellite System

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ABSTRACT

Due to the technological advancement in wireless communication remote sensing and control system is used in many applications. Some of these applications which require tele-monitoring and control can be seen in the industrial automation, medical field, military applications and habitat tracking. Hence the continuous increase in interest from the scientists and engineers to develop such systems. Wireless Sensor Networks (WSN) is one of the technological components that can be used in such systems. WSN consists of various distributed autonomous sensors, which are used to collect data and to cooperatively pass the sensing data to a main location through the network.

In WSN, each node is set of one sensor or more and microcontroller in addition to transceiver and power source. Electronic sensors, microcontroller, as well as the transceiver should be designed to form an efficient system. This system transmits the required data with minimal amount of data rate and power consumption. The autonomous nature of the WSN is one of the most attractive features on it. When the nodes deployed in the field, communication between the nodes are automatically initialized which create mesh network to relay the information from and to the gateway node of the system. This allows various nodes to be deployed almost anywhere.

This paper describes the integration of WSN network, Thuraya satellite, and control base station in order to build a remote sensing and control system. This system contains three main parts: Zigbee mesh network, Thuraya transceiver which will be in the remote side and control base-station with intelligent user interface. Zigbee mesh network consists of various nodes that have different types of sensors including vision based sensing that used for monitoring purpose. The mesh network topology was chosen for the WSN since it allows sending data using different paths in case of node failure. The Zigbee coordinator will gather the data from different nodes and will organize it in packets that will be transmitted to the control base station via Thuraya transceiver. The data will be gathered periodically each half an hour. While in the user side there will be a data server with compatible user interface with it that's used for displaying the data that comes from the remote side to the user. This interface allows the user to send instruction to the remote side using the same path.

This system consists of a two ways communication between the system and the client. Since it uses Thuraya transceiver which has a line of sight communication, it will provide a solution for remote sensing and control for systems that are placed in areas that do not have any GSM coverage or internet access. This kind of system can be used for various purposes such as monitoring remote habitat and monitoring and detecting boarder intrusion.

Long Term Measurements of the Spatial and Temporal Variations of Renewable Energy Resources in UAE

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ABSTRACT

The design of photovoltaic, solar thermal, and wind renewable energy systems requires accurate assessment of renewable energy resources like the average incident solar radiation, the temperature, and the wind speed in the region at which the systems will be implemented. In zones where the weather is highly localizes, like coastal zones, it is difficult to accurately determine the previous parameters with theoretical models. Computer based monitoring systems are considered as reliable systems which are able to determine the spatial and the temporal variations of renewable energy resources in these zones accurately. On the other hand, the availability of accurate assessment of renewable energy resources minimizes the economic risk when implementing these systems. The aim of the present project is to design and implement an end-to-end reliable system with which one can measure, record, and assess renewable energy resources data at any locations in UAE. Our suggested system is a computer based wireless one which can continuously work without interruptions to generate data which represent the spatial (geographical) and temporal (hourly, daily, and monthly) variations of renewable energy resources at all selected locations. The generated records will be used to assess changes in these resources and to enrich their data in UAE.

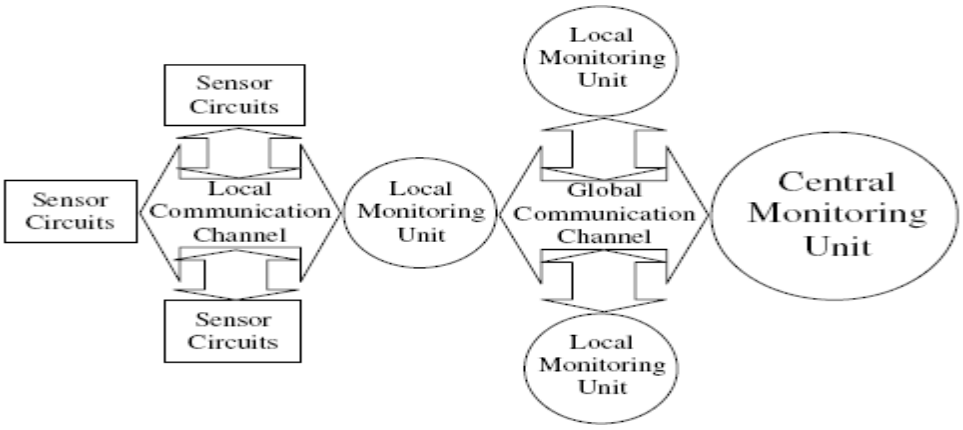

Fig. 1 Block diagram of the suggested low cost solar powered monitoring system

The block diagram of our suggested efficient low cost solar powered monitoring system is shown in fig. 1. The system is designed to monitor any environmental physical quantity through sensor circuits which transform the changes in the required physical quantities into electrical changes that can be measured and recorded. Any transformation function which describes the sensor behavior can be accurately included in our system. Based on the customer requirement, the system hardware can be easily modified to accept any number of inputs from different sensor circuits and the transfer data from the sensor circuits to the local monitoring unit is decided to take place over wired or wireless channel. The flexibility of our programming environment allows the implementation of any monitoring and processing feature on the required measured data. The specifications of our solar powered photovoltaic system components are determined based on calculations of the actual power needed by the sensor circuits and by the local monitoring unit. Our system is designed to use mobile communication networking and internet networking facilities to have a zero cost networking infrastructure for our global communication channels. In addition to all of the above features, we believe that the hardware and software system components which are used in our project can be easily upgraded to fulfill additional users' requirements, to enhance the system performance, and to achieve the minimum system cost without scarifying accuracy.

Warehouse in Cloud (WINC)

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ABSTRACT

The invention of Warehouse Management Systems (WMS) has facilitated the work of many companies. However, a lot of factors hinder the companies from being able to use the WMS they install on their systems. Such obstacles include the inability of accessing the WMS from any geographic location especially that a lot of employees need to access the system during their vacation or upon travelling. Another obstacle is that companies require WMS to be designed according to the types of items specific to this company, and thus a lot of designs and models or WMS have to be created to accommodate the needs of each and every company. Our WMS finds solutions for the aforementioned issues. Our final project is based on implementing a fully integrated warehouse management system using cloud computing. Warehouse in the cloud (WINC) will be the solution for many companies regardless of their business because it is a simplified implementation of a WMS through putting the warehouse in the cloud and to meet different requirements. This is a better approach because you can access the system via a web browser that helps you get rid of hardware and software costs. Through WINC, applications work online (internet) and offline (intranet). Its design will be optimized to be used with mobile PCs such as Samsung slate which will give mobility and easy data entry. Another feature is a customized easy to use interface for tablets. Our system is machine independent so that you can use it on Macs, Android or any device that opens a browser.

Our system is based on the shown below diagram which clarifies the hierarchy we are implementing in WINC. WINC is a system to be used by different companies and in our system we make sure to separate between each company's data that are all found on the server. Each company is made up of several divisions. For example, a company has divisions in Lebanon, UAE... and each division is made up of several facilities. Example of facilities can be: If the division is Lebanon then the facility can be in Beirut, if it's in UAE then the facility can be in Dubai, Sharjah...etc. Each facility is composed of many warehouses where each warehouse is made up of many items. Items are assigned to warehouses according to their types and items can move between warehouses. Item lots are used to differentiate the types of items stored in the warehouse. This separation of items is a vital step because it will facilitate the expiration management process which is removing the items that have expired, in an easy way. Users make orders where orders are taken from lots..

We are working on integrating a hardware part to the system which will allow employees to pick stock or put stock in the correct locations in no time and with no errors. Pick-to-light and put-to light are based on adding small screen in every location with a light source that will point to the specific location desired and the quantity from this location. Hence, our WINC will facilitate the work of any company so that Cloud computing is the future for warehouse management system and this would save space, money and make business more flexible, scalable, and quick as never seen and thought.

Remote Home Security Monitoring Using Wireless Sensor Networks

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ABSTRACT

Automated systems have become deeply involved in our daily life these days. Every day new researches and solutions are introduced in the worldwide to utilize computer systems to satisfy human needs. The integration of technology and services through home networking give us smart home environments for automating, improving, safety, security, communication, comfort and energy saving. In this project we propose a Remote Home Security Monitoring System using Wireless Sensor Networks (RHSM). This system helps the people to keep track of their homes› security and protection wherever they are. The system works by using some sensors technique to detect any foreign object resides within the home. Then, sending a warning SMS to home owner.

This project presents a system using Wireless sensor networks WSNs. WSN is a wireless network consisting of spatially distributed independent devices that use sensors to monitor physical or environmental conditions. These independent devices, or nodes, combine with routers and a gateway to create a typical WSN system. WSNs enabled smart home environments to create pervasive and ubiquitous applications, which give context-aware and scalable services to the end users. This system develops an application and reports its implementation on real WSN by using some sensors technique for detecting any intrusion within the home to provide remote home security. We use variations in received signal strength indicator (RSSI) value to find the intrusion activity at home. The variation of RSSI, is sufficient to detect the intruder by determine the mobility of an intruder and have found that accurate intruder detection is possible for at least short distances. An architecture of application has been presented consisting of Moteivs Tmote Sky motes and base station. The application sends a piece of alarm as (SMS) to the homeowner mobile phone in case of some intrusion activity has been detected at home. So, the people will be able to keep track of their homes' security and protection wherever they are.

We use TinyOS and nesC programming language for sensor motes programming and Java for web application development. We deploy six sensor motes on different entrance locations in a house and programmed them with an application to send a packet after every 250ms to a base station. There is one sensor mote programmed as base station to receive packets from other sensor motes and calculate RSSI value from those received packets. Base station also records the RSSI value in a text file along with sensor mote ID. We developed an application in Java which applies local processing on these RSSI values to find variation from a specific threshold range to find any intrusion activity. If the variation of RSSI value is beyond the specific threshold range, our application generates a real time notification through SMS service on already stored phone numbers.

There are two important points we noticed and they showed to be considered in future work. The first is enhancing the minimization rate of false positives and false negatives. The second is taking a real-time picture for the area that detect intrusion in it by using integrated cam or sensor cam for this purpose then send it to the mobile phone of the home owner.

Tele-Order System for Supermarket (TOSS)

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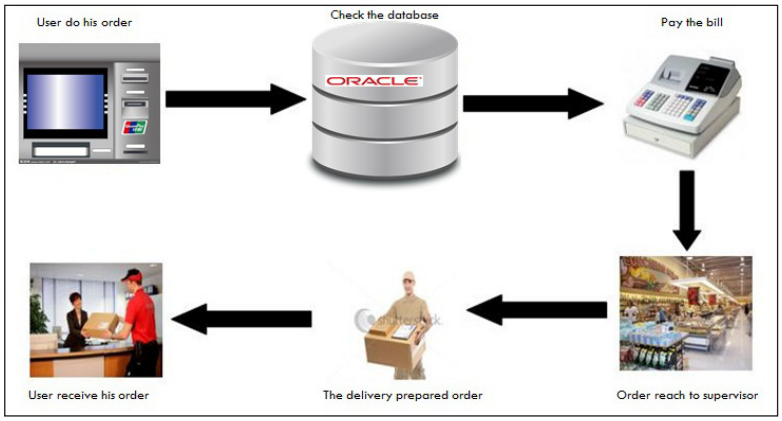
ABSTRACT

In these days, the spread of commerce centers are built on huge areas that including a supermarket. It has become popular style around the world. So the common problem, when any customer wants to do shopping from supermarket or mall, is wastage of time to reach to the supermarket and do shopping at different sections of supermarket. Another problem is the permanent crowds in supermarket›s queues taking account that is not organized.



To address the above problem, some supermarkets identified cashiers to serve orders for example that have less than 10 items only. This idea helped but not as expected. Other solution, they (supermarkets) allocate some cashier to serve on kind of category and separate it as a section such as newspaper, vegetables and fruit section. This idea helped a lot but caused other problems like suffocation around the exit door.

Our project is aimed to build an application that will help to reduce crowding around cashiers. Same application will also help to save time when you want to do shopping from more than one store beside the supermarket. This application will give the ability to buy from supermarket without going inside it and save time to collect his order (same as take away system).

We will determine an area in mall on the other side of supermarket that will have a terminal machine and a cashier .The terminal machine will contain all items and each item under its suitable category. The customer can choose any item of any quantity to add it to his order list. The system will print a bill containing order to make sure about it. After that, the customer will pay his bill from nearest by cashier .The order will reach to the supermarket. A supervisor will control these orders and distribute to deliver. At this time, the customer can shop from some other store until his order will reach to same cashier that he has paid.

A terminal machine like (ATM) system is required to implement this system. C# programming language and SQL server will based as implementation tools. A small network will connect the system with supermarket's supervisor.

Privacy Issues in Social Networks

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ABSTRACT

Social networking is a phenomenon that has been trending tremendously in the past few years. People started creating online or virtual profiles to meet, connect and reconnect with friends. An online profile is a virtual identity that includes a list of personal information. It contains one's real name or an alias, also called, a 'nickname'. They also contain people's photos, birthdays, addresses, religions, ethnicities, and their personal interests and hobbies. Adding another social network user as a friend gives access to each other's profiles, adds them to your social network, and vice-versa. The amount of information being shared on social media is alarming; they can go as far as sharing their locations and whereabouts. Sharing information has never been easier, but like any technology, it comes with its consequences.

Many Social Media users are clueless about the privacy of their own accounts or how much of their information is stored and publicly exposed. Some users might over share and expose personal information that should not have been shared. The information they share might be manipulated or used without their knowledge. Many users hit the "I accept these privacy policy terms" button without reading through them and without knowing what they are agreeing on. Setting an account to public or to private in a Social Network may not concern a user because they may not be aware of what it really means to have a public account.

Passwords, credit card numbers and Social Security numbers are examples of types of information that many carelessly share over social media and are usually targeted by identity thieves. Identity theft is only one type of fraud that uses the information people share on Social Networks. Criminals find Social Networks a tool to find potential victims, getting to know them through stalking their profiles and gathering information from what they share. Social Networks should be obliged to guide users through a series of privacy steps that helps in preventing them from over sharing personal information that could be used against them.

A suggested solution for helping users practice their daily usage of social networks without being victims of privacy issues is 'SafelySocial'; a theoretical online application that concentrates on providing users with a safe environment to browse and use their social networks. SafelySocial offers a platform that combines all of your social networks in one network that easy to control and limit it from potentially harmful external entities. What makes SafelySocial safe, is the special features it offers that gives the user the ability to safely share and connect with friends without worrying about privacy issues. In order to create such an application, a research on the issues in hand had to be conducted. The features of SafelySocial were developed after analyzing the 600 responses an online survey produced about the topic.

This research paper is dedicated to finding, comparing and exploring all privacy terms and their meanings and to investigate everything that could help develop a more private environment for social media users.

Real Time Drawing in 3D Space

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ABSTRACT

A real-life problem that designers and engineers face when designing 3D models is the difficulty and time-consuming nature of this process. The main inconvenience in current 3D modeling methods is the lack of user control and freedom in navigating the third dimension. From this point in particular, the idea for this new approach arose.

The new technique enables the user to control his movement in the third dimension in a very simple and intuitive way, and most importantly, in real time. Using a special pointer (an IR LED), the user's movement in the 3D space is tracked. In order to be able to actually track in 3D, two infrared cameras are used.

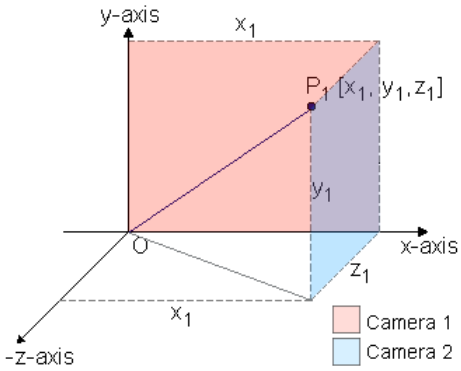
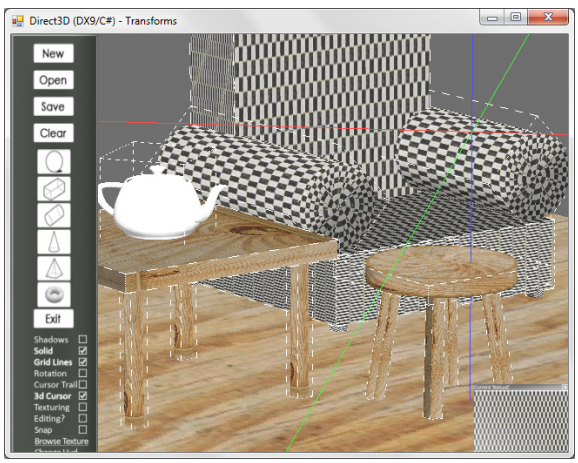


Figure 1: Both views combined into one point

Each camera captures a 2D coordinate based on the pointer's position relative to the camera itself. We take the X and Y coordinates from each camera and extrapolate a 3D position based on them. Figure 1 shows the captured image from each camera.

The application side of the system is a modeling program that is programmed to use the pointer coordinate values to display an on-screen 3D cursor. A designer can choose to create his scene by using predetermined shapes, using the pointer to easily place, edit and remove shapes at will. One may also use the pointer as if it were a pen and simply point and draw to create a model or draft. This is the main appeal of the system it relieves the need complicated drawing commands and camera positioning when modeling. This is especially apparent when someone has an idea, but has little background in 3D design and needs to convey his idea to others, or if he needs to make a draft of a model quickly.

The processing power of personal computers has increased dramatically in the last decade, applications that require artists and modelers (such as computer games, animated movies, and special effects), are no longer limited by the graphical processing power of computers, but the time and budget it takes to actually produce the models, assets, and resources of the application needed. The system has the great benefit of reducing the time it takes to create complex models; this is due to being able to fully and freely manipulate the model in 3D.



The main challenge for the system was developing a robust piece of software that could satisfy the needs of the modeler and enables him to interact with the hardware components effortlessly. The required algorithms to generate the 3D coordinates are implemented in the software as well as other image processing and geometric calculations needed.

The results of our research and work are as follows: We were able to track a speci
using the two cameras fully, in real-time, with great smoothness, and most of all, with almost zero latency. We were able to find an excellent camera that provided superior speed, accuracy, and pixel resolution. We have also created a capable, robust, and user friendly system interface (Figure 2); impressions from peers and superiors alike were highly encouraging to continue development and further expand this approach.

Error Reduction in Mobile Robots Navigation

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ABSTRACT

This research is derived from an implementation of a navigation algorithm in MAROFEX [1], in which the deviation errors of the robot were relatively large. The deviation of the MAROFEX's trajectory mainly occurs when different frictional forces act upon its wheels. To reduce this deviation, a trajectory stabilizing method was used in [1], even though the error margin was somewhat large; therefore, the study of this research became necessary.

The aim of this research is to increase the precision of MAROFEX navigation and maintain a steady trajectory. Since MAROFEX-1 was built with an upgradable design, a newer version of MAROFEX has been made (MAROFEX version 1.1), which led to this research.

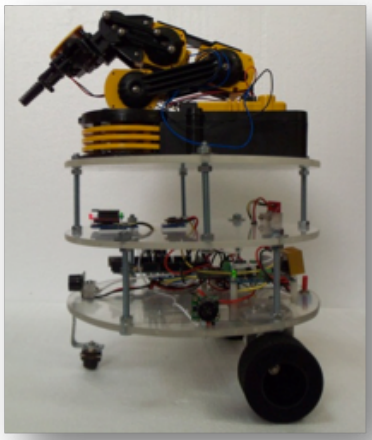

Figure 1: MAROFEX

MAROFEX-1.1 is introduced with a new hardware component to be utilized, which is the ADNS-2051 optical mouse sensor; it is fixed below the main layer of the robot and is used to measure the distances traversed by the MAROFEX in inches. Since the ADNS-2051 has a resolution of 400 counts per inch (cpi) and an accurate rate of motion up to 14 inches per second (ips), it is able to measure distances precisely and to detect small deviations from the path. The other sensor used is the electronic compass HMC6352, which measures the angle of deviation from the robot's original path in degrees.

By sensor fusion and proto-threading, the data is obtained from the ADNS-2051 and the HMC6352 sensors to produce useful data instead of letting the MAROFEX depend on using data from the two different sensors individually. The data is analyzed to lessen the error margin whilst navigating through a specified path.

This error reduction method is not limited to be used on MAROFEX robots only, but also on other mobile robots which use similar sensors.

References:

[1] Chenaoua, M.K., and Abdulhasan, A.A.: MAROFEX-1 A Mart Mobile Robot. In IEEE Multidisciplinary Engineering Education Magazine (MEEM), special issue on Selected Papers from URC2011 (Editots: Mahmoud, Q.H., AlTaei, M., and Jololian, L.), December 2011, pp. 36-41.

Ehsaat: Numbers to Better Nation

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ABSTRACT

Ehsaat is web based solution, it's channel to connect the citizen directly to the State officials in our country, the solution serves two users, the first one is the citizens who need to deliver their voice about the problems they faced it, so the user will submit the complaint and then it will be classifying according to the responsible agency. The second user is the Admin who belongs to certain agency or ministry, his job is to check the problem that frequently happens, for example: "X restaurant is raising the price", send these complaints to the responsible to solve it and then follow up with user with situation by writing feedback to them.

Ehsaat solution exhibit accurate number to the officer, head of departments, secretary or even the king himself, these numbers can't be manipulated and it will be the real major for the citizen's satisfaction, In addition the solution will produce future numbers by applying data mining on the database, the idea of solution came from seeing our friends always grumble in Twitter and Facebook about the vexatious they face it daily, without making any step could change the reality, and after investigation we found out the bureaucracy is controlling almost every ministry and make the communication complicated and take a long time, and if the officer incogitant then their effort to make a different will be windward.

King Abdullah initiate The National Commission of Fight jobbery and this solution is our contribution to our country to flourish more and more, and to help this commission to succeed, the solution's future is promising by knowing that 70% of King Saudi Arabia citizens is youth, and they are excited to contribute in building better nation, the solution could have a very large audience in few weeks after that the Ads will be the solution earnings. And from there the Ehsaat solution could be promoting the mobile application, so the people could easily use it anywhere.

The solution now is in the implementation stage, the Ehsaat's team is working on two sides; the user interface side where the users can subscribe, login, write complaint and view the feedback on them, and the other side where the admin can login and view all complaints and statistics.

Vocafun: A Mobile Game to Teach English Language Vocabulary

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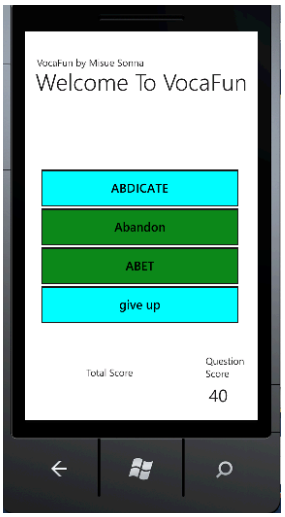
ABSTRACT

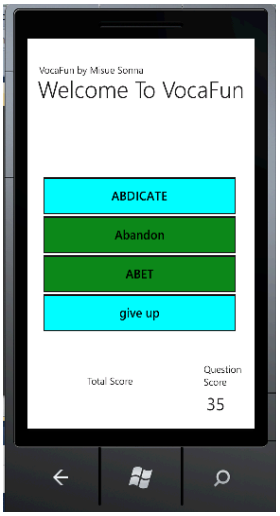
The English language is the most spoken language worldwide. A key challenge of learning the English language is learning the language vocabulary.. Learning vocabulary itself can be very challenging. Almost every English word has two or more meanings -depending on the syntax- and there are words that are pronounced the same but spelled differently.



Vocafun is an application that addresses the issue of learning vocabulary through a mobile game. The user gets to learn new vocabulary and test his English vocabulary through time-management and matchmaking concepts. Therefore, when the user is given a set of words, he/she gets to select two words that are closely related to each other “Synonyms”. The faster the user response the higher his score is. As the user advances in the game:

1. The sets of words become more sophisticated.
2. The score granted to solving a set increases.
3. The number of words to choose from increases.
4. The time given to the user becomes shorter.

The scoring system and the levels concept both increase competencies between users of the game by letting users compare their scores. They also add a thrill and help attract the user attention and keep him focused on his goal. There is no win or loss in this game. After a certain time, if the user does not supply any answer the answer will be shown to him/her and the user will be granted a score of zero. Moreover, the user will not move to the next level before he/she passes a certain number of quizzes in each level.



Vocafun has several major advantages over traditional methods of teaching English vocabulary, such as:

1. It does not require internet connection.
2. It is weightless unlike paper books or papers.
3. User does not need to carry extra staff “like a laptop to play a cd”.
4. It does not require software to run “like e-books”.
5. The user gets to learn and practice whenever and wherever they want.
6. It is more interesting and thrilling.

Results and Evaluation:

We tested the initial version of the game on 100 students; the students reported that Vocafun has the following advantages over the regular methods:

1. Inviting to use. The concept of learning and playing is very attractive especially to young minds.
2. Simplifies the learning process. Learning is a gradual process. In other words, no one can learn everything at one time rather it is a gradual learning. This is what Vocafun does. It decreases the learning curve.
3. It helps breaks the routine.
4. It is targeted to public. Anyone can play Vocafun; it doesn’t target a specific group. It targets everybody.

Overall, from the gathered feedback, this system is very promising. It is a great approach towards improving English communication skills.

Teaching Arabic Sign Language Using Avatar Technique on Mobile Phone

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ABSTRACT

Communication is a very important factor in human life. It is a process to exchange information, opinions and feelings between members of society. There are different ways to communicate. For example, linguistic communication through speech, writing and communication by sign. Also, while communication is important for all, it plays a much important role in the lives of disabled people. They need more than others to communicate to deliver their feelings and needs to the community.

The sign language is a natural way of communication between deaf to communicate with each other and with other members in the community. Healthy and deaf people need translator to translate natural language to sign language and vice versa. To make this easier, we developed mobile phone application to teach Arabic Sign Language using Avatar (virtual human) technique in new interactive, scientific and educational way for deaf and healthy people.

We developed the application on mobiles because of the widespread of them and their applications. This makes the application available and accessible to a wide variety of people at any time. The main steps used in developing our project are:

1. Collecting signs.
2. Creating signs using the Avatar.
3. Converting them to video clips.
5. Building the teaching system, which consists of three educational levels:
   a. First level: learning letters and numbers from 0-10.
   b. Second level: learning numbers from 11-100.
   c. Third level: teaching basic words that belong to four fields, which are religion, family, food and colors.

The system Represents, Describes and Pronounces the sign by the Avatar.

Main Tools used to build this system:

Vcommunicator Gesture Builder: To create sings. The programmer can only Create the hands movement using this tool.

Vcommunicator Studio: It uses .gse files which are created by Gesture Builder, then generates video files. We can add more features using this tool such as sounds and lips, legs and eyes movements.

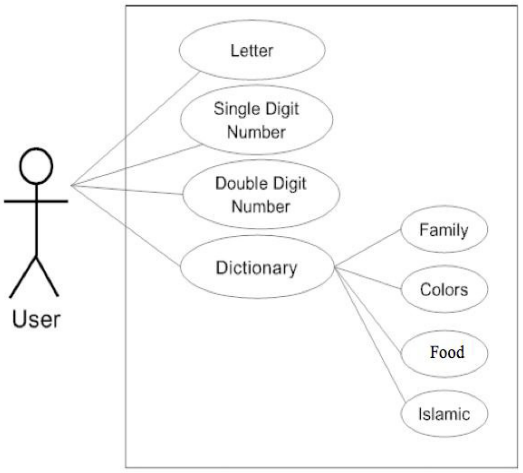
(SDK): Tools that are used with any environment like eclipse to made android application.

Xml: To design interfaces which include buttons and images.

Java: To affect the behavior of buttons and images. In system analysis we used use-case diagram for functional requirement.

As a result, deaf and healthy people all benefit from our application. For deaf, the System helps to express their needs by learning the signs of words. For healthy people, it helps the family of deaf to understand the deaf 's needs and speak with him/her in their language.

The evaluation of the application will be in two types, expert and end user evaluation. Our application is usable, since the design of this application is easy to use especially for naïve users. Also, it is reliable, since all the signs are taken from United Arabic Dictionary. End user evaluation can evaluate it after uploading it on the Android Market.



1.Use case diagram.

2. Screen shots show sign of the word "القرآن الكريم"

Pilgrim Smart Identification using RFID Technology

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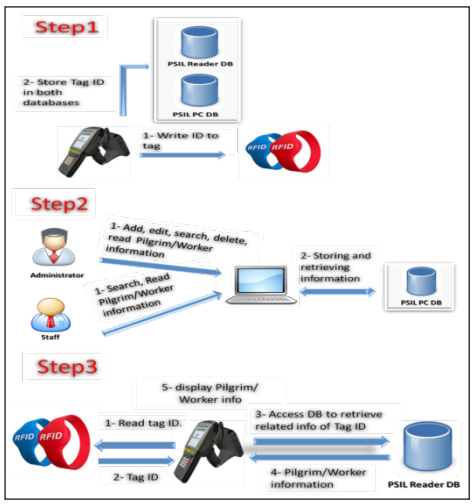
ABSTRACT

Yearly, from all around the world, different nations millions of pilgrims gather for Hajj season in one spot in holy Makkah to perform Hajj rituals. The Hajj season is the most crowded event that is repeated every year and the number of pilgrims is increasing year after year rapidly, so Saudi government and Hajj institutions facing a big challenge and a lot of problems summarized in losing the official identification documents, language barrier in communicating with the authority especially in emergency cases (need guidance when missing directions, and medical problems) and determining the identity of dead pilgrims. Currently, Hajj campaigns identify pilgrims by a carried information card. But there is no proper way to identify any pilgrim in case of loss, sick or death.

The aim of Pilgrim's Smart Identification (PSI) system is to improve the current identification method by using RFID (Radio Frequency Identification) technology. This PSI system contains two databases to store pilgrim/worker's information and two applications have been developed on both platforms (PC/reader), which are established based on C# and .NET framework.



All tags would be reassigned new IDs using (Write Tag ID) in the reader application and based on the Hajj campaign rules.. Through PSI's PC application the administrator could assign pilgrim/worker information to these tag IDs and he has also the ability to edit, read, delete, search for pilgrim or worker information on the PC database which constructed by SQL Server. After that the reader application reads the tag ID and retrieves the related pilgrim/worker information from the reader database which built by SQL server compact edition. The information would be displayed in the RFID reader's screen only if the tag is already existed in the database. Also this application has the ability to add and delete pilgrim/worker's information in case of emergency.

The right selection of the technology and equipment considered as a curtail part of the system development.

There are many auto-ID-Technologies similar to RFID such as: barcode, smart cards, and biometrics. RFID and barcode both carry information about products. However, there are important differences between these two technologies:

- RFID has ability to read, write, modify, and update whereas barcode has ability to read only. Reusing ID's tags is considered a remarkable point in minimizing system's cost and saving the wasted material.
- RFID tags can store data up to 2 KB whereas the barcode has the ability to read just 10-12 digits, which add the capability to store pilgrim/worker's picture.

Also PC's application facilitates registering pilgrim and worker information which saves time and effort in identifying and searching for the missing pilgrim/worker. Reader's application facilitates retrieving pilgrim/worker information especially medical information in emergency cases using reader's built-in DB.

We envision that our system will get global recognition in term of easiness, cost-effectiveness, great solution for identification of pilgrims using the latest technology of RFID. This will open new areas of research for other students and beneficial for government of Saudi Arabia.

Practical Comparison between Two Algorithms for Indoor Localization

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ABSTRACT

Objects localization relative to their environment is important as it has many applications. Localization can be done indoor as well as outdoor. This paper focuses on the former type. Indoor localization systems have gained a lot of interest in the past few years. This interest is due to the enormous number of applications where such systems can be utilized. Determining the location of remote objects wirelessly could be used for security, sensor networks and navigation in an unfamiliar building (such as a shopping malls and museums). In the case of outdoor localization GPS is normally used. However, due to its line-of-sight requirements, GPS cannot be used in indoor environments.

Therefore, to locate mobile devices in an indoor environment, other methods using a wireless network and a localization algorithm have to be used.

The most popular wireless technologies used in indoor localization systems are ZigBee, WLAN, UWB, and Bluetooth. ZigBee, among the other techniques, has very attractive characteristics such as low power and low cost. Regarding the localization algorithm, there are various algorithms that make use of different signal measurements such as Time of Flight (TOF), Direction of Arrival (DOA), and Received Signal Strength Indicator (RSSI) to infer the distances among different nodes in the wireless network. RSSI based algorithms are particularly attractive, since they requires no extra hardware on the remote node side. However, the information that the RSSI generates is highly affected by multipath propagation, shadowing, and other effects that are naturally occurring in an indoor environment. This can present a challenge to applying RSSI for accurate localization. Therefore, modified forms of RSSI that overcome the aforementioned problems are needed.

This paper presents the results of a practical implementation of a ZigBee based indoor localization system. Two RSSI based algorithms are going to be tested: Weighted Least Square Estimator (WLSE), and Geometrical based Technique. The WLSE algorithm is particularly attractive because it is robust against errors arising from the path loss, and has a good accuracy for a small number of reference nodes. However, the algorithm requires high amount of computations that need a relatively powerful processor to execute in real time. Another technique based on geometrical formulation was developed to eliminate the need of a powerful processor. This paper will present a detailed practical comparison between two algorithms using different test beds.

The testbed for the evaluation is a ZigBee network. Some of the nodes in the network are reference nodes with known locations. All other nodes are blind nodes, and the system should determine their locations. The blind node will measure the RSSI from different reference nodes and will estimate the distances between them using a path loss model. These distances will be used in the localization algorithm to approximate the location of the blind node. Then, the location of each blind node is going to be displayed on a tablet.

Toward an Arabic Digital Library

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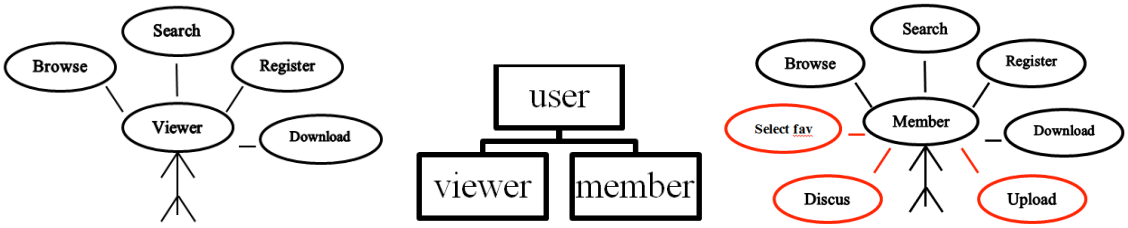
Many Digital Libraries (DLs) exist and they have proven to be very beneficial, but in the Middle East there is a significant lack in them. Therefore, the mission of this project is to encourage the creation of Arabic DL.

A DL is a collection of documents in organized electronic form, available on the Internet. Depending on a specific library, a user may be able to access magazine articles, books, papers, images, sound files, and videos. Electronic Library and Virtual Library are some synonyms for Digital Library.

This project takes advantage of many good digital libraries existing in the internet and tries to implement the system in a way that avoids problems that other DLs have been facing. In addition, new features were added to the project to make it trustful, dependable and attractive for the users.

DL faces many issues that must be taken in consideration while implementing a new one. Finding resources, unreliable resources, limitation in accessing information and using services, preservation, and copyright are major problems in DL. The project tried to solve those problems in several steps. It offers resources for the readers and allows users to participate in providing resources too, although there are some constraints for the user to upload his/her material such as legal copyright form, author's name, publisher's name, and so on ;those to insure that resources are reliable, and no copyright problems should occur. Plus if any plagiarism appeared the responsibility will be held on the author (up loader). The collections are available 24 hours 7 days a week, they can be shared easily with no limitation, plus the services and material are accessible for free which saves cost for the users.

The project implement the three desire features for any digital library system: uploading, searching, and downloading; in additional to more features like providing resources, selecting favorite material, browsing, listing, classifying, discussing, and publishing new collection . Those were added to make the system unique and able to compete other systems. Also, the system will ask the users to fill some information about them while registering, only after registering the users will be able to activate the uploading, discussing and selecting favorite features. Moreover, in term of backup, the system interacts with servers and hard drives to keep copies of the DL contents.



The research conducted talks about the project's context and its history by describing and explaining the issues and how those issues have been handled. In addition, the research will give specific details about the system design requirement; what have been accomplished and why; it will explain how the project provided options and justification to the overall design of components and methods used in each functional part. Furthermore, it discusses in depth the final implementation and how the system brings the main three concept of the DL; collection, people and services together in one environment. Also, it describes the project functions including diagrams, small code examples, and figures

All in all, DL allows its content to be created, saved, accessed, maintained, and managed which make it different from the traditional library. The cost of maintaining a DL is much lower than that of the traditional. Also it is not limited to a particular location; it is virtually distributed all over the world. It can be accessed at any time and used by a number of users at the same time. The user is able to use any search term bellowing to the word or phrase of the entire collection. Those advantages for DL cause users to shift from traditional library to virtual library.

Developing a High-Performance Voice Controlled Network Utilizing Commands Database Approach

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ABSTRAC

The tremendous development in Information and Communication Technologies (ICT) have led to the emergent of the concept of Voice-Controlled Networks (VCNs), in which voice commands replaces push buttons. However, the performance of such systems depends on a number of factors, such as: quality and accuracy of the voice recognition system, quality of the communication link, environment noise-level, error-correction efficiency and tolerance-level, and type of the voice-controlled applications. Many approaches have been developed to improve one or more of the above factors targeting maximum applications' performance. One of the most effective factors is the quality and accuracy of the voice recognition system as it affects applications understanding to the issued commands.

This paper proposes a simple and effective design model that can be used for developing a high performance VCN. The model is based on establishing a commands database for the application under development to filter out and match commands before further processing. In order to investigate and evaluate the performance of the proposed model, we develop a software tool controlling Windows Media Players (WMPs) running on computers connected to a Wireless Local Area Network (WLAN). Thus, the tool is referred to as VCN-WMP. The voice commands can be executed on one/group/all devices on the network at the same time.

VCN-WMP is a tool that is designed for remotely control a WMP running on one or more computers connected to a network from any other computer on the same network. The computer on which it runs is referred to as the slave computer, while the computer that controls the operation is referred to as the master computer. VCN-WMP can play media files with cool playlist, control all functions of the media player with voice command from a master computer on one or more slaves subject to have all computers connected to the same network. The computers could be linked through Local Area Network (LAN) or Wireless LAN (WLAN).

VCN-WMP comprises six main software modules, these are: Graphical User Interface (GUI), voice-to-text, communication, command, management, and commands database. In this work, VCN-WMP is implemented considering the following software and hardware: Windows 7 PC running Windows Media Centre 7, TP link router, speaker device, Microsoft Speech Sdk5.1, Microsoft Visual Studio 2010, and Web server. In order to minimize number of misses or mismatches between outcomes of the voice-to-text tool and the system commands; due to voice indistinguishablity or interferences, we establish a database in which we store all system commands as text words. So that after each text-to-voice process the extracted command is match with the closest command on the database list. Then, the matched command is sent by the master across the network to be executed on the destination slave (s). In this case, the database is acting as block to enhance quality and accuracy of the voice recognition system.

From the many ways available to communicate between the network nodes, we chose in VCN-WMP a Web services. It offers many benefits over other types of distributed computing architectures (interoperability, usability, reusability and deployability). Web services are components on a Web server that a client application can call by making HTTP requests across the Web. Visual Studio has the capacity to create custom Web services or to use built-in application services, and to call these services from any client application. However, there are some requirements on the system to enable running Web service, such as: the master computer needs to turn off his firewall to give commands, if the slave computer works on windows XP; it needs to install windows service pack3, the slave application needs to be connected and see the service before running. The performance of the database approach is very encouraging to extend using the same principle for a wide range of applications, such as controlling home electronic equipments, offices, factories, etc.

A Cost-Effective Water Quality Monitoring System Using Wireless Cellular Networks

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ABSTRACT

In UAE, the quality of conventional water resources (groundwater) is deteriorated due to the imbalance between the input (scarce rainfall) and output (increasing consumption) of the groundwater system. Desalination and wastewater treatment plants (non-conventional water resources) have been widely established to cover the shortages of conventional water resources and to meet the high demand of water for domestic, agricultural and industrial purposes. However accurate monitoring of the quality of the desalinated water, treated water, and waste water produced by these plants is a must. Due to the enormous number of conventional and non-conventional water resources in UAE and due to their widely spread all over the country, the fulfillment of the previous water quality monitoring requirements using conventional sampling and laboratory-based techniques is difficult, expensive, and unreliable. In the last decade, intelligent monitoring systems were introduced by utilizing the achievements of research efforts in enhancing sensor and network capabilities, communications technologies and data delivery formats. For example, wireless sensing systems offer the potential to reduce the system cost considerably, as well as to provide more useful, continuous monitoring capabilities by giving an accurate idea of the changing environmental and water quality in real time. On the other hand, the availability of spatial and temporal variations of the different water quality parameters allows more accurate and specific interpretations.

In this paper, we introduce a cost-effective water quality monitoring system using wireless cellular networks. The basic building blocks of our systems are the hardware sensing circuits, the hardware interface circuit, and the monitoring and control software environment. The hardware sensor circuits will generate the calibrated output voltages which are proportional (correlated) to the variations in the measured physical quantities. This data are transmitted wirily or wirelessly through our designed transmitter/receiver and encoder/decoder circuits. The function of the interfacing hardware is to latch the data received from the receiver to the computer for further data recording, processing, and analysis. Our designed hardware circuits are interfaced with our computer using standard data acquisition card (DAQ). After the DAQ latches the measured signal in a suitable form to the computer, an efficient software program will be implemented to monitor, record, and display the data in a form that can be easily accessed by the interested users. To fulfill all users' needs, LabVIEW programming environment is used to create our program that will continuously accept transmitted data fom our real time monitoring circuits. LabVIEW is standard, user friendly, and moreover allows the user to send setup and operating commands to the DAQ while allowing various types of data to be logged. As shown in fig.1, Data files can be output in MS Excel and text file compatible format, for direct handling by users who do not have advanced programming skills.

Fig. 1 Front panel of the local monitoring unit

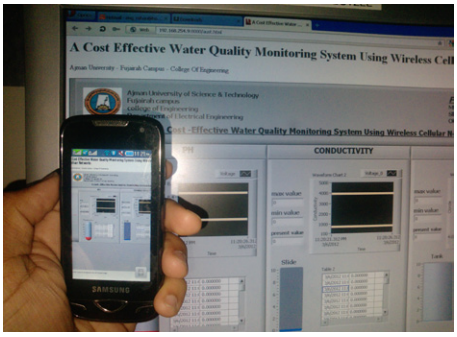

Fig.2 Monitored data transmission over wireless cellular network

It has to be mentioned that based on the user's requirements, the capability of our proposed monitoring system can be further enhanced to handle more input (analog input, digital input) and outputs, to recorded additional files or display additional graphs, using available wireless cellular network facilities for data transmission as shown in fig. 2.

Encryption and Decryption Using Vernam Cipher Algorithm

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ABSTRACT

Cryptography, the art and science of using mathematics to encrypt and decrypt data to keep messages secure, it has been practiced for nearly as long as has been communication.

This paper is dealing with the cipher and deciphers information by using the Vernam algorithm. Since the Vernam cipher is part of the cryptography initially it will describe some of the keywords in cryptography, then it will explain and analyze the Vernam cipher and implement it.

In the Vernam cipher if the key is not repeated it's called one-time pad cipher. But in the computer science it's not particular or useful to make the length of key as long as the length of plaintext without repeated even though it was useful in the past.

The one-time pad cipher cannot be cracked by the FBI or NSA – or by anyone because of using a random key that is as long as the message.

The first one-time pad system (Vernam cipher) was electrical in 1917. Each character in a message was electrically combined with a character on a paper tape key. The second development was the paper pad system. Diplomats had long used codes and ciphers for confidentiality and to minimize telegraph costs. For the codes, words and phrases were converted to groups of numbers (typically 4 or 5 digits) using a dictionary-like codebook.

Vernam Cipher is a stream cipher where Gilbert Vernam, an employee of AT&T Company, invented it in 1917. He designed it as a security device for telegraphic communications but in modern cryptography it works on bits combination of random characters with characters of plaintext using the XOR function. The Vernam system is still being used today by intelligence agencies like Britain's MI.6, Germany's BND, France's DGSE, Russia's MBRF, and China's Cheng Pao K'o also Dubai Islamic bank use this cipher in his transactions.

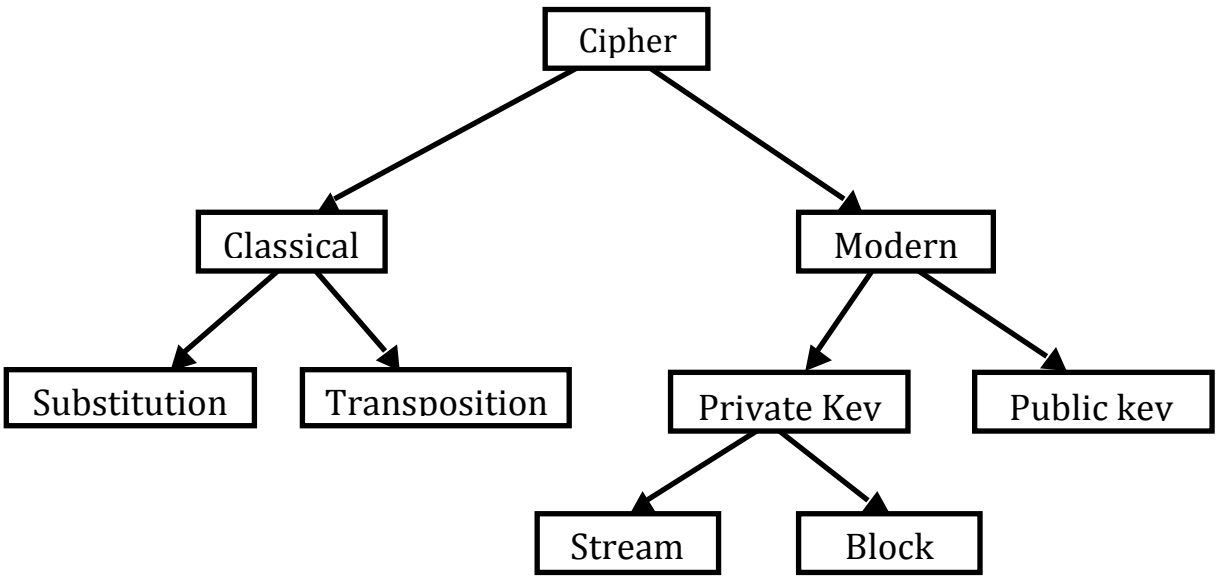

Figure 1: Cipher's Diagram

3D Virtual tutoring System for Architectural Designs

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ABSTRACT

This project presents an ongoing research that intends to improve architects construction education through the use of CAD (computer aided design) modeling (a 3D design of such environments plus time) of construction processes. This system is intended for System architectural designs (SAD). The project is proposed to implement SAD modeling for the architectural engineer and designers that will provide an interactive working environment for simulation, visualization and modeling of constructed sites using fully animated walkthrough in blender and Python based-on Tkinter. The proposed system intends to be a base for experimenting with the use of immersive virtual reality through which our created tool allows construction engineering users to interactively generate sequence of modules for a project in an immersive environment.

This tool will provide a Python environment and Blender for sporadically creating, renovating, modifying and making animation for imported models from AutoCAD file and 3D Max file. The system will serve as a flexible toolkit that will have most of the AutoCAD / 3D MAX operation and utilities in addition to have users able to manipulate designs in an immersive design. The final prototype is intended to be a system that can be installed on i-pad devices , that are portable and fixable to accommodate designers needs in a way that give the look and feel for better decision support.

Virtual reality is a computer simulation of a real 3-dimentional world, often supplemented by sound effects. Immersive virtual reality is done with animation and emphasizes interactivity with a virtual (software-based) 3D blender environment. The project allows the user to enter and become immersed in the virtual world. the main difference between an immersive and other forms of VR include the fact that the user in an immersive system can feel directions where he can turn around , look behind , and see and modify the models in the virtual world-door, closet, walls or any present object in that model.

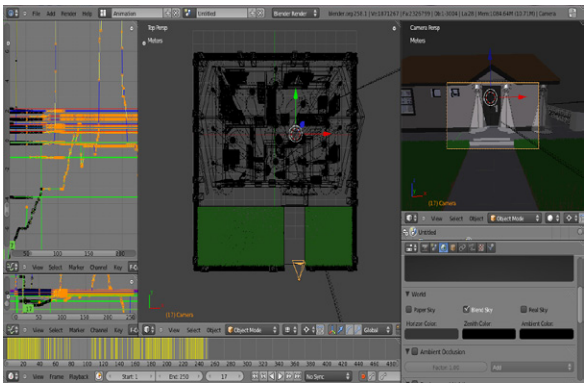

Figure 1: The animation interface

When presenting virtual reality software as an enhancement and alternative to draw on paper all the time, things have changed to the best and become more flexible. Of course a designer needs to have solid knowledge of 3D graphics software which they can make a particular design with. The 3D software allows the designer, to modify a building design in all the 3 dimensions and see the internal and the external of the design with animation. This means the designer can make 3D environments with a walkthrough for the model and keep adding details. For instance view how the window and door will look from inside, etc. in a custom manner with the interaction of the owner or customer in a real-time manner with immediate feedback.

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Crypto Educational Tool

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ABSTRACT

CET (Crypto Educational Tool) is a window's based application can be used as a learning tool for those who are interested in the basics of cryptography, it includes interactive teaching material for most of the historical and modern ciphering algorithms, explained in simple step by step method, and a multiple choice test that it can be updated to have a huge set of questions chosen randomly. There is another section in which it provides a tool for RSA and DES encryption and decryption. The implementations of both modern ciphers are difficult, therefore having a tool that shortens the steps will be important for those who want implement these ciphers.

The first part of the software can be used by two groups of users, firstly computing students, who might find this application useful as a handy tool to remember or understand set of classical or modern ciphers, besides having a multiple choice test for the teaching materials. This test can be extended and enhanced by an admin user to enrich the database with varieties of questions that can be chosen randomly. The second group are general users who are interested in learning about different cipher systems, in simple way without deep knowledge requirements in other fields.

The classical ciphers included inside the learning section, contains both mono and poly alphabetic characters, for both transposition (Caesar, affine, and vigenere) and substitution (columnar and simple) ciphers.

The modern ciphers will be explained in the learning section and implemented in the other section. The fully functional algorithm for two complicated ciphers (RSA and DES) cannot be solved easily using normal calculation methods.

RSA (Rivest, Shamier, Aldeman) found in 1978, based on an 18th century theorem in modular arithmetic, attributed to Euler & Fermat. The public key cipher is linked to the NP-complete problem of integer factorisation.

RSA encryption is based on the public key (e,n) and the decryption is based on the private (d,n) key as follows

Encryption:

Decryption:

The algorithm of the application tries to solve the and automatically, because having a block to a large power will give #NUM! error or overflow when we try to solve it directly, therefore we try to calculate the power through a recursive function that will add up smaller power values to sum the value of e. The same thing can be applied on.

For the DES algorithm

The user enters the message and the application will accomplish the following

1. The message will be divided to two 32 bit halves
2. Expansion permutation of right 32 bit
3. 56 bit key will be driven from original 64 bit key and divided to two halves then the will be shifted by one
4. 48 bit key will be driven from 56 bit using compression permutation
5. XOR the right 32 bit with the key
6. 8 S-Boxes will be used to reduce the 48 bit result to 32 bit
7. The 32 bit result will be permutated using P-Box
8. The result will be the left part of new round and the whole process will be repeated again

In this paper we highlight the content of the teaching tool and the target user's, then explain what are the difficulties to test and practice the two complicated ciphers, and how our algorithm tackle the problems.

E-Learning of Childcare for Parents

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ABSTRACT

This paper presents the outcome of a research study conducted as a part of the ongoing development in Kurdistan Region of Iraq. The main aim of the study was to carry out a study of child health care and to design a help tool for parents. Since the healthcare has become a crucial competitive advantage in hospitals; new strategies are necessary to develop in order to learn more about healthcare, as well as training within the field. Moreover, nowadays E-learning, which uses digital technology to deliver educational material, has been used to a greater extent by individuals as opposed to other, traditional, technologies, for the purpose of acquiring education. The reason for this is mainly because it includes a reduction of time and cost. Behind that, as children are those who are developing and shaping the future society, we should focus more on them by way of guiding them to the right paths. Parents have a challenging job in today's society when it comes to raising healthy children. In aiming at a society that increasingly can have healthier children, parents should have the opportunity of accessing different sources where they can find the help they need in bringing up their children.

Consequently, this project attempts to design an E-learning of childcare website for parents, which can empower parents in such ways that they can ask doctors questions that concern their children. The benefit of the website is that, parents will have direct contacts with the doctors and they can ask questions and get answers immediately. Both of doctors and parents who want to ask question to other doctors about kids. First they must send their information to admin via contact us to have a username and password to login to the system to add questions and answers. Only doctors have right to answer questions that has been asked by parents. This system would also have the possibility of publishing any news or event that is related to children between the ages of two to ten. Parents can in this way find help in creating a brighter future for their children. This category will be adding by admin and also other people can send their information to admin via contact us to publish their news or events. The last service of this website is the parenting category, which will be adding by admin or doctors who registered. This is a supportive method in particular for those parents with their first child that may have a fear of failure or the uncertainty of identifying what is wrong and right.

Hence, in such situation E-learning of childcare for parents is an encouraging way to ensure parents in a conflictual situation not only where to obtain the help, but also be confident about that there is help and support. Additionally, there are a number of advantages, for instance E-learning provides quick, accurate, flexible, accessible information, on demand availability, and costs less than other means. One of the less advantages regarding E-learning is the fact that there are numerous websites within this area that may provide information about healthcare and present some recommendations, but without any organization behind it. It is therefore also crucial to make parents aware of this and supply guidelines to how they can search and obtain accurate information. A final note, the proposition of a website like this, is by no means aiming at commercial benefits, but rather endeavors to contribute with a genuine source and means in order to improve the quality of parental support and participation, which in the long-term will make a difference in the society.

Technology enhanced M-Learning Systems using Web Services

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ABSTRACT

In order to allow the development of joint degrees through heterogeneous M-Learning Systems, we propose a federation services architecture whose implementation will be based on Web Services. Our main objective is to allow M- Learning Systems to be able to work in a collaborative way; combining their data and functionality through the integration of their services. E-learning (learning supported by digital "electronic" tools and media) and m-learning (e-learning using aim at specific kinds of knowledge, namely knowledge that is location-dependent and situation-dependent). The way e-learning is changing to m-learning is shown in Figure 1 mobile devices and wireless transmissions have emerged.

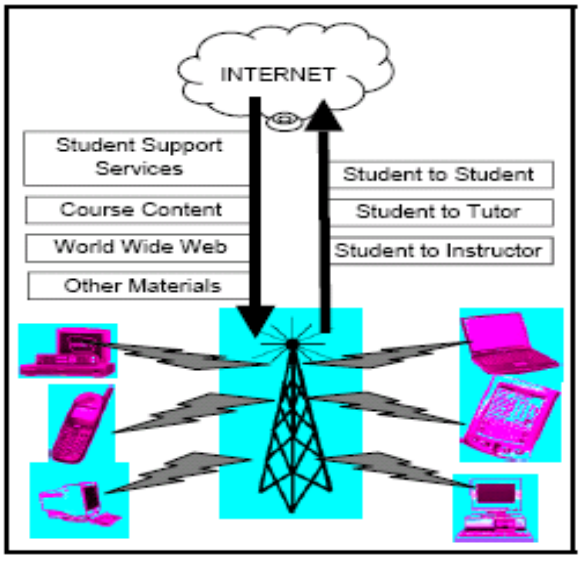

Figure 1

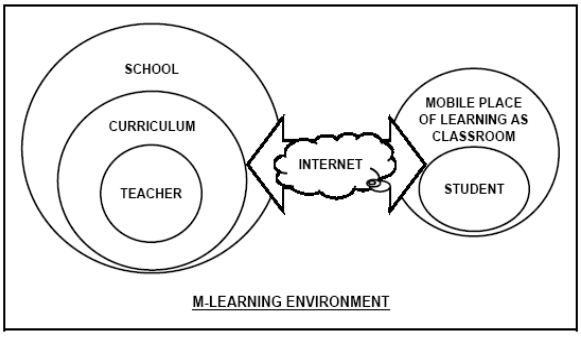

Figure 2

Mobile learning is unique because learners can access the course material, instructions, and other course related applications anytime and anywhere. This increases daily attention to learning material, makes learning pervasive, and may boost the learner's motivation for lifelong learning. Moving from stationary to mobile learning allows ad hoc collaboration and informal interaction between students. Mobile-learning is learning supported by mobile devices, ubiquitous communications technology, and intelligent user interfaces. The unique elements of mobile learning are; the facility to communicate with individuals or learning communities, either transient or well established, at any time or location; the ability to provide learning content dynamically dependent on a learner's location, wider context and the device being used by a learner, and the ability to record discrete acts of a learners 'learning episode', as they move through space and time, for later use and to provide recorded elements of previous learning episodes at any time or location. It is envisioned that with m-learning, the boundaries between the social arena and the formal learning arena, the classroom, diminish as students also take mobile telephone into use in classrooms. The teacher is put in a position in which the information that exists within the four walls of the classroom competes with information from 'outside' the classroom - beyond the teacher's control. Thus, the classroom culture is bound to change. We also hold the view that learning is an individual process that can be supported by adequate interaction and/or collaboration in groups. Mobile learning technologies present a challenge to the school – a challenge to access and utilize alternative learning arenas technologies are referred to as handhelds, Personal Digital Assistants (PDAs) or Pocket PCs, iPods and iPads.

Design and Development of an online web-based Lost and Found System in an Educational Institution

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ABSTRACT

Losing your personal belongings can be a very frustrating experience. But, with an effective lost and found system, all your important items like keys, mobile phones, digital cameras, laptops, wallets, ipods, briefcases, handbags and others, will find their way safely back to you. Therefore, as group of undergraduate students at the College of Information Technology, we decided as capstone project to design and develop a new Web-based Lost and Found System to be used by Zayed University community members, so they can report their lost and found items in an easy and efficient manner.

The main purpose of the project is to address the lost and found issues on campus by automating all the steps involved in the current practice and procedure. The research methodology included, literature review (study and examine related systems), survey design, Study the existing paper-based system, design and implement the new system, and finally eye tracking-based testing evaluation. As a result an online web-based lost and found system was planned, designed, implemented, and evaluated. The main system components and architecture are provided in figure 1.1, the web server receives request from the user, then it hands the page to the PHP engine, which normally runs as a module within the server. Depending on the code and type of request, the PHP engine queries the database if necessary, and then builds the HTML output code to send back to the browser for display.

A fully functional prototype of the system was developed to provide the users with an opportunity to experience using its main features and functions. The system is designed to be simple and easy to use and learn, and it can be accessed online by all university students, faculty, administrators from anywhere on campus and off campus. The group used several technology tools to develop the new system such as XAMPP, Dreamweaver, Adobe PhotoShop , Adobe Image Ready, Tobii Studio, HTML, MSQL, PHP and JavaScript. A samples of screen shots from the actual system are provided in Figures 1, 2, and 3.

A complete eye tracking-based usability evaluation study was planned, designed and conducted on the new system to measure its effectiveness, efficiency, usefulness, and usability aspects. An eye tracking data were recorded and collected from observing participants and later analyzed by the student group. The results from the usability study indicate that users were very satisfied with the functionality of the system as well as pleased with the quality of its user interface design. So, having such a new system deployed in place will be great addition for Zayed University community.

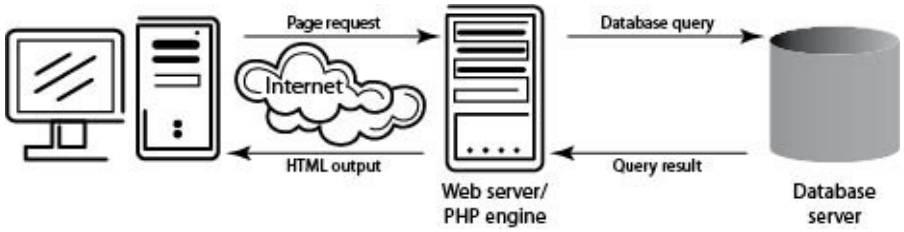

Figure 1: The System components and organization

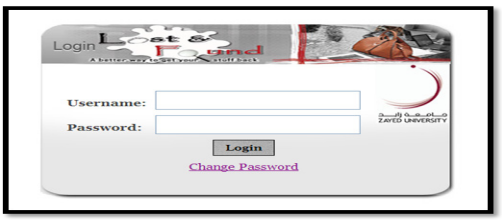

Figure 2: System login screen

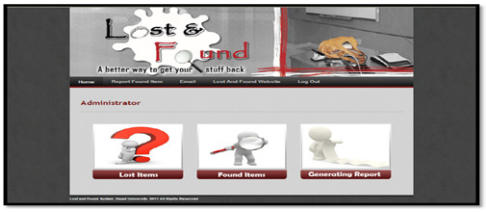

Figure 3: System main menu

A Usability Study on User's Behavior to Evaluate Facebook Online Search Results using Eye Tracking Methodology

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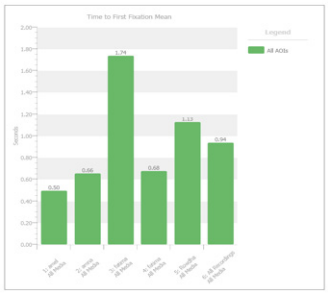
ABSTRACT

The Internet has changed the way people live, work, communicate, shop and study. Social networks and search engines are the most popular and growing services available on the Internet. Nowadays online Social networks are getting extensive among internet users, especially college students. People are using social networks for different purposes like sharing information, chatting with friends; connect family members, share photos, and planning for group events. Social networking sites have quickly become one of the most popular means of online communication. Face book, twitter are the most popular sites that people integrated them to their daily life. Facebook is a social network site that was launched in February 2004 has become one of the most popular social networking websites, including more than one billion active users. According to a recent survey of the most visited websites in UAE, Facebook ranked second just after Google.ae.

Usability testing is used to measure the quality of user experience when interacting with a product or system. Testing usability requires users and asking them to perform different tasks and observe the whole process. Eye tracking methodology has been used in many usability evaluation for many years. Eye tracking is an advanced usability testing technique that uses high precision technology to measure exactly where a user is looking and for how long. Eye tracking is used to study the relationships between eye movement data and cognitive activity of the user. Eye fixations are considered the most relevant indicator for evaluating information acquisition and processing in online search and visualization environment. Tobii 120 with studio installed was used in this study

The primary objectives of this study is to conduct a usability study to investigate how users interact with online Face book's search engine results page using eye tracking methodology. The study focuses on the user's visual browsing behavior and pattern on the first ten organic hits (abstracts) and its relevant commercial ads. The research methodology used both quantitative and qualitative approach. Data and feedback on user behavior and experience using performance and preference measures were recorded. A complete eye tracking experiment was designed and conducted using the most popular social networking website: Face book's search features where young female students at Zayed University were used as subjects. Each participant completed four search informational and navigational tasks. The 20 participants' browsing behavior and interaction with the search contents have been observed, recorded, collected and analyzed. A comprehensive data analysis was performed. The findings from the study conclude that 1) page results in face book are mostly viewed linearly and horizontally 2) The top (five) results are most likely to be viewed by searchers 3) Searchers first click is concentrated mostly on the top two results 4) Ads are less likely to be viewed by most searchers 5) Searchers follow different viewing patterns to make their first selection 6) Presentation of results can affect searchers selection 7) Majority of searchers tend to click first on one of the top two results. The study also shows the importance of SEO (Search Engine Optimization) to business's website to obtain high ranking position at the SERP (Search Engine Result Page) listing.



Design and Build a Wireless Home-Power Monitoring System for Smart Grid Applications

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Supervised by
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ABSTRACT

Nowadays, most of the electric utilities are designed to generate energy form non-renewable resources like petroleum and natural gas to provide the customers with the needed amount of energy. However, with the continuous increase in the power demand, these utilities cannot manage the increase of the loads without any enhancement in their systems. On the other hand, the demand of using renewable energy also increased which consequently forces utilities to upgrade their basic structure to handle the new generation sources. In order to fit and integrate these renewable energy into the grid, more accurate measurement, monitoring, and control equipment should be installed and used by these utilities. These technological and communication upgrades are called “Smart grid”.

To improve the current electricity grid to a smart grid, many enhancement should be applied, and different equipment should be installed, but, the most important thing to start with is to measure and monitor the consumed power by the customers. This is the main purpose from having a power monitoring system where it provides the user with the detailed of the consumed power in their home appliances using wireless communication system. The system is able to report the electrical expenses of home appliances by minute, hour, day, week, month, even an entire year using devices called “Smart Sockets”.

In fact, the system consists of a network of smart sockets that is connected wirelessly to a host PC. Each smart socket is able to sense the voltage and current consumed by the device that it is connected to it and then reports wirelessly to the host PC the consumed data such as : RMS value of voltage, RMS value of current, average power, power factor, and the total energy consumed. The host PC has a software interface that filters the data received from the smart sockets and displays the real time consumption of each smart socket either in numbers or in graphical representations that can be easily understood by the user. The overall project diagram is clarified in Figure1.

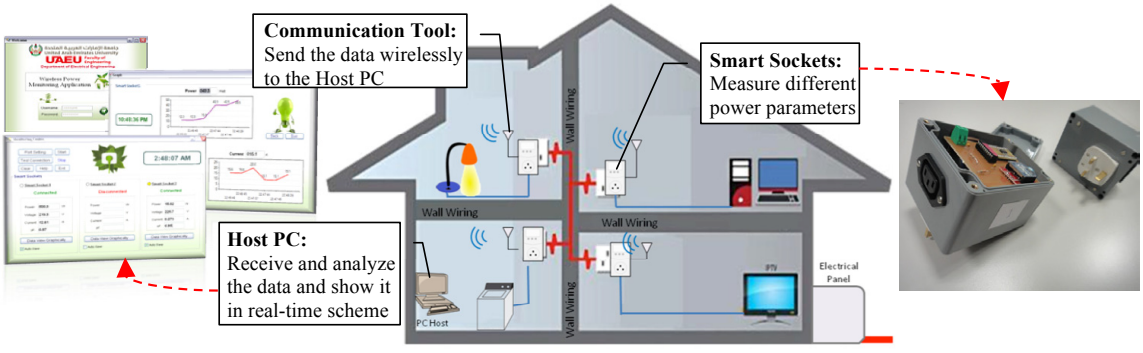

Figure1: Example of a home with a home power monitoring system

The objectives of this system were achieved successfully where a network of three smart sockets were built along with a host software that was designed using Visual Basic. The smart socket design consists of three main parts which are; analog circuit, digital circuit and wireless communication tool. The analog circuit consists of non-isolated sensors beside safety components that include fuses and diodes. The digital circuit consists mainly of power measurement and calculations engine, and microcontroller. In addition, the XBee chips were configured as the wireless communication tools. The estimated cost of manufacturing one smart socket is around 220 AED.

The benefits of this system can assist both the consumers and the electricity suppliers in different ways. The provided data from the system gives the consumer an idea about his consumption. That will help him to control the consumed power and reduce the wastage energy. For the suppliers, these data can help them to reduce the generated electricity and save money by feeding the consumers with their needs only. Also, it helps them to come up with the best solutions of the overload problems by knowing the time and the place of the overload in the system.

Raseel : SMS Protection Using Symmetric and Asymmetric Encryption With a Public Key Infrastructure

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ABSTRACT

Using Short Messages Service (SMS) as a method of communication is growing dramatically. It is popular and fast and easy to use. But, in the same time it is not considered as a secure method for sensitive transactions and to exchange information. Because, a message is sent and delivered without being encrypted. So, service providers may have full access to a message contents. Also physical unauthorized access is another point of weakness. Messages are not encrypted while stored in the device. For a result if anyone puts his hands of a phone, he could see all the messages in it.

From here the idea came, how to increase the security level of SMS? The Answer is: by encrypting the messages before sending. And decrypting them after receiving.

Symmetric encryption is not enough because the user should send the key with the message. And that is not efficient. Also, Asymmetric encryption is not very easy to use, the users should keep along with lots of keys for each conversation, and they are hard to exchange.

The proposed project is an android mobile application that provides a trusted and easy-to-follow procedure for sending and receiving secured messages, as the available solutions are either kind of hard to use, or does not support Arabic. And none of them is using the proposed mechanism, which uses 2-tier encryption. The first one is the symmetric encryption it is used for encrypting the message itself using AES algorithm with 16-byte key. The Second tier is the asymmetric encryption. It encrypts the previous step's key with the "public key" of the receiver. The application then generates a new SMS message with the encrypted text in it automatically and very fast.

On the other side. Message receiver can reverse the procedure using his private key. The application will decrypt the part of text that contains the symmetric key. And will use that key to decrypt the part that contains the ciphered original text. As an obvious result the original message will appear again. And it will remain encrypted in the inbox until it is decrypted again.

The Keys are stored in a web based Public Key Infrastructure that facilitates the exchange of keys between the users, and makes it possible to verify the parties of a conversation.

This solution may be applied in a lot of fields that require secure transaction between them and their customers. Such as banks, medical facilitates.

The App is performing its functionalities as described in the table below.

Table.1: Applications functions performance measures.

Process	Time in Seconds
Login/Get The Private Key	1.355
Get The Public Key of Receiver	0.663
Encrypt a Message	0.034
Decrypt a Message	0.101

Blood Geo-based Search Engine

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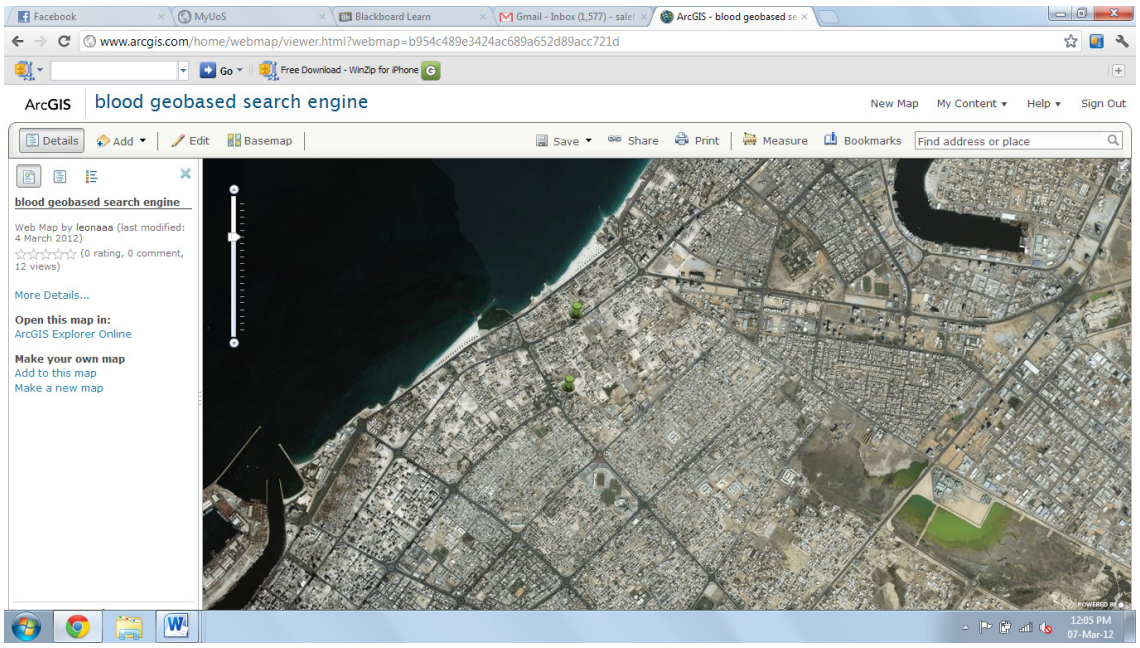
ABSTRACT

In many countries of the world, especially in underdeveloped countries, there have been tragic fatalities due to blood shortages. In some cases where an immediate supply of blood was needed, patients were injected with blood full of harmful diseases. These and a few more incidents motivated us to develop an application which would help us find the right, healthy blood type to the patient. A shortage of a blood type can be catastrophic and can risk a patient's life. Therefore, getting sufficient amount of the right blood type at the right time is vital to save a person's life. Our objective in this project is to create a system which would reduce the time period of getting the specific blood type to the recipient. We are going to create a system in which a person's blood type can be mapped on a mobile device. Every resident in UAE is required to have a blood test in order to get a visa and now it is also required to get a blood test when applying for the UAE identity card. These blood types of interested donors will be mapped on an application in the cell phone. Hence when a hospital falls short of a specific blood group in their blood bank, they can use their mobile device to track all the available donors in the particular area. The mobility of this application is that it can be used in an ambulance ,for example if there's a patient that is need of a specific blood type ,the paramedic can use the application to track down any available and willing donors and contact them on the way to the hospital. So by the time they arrive at the hospital the donor will already be there. This would reduce the considerable amount of time that could be lost in looking for blood donors and could result in saving a lot more lives in the same time.

The mobile device that we are using for this project is Windows Phone 7 SDK 7.1. We have created A map using ESRI website. The map will display a list containing x and y coordinates , the donor name and blood type.



This project is created using ArcGIS API for Windows Phone (with the help of Microsoft Visual Studio 2010 Express for Windows Phone 7).

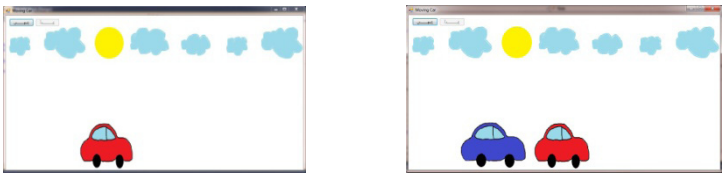
Application to Solve and Improve the Problem of Communication Disorder

ABSTRACT

When kids are unable to pronounce the words correctly, we directly notice that they are suffering from speech disorder. They need to practice continually, either by their parents or their therapy (teachers or doctors). This practice usually takes lots of time to do and sometimes it becomes boring. This project helps those little kids to improve their language and communication skills in a manner like playing a game.

The application is an interactive game using voice recognition technology; kid can interact with an animated picture using his voice. MATLAB, Visual Basic and Microsoft Access are basic tools to implement this system. There are three levels for giving the speaking skills to a kid at different stages.

First level is very basic to help the kid to improve the speech skills and making sure that the kid doesn't have any health problem preventing him from specking This level aims to encourage the child to produce sounds. It provides an interesting interactive interface shows friendly simple objects. These objects start to animate as the child produces sounds and this behavior changes when sound threshold level increased in an interesting manner. For example one interface story contains a car, starts to move as a child start produce sounds and changes to be a two racing cars as the child increase his voice (as shown if figure 1).



(b)

Figure 1: An example of the first level interactive interfaces.

Second level is devoted to children who got the ability to pronounce letters but in a wrong way, so this level aims to correct their language disorder problems by providing short vocal words such as cat or beer (قط – دب) with related pictures and encourage them to pronounce words correctly by getting them marks when saying them correctly. This stage based on a simple speech recognition system consists of pre-processing stage (Butter worth band-pass filter) for noise removal followed by Dynamic time warpping and feature extraction stage using Mel frequency Sepstral cofffecianat, finally performing classification stage by compaing the input features with the saved corresponding one from system database as shown in figure 2. The third level designed for improving the communication skills by involving the kids into a conversation and asking them to complete it in a right way but we still work on it and didn›t finished.

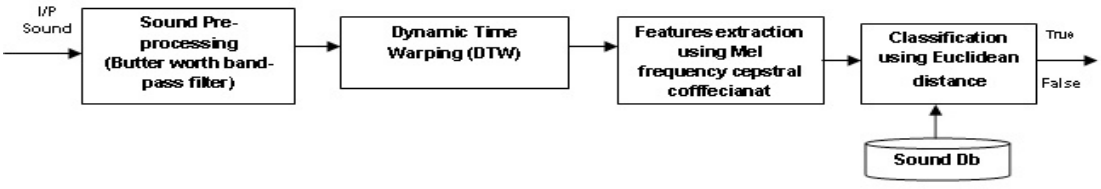


Figure 2: level 2 simple speech recognition

This application aim to help kids to learn and improve their communication skills in an easy, interactive manner, like playing a game. The current application main advantage is that it is in Arabic while, most of the available commercial applications are in English and it can be used easily at home, institution or any place.

The results of the usability test show promising results for speech therapist, parents and kids. The results show that all of 5 therapists and 8 of 10 of the parents did all the tasks directly and navigate through the application windows easily without mistakes. The children test results shows that for the first level 7 of 8 children play it in a short time, while in the second level test 5 of 7 play it in a short time. Generally the children impression was good and they like the animated pictures response a lot.

Intelligent Discharge Summary System (IDS)

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ABSTRACT

Healthcare is a vital part of any society to provide services to public. Everyday hundreds of thousands patients come to hospitals to benefit services provided by the healthcare. The major challenge faced by healthcare providers is to manage patient information in effective manner. Previously, this data was organized manually in record, which was time consuming. Now-a-days, many hospitals use Electronic Medical Record (EMR) which is the digitalized format of patient medical record. Also, EMR includes many Hospital Medical reports (HMR) such as Laboratory Report, Operative Report (OP), and Discharge Summary (DS). DS report is one of the most important used to dictate by the doctor at the end of the patient's stay in the hospital. It includes summary of everything that occurred from admission to discharge. In addition, DS usually ends with detailed plan for patient. No doubt, a lot of responsibilities rest on doctors and hospitals while preparing DS reports. There are many applications which generate the DS report but they are still need to be improved. However, these applications have limited automation mechanism, thus the intention for this research is to construct intelligent criteria to build the DS report. Adding an intelligent part is considered very important improvement which can save the doctor's time and minimize the errors. The goal of Intelligent Discharge Summary (IDS) system is to provide an efficient, less time, less typing and automated system to doctors to generate DS reports by one click. In addition minimize the human errors within such sensitive data as medical data, so the doctor can spend the rest of the time with patients freely. IDS system is based on Text Mining, which uses summarization technique that provides the ability to have an important data from a large size of text .This summarization technique is based on three factors. First factor is concerned on the sum of documents that need to be summarized and the number of languages involved in the documents. IDS system is restricted on single language (English) and generates the DS from different fields of database tables (documents) which include patient and doctor information, DS symptoms, Physical Examination, date and reasons of addmission. The second factor is the determination of system's purpose and its domain. IDS system depends on medical domain while the main purpose of the system is to produce DS from a collection of patient information. The third factor is concerned on deciding the summarization method which can be Extracts/Abstracts. Past medicine, surgical history and Relevant presenting symptoms would be extracted. While the Hospital course and management would be summarized using abstract technique. IDS would apply preprocessing techniques such as Stopword Filtering, followed by utilizing techniques like Decision tree learning and abstract method for each diesis. The IDS system interface is ready for basic data retrieving. Also the preprocessing stage of the summarization in IDS has been established as part of summarization process. The integrated sections of IDS indicate that the system would be effective and promising.

M-Pharmacy

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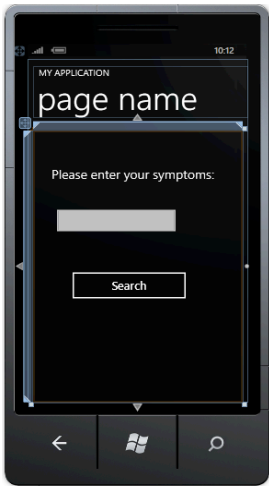
Four-month-old baby 'dies of overdose after mother was given wrong prescription' 10 Common Medication Mistakes that Can Kill; Five-year-old took wrong medication for two months; High-cholesterol patients in the UAE are not recovering at a fast enough rate because they are not following the prescribed treatment or are not being given the correct medication.

This is the reality. Most of us have gone through these problems frequently. The problem is due to complicated technologies, powerful drugs, intensive care, and prolonged hospital stay. Illiteracy, poverty are also some of the reason of wrong medications. To avoid such problems, the solution that we propose is to let people know what medicine they can take. Our proposed solution benefits from both technologies: mobility in order to solve a common health problem that can be faced by each one of us, and location-based services (LBS). It is an information or entertainment service, which is accessible with mobile devices through the mobile network and which uses information on the geographical position of the mobile device. LBS can be used in a variety of contexts, such as health, indoor object search, entertainment, work, personal life, etc.

M-pharmacy (known as Mobile-pharmacy) is an application that we introduced to the patients those who cannot get direct touch with their doctors through a mobile device. M-Pharmacy will be implemented using the Windows Phone operating system with the help of geographic information system which is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographically referenced data. In Mobile computing can improve the service you offer to your customers. And this leads to great flexibility in working.

The benefits of this project are:



1. Desktop versions can be done on mobiles: you need not waste time in sitting in front of the desktop to access a particular application, all you have to do is download the same one to your mobile and access it in seconds.
2. Anytime and anywhere: you need not search for internet access, your mobile phone allows you to access it at any time and any where.
3. Reduction of common medication mistakes that many people repeatedly perform and saving lives of many peoples.
4. Can be used by both developed and developing countries.
5. Transportation problem solved.

One main concept used here is the HMIS (**Health management information systems**) - A system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services. Health Management Information System (HMIS) an information system specially designed to assist in the management and planning of health programs.

M-Pharmacy allows users to enter as input their symptoms (headaches, coughs, stomach aches and so on) in the place provided. The search button will display the result in a new page with the needed medicine. We are also planning to add the map feature to the project in order to make it more flexible, the location of the nearest pharmacy or doctor to visit.

A Web Application for Protein-Protein Interaction and Complex Prediction

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ABSTRACT

In human health, identifying disease-causing genes is considered as one of the most important challenges. One way to overcome this challenge is to study which proteins interact with which and how protein complexes are formed.

Protein-protein interactions (PPIs) happen when two or more proteins try to carry out their biological function by binding together. Approaches such as yeast two-hybrid-based methods and mass spectrometry have helped in identifying proteins in different species however, they are time consuming and al very expensive. It is necessary to develop computational approaches to predict the interaction partners and detailed structure of protein complex.

Moreover, protein complex is a group of two or more linked polypeptide chains. These complexes play an important role in enhancing disease development process. Therefore, it's important to identify and characterize protein complex involved in order to understand the molecular events under physiological conditions.

In this paper we implemented two novel methods for PPI prediction and protein complex detection. In the first method, we detect the PPI based on pairwise similarity and using only the primary structure of the protein. The (PPI-PS) method [1] consists of a representation of each protein sequence by a vector of pairwise similarities against large subsequences of amino acids created by a shifting window which passes over concatenated protein training sequences. Each coordinate of this vector is typically the Smith-Waterman pairwise similarity score. These vectors are then used to compute the kernel matrix which will be exploited in conjunction with support vector machines. These steps are shown in Figure 1.

In the second method [2], we implement the concept of detecting maximum 3-cliques or dense sub graphs as observations show that dense regions in PPI networks are often correspond to protein complexes.

These two methods have already shown high prediction accuracies as reported in [1] and [2]. PPI-PS showed higher SN, SP and overall accuracy compared to other methods with values 78.3, 37.53 and 77.9 respectively. Furthermore, 3-cliques method detected 51% of complexes that matched the original known complexes which is considered a high result compared with other methods.

In addition, we designed and developed a comprehensive web application that offers different biological services mainly predicting the PPI network and protein complexes. To our knowledge, no such web application exists so far. This web application is designed to handle biologist needs of understanding proteins which will aid in identifying disease-causing genes. Thus, implementing this project will save time and effort for biologists, chemists and doctors who need to understand proteins functions for saving lives using only the primary protein sequences information.

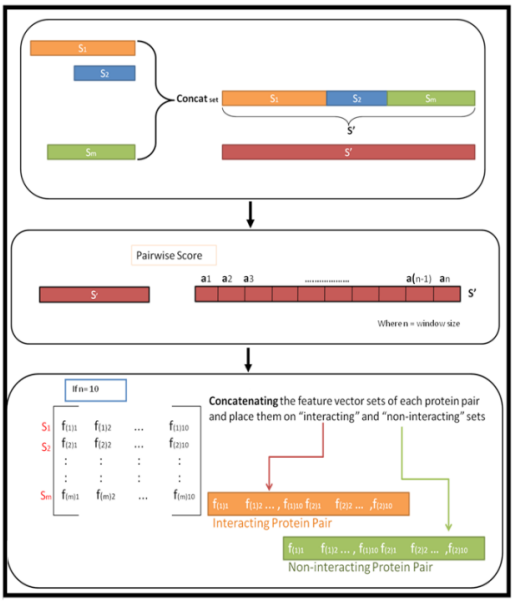

Figure 1: PPI prediction based on Pairwise Similarity (PPI-PS) method

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[2] Zaki,N., Efimov,D., Berengueres,J.: Detection of Protein Complexes Using a Protein Ranking and Filtering Algorithm (to appear).

Security Implications of IPv6 Transition Mechanisms

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ABSTRACT

Due to networks accelerating growth and emerging new technology devices such as mobile devices, IPv4 address space of 32 bits became insufficient. IPv6 with 128 bits has been proposed by IETF to replace IPv4, and to solve the problem of impending exhaustion of IPv4 addresses. Unfortunately, IPv4 and IPv6 are incompatible protocols and the transition between them will not be occur overnight, many challenges face the specialists during the try to cooperate the two protocols till we can get a pure IPv6 networks. The basic transition mechanisms are dual-stack, Tunneling and the Protocol Translation. The first one can be summarized that the two protocol stacks are available at the host, and each one have its separate Ethernet field type. The basic idea for the second one is that the IPv6 packet encapsulated into the IPv4 payload and sent through the tunnels. The last one based on the native of IPv6 hosts to communicate with the native IPv4 hosts through available pool of addresses, the IPv4 addresses are assigned dynamically to the IPv4 addresses.

The most common tool in the transmission between the two worlds; IPv4 and IPv6, is the tunnels, but the main challenge of this mechanism is the security issue. The security tools for IPv4 can't guarantee secure transition of data, so in this project we aim to recognize the different types of DoS (Denial of Service) attacks, and spoofing the tunnels nodes and the way to mitigate the threats. The researchers did many experiments to check how the current securing tools behaves when an IPv6 threat packet transmitted through the tunnel, and then comparing to its behavior of an IPv4 one. The tools used were the firewall and the IDS (Intrusion Detection System). The results were that the firewall blocks the threat IPv4 packets, and the IDS can detect these packets. When using a pure IPv4 network and try to detect the encapsulated packets the firewall and the IDS were succeed in that. However, when using the IPv6-IPv4 case, the firewall could not decide to permit or deny the packet, and so the IDS, and here the problem announced. The future work, according to these results will be focusing or developing a suitable technique to detect the threats of attacks through the IPv6 transition mechanisms.

The tools we used in this project distributed in many sides, we started from installing a Virtual Box machine, then we installed Vyatta router tool, an ISO images for different OS's were loaded and we started doing the main configurations and try the pinging to guarantee delivering the packets using tunneling. Our next step is to generate a DoS attacks using Python programming language, and our critical step is to think how we can explore a tool that guarantee capturing the attack packets in the victim node to deny it. Doing this task, will open wide doors to achieve a secure tunneling network, till we get a secure IPv6-IPv4 networks in the future.

Up to now we build a simple scenario, that contains both the IPv4 and the IPv6 addresses, we use the 6to4 tunnels to connect the two worlds with each others. After that, firewalls used to be configured to allow and deny traffics form different networks. From this point, we have got knowledge that the firewall can detect only the pure IPv4 packets, but not the IPv6 ones, since they are inside the payload of the IPv4. Because of that, we will try to find a solution that will cause the firewall to detect the IPv6 traffic and to know the attacked ones, In order to capture them, and deny their access to the network.

Automated Segmentation of MRI Brain Scans

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ABSTRACT

This work presents some preliminary results regarding a project designed to perform automated magnetic resonance Imaging (MRI) segmentation. Medical image segmentation is the process of labelling each voxel in a medical image dataset to with a tissue type label such as white matter (WM), gray matter (GM), or cerebrospinal fluid (CSF) (Caviness V.S. et al., 1997). The result from this process can be used in variety of applications in medical research and visualization; in this case it is to detect tumours and foreign bodies in the brain. The input will be provided from databases that have supervised MRI Brain scans. That is, a high resolution 3D T1 image of a human brain has been made publically available, in which each voxel is labelled by according to a tissue type. This forms a gold standard that can be used to train an automated voxel labelling system. The proposed system will utilise this labelled brain volume as a platform for investigating automated lesion detection. The MRI Slices should be displayed in 3D, and then all the non-brain voxels should be segmented. Lesions then will be embedded inside the brain. Regular and irregular lesions will be embedded to give a more realistic test for the classification algorithms. The output will be voxel labelling and classification of this voxels, along with the accuracy results of the classification algorithms.

Whenever human lives are involved, the consequences of mistakes become more severe as they endanger human lives. In such sensitive field manual segmentation of medical images such as MR brain images is unreliable; there is a high chance of human error, and the manual process is time consuming. An automated segmentation method would be essential to collect and analyse MR brain images and to decrease the amount of manual mistakes (Rastgarpour M. & Shanbenzafeh J., 2011). This method is more productive and reliable as it saves a lot of time and provides more accurate results. Also by comparing different classification techniques, it will be easier to choose the classification algorithm with the best accuracy.

Automatic Image segmentation has a lot of applications in the medical field. This project focuses on the automatic segmentation of MR brain images to save the time needed for manual segmentation and to give more accurate classification results. In order to provide an automated solution, a data set of MRI brain scans is collected were both supervised dataset will be used. The supervised scans are from Brain web: Simulated MRI Volumes for normal Brain (McBIC/MINI) database and other scans from other databases such as the Whole Brain Atlas- Harvard Medical School and the National Library of Medicine's Visible Human Project. For instance, issues such as shape and the magnitude values for lesions must be acquired in order to make the lesions as realistic as possible. For this, I will consult internet housed MRI data repositories such as the Harvard Brain Atlas for realistic values.

Once the lesions have been placed randomly within the 3D labelled MRI volume, the task of automated segmentation can begin. The data needs to be pre-processed, noise removed if needed, and the data set duplicated. The Duplication of the dataset is required in order to embed artificial lesions in the duplicated data. Moreover, the duplicated data will be used later to validate the classification and clustering techniques. Regular lesions (e.g. squares and rectangles) will be used in the early stages to test the algorithms, but later irregular lesions will be used to give more realistic results especially during the calculation of the accuracy of the voxels classification. Lesions will be embedded in different areas within the brain and some times one lesion can be embedded in two areas. After embedding the lesions different classification algorithms will be used to determine the algorithm with the highest accuracy. The project involves building an application that provides the user with a graphical user interface that allows him to display a 3D representation of the MRI scans and to test different classification algorithm. Further, the application will allow the user to extract out specific regions (tissue classes) from the 3D volume and view them in isolation from the rest of the brain.

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Wireless Home-Power Monitoring System (WHPMS)

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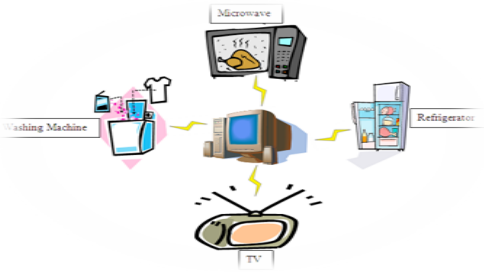
ABSTRACT

In the next decade, the demand of home-power monitoring will increase. This is because of monitoring power will help to reduce electrical bill since multiple studies show that monitoring home-power will help clients save 10-20% off their electrical bill. In addition, monitoring the home power is required for smart grid application to deliver electricity from suppliers to consumers using two-way digital communications.

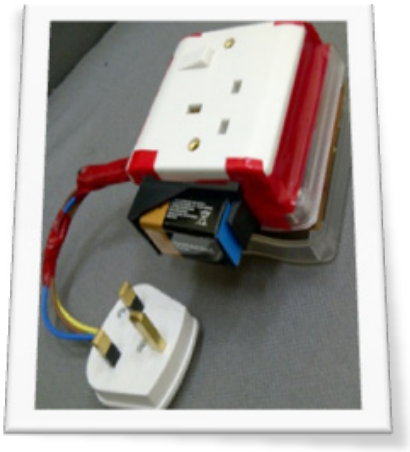
The aim of this project is to design and build a Wireless Home-Power monitoring systems that report real-time electricity consumption by minute, hour, day, and weekly. It can also report the quality power of every home electrical appliance. The project of Wireless Home-Power monitoring will consists of 3 smart metering units. These units will be connected via wireless communication system to the main host server. In the main host server, all required data will be received and results are displayed for users. The required data that will be showed to the user are line Voltage (Vrms), Current (Irms), Average Power (P), Power Factor (PF), Apparent Power(S), Energy consumed by Kilowatts/hour and the total cost for each electrical device.



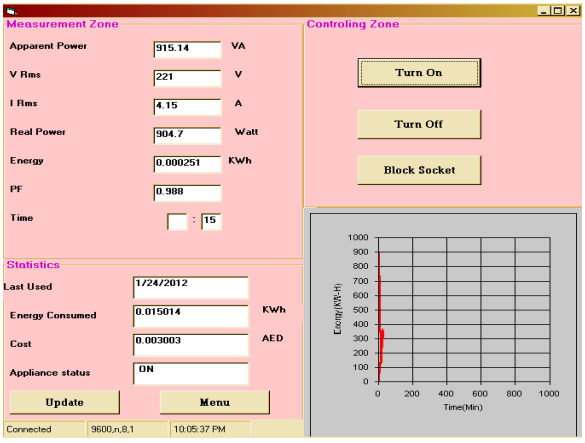
The designed system consists of two main parts: hardware and software. The hardware part was implemented on the socket side. The hardware design consists of components that were soldered on PCB (Printed Circuit Board). This PCB contains of shunt resistor and voltage divider to measure the current and voltage respectively. Also, it contains a microcontroller Atmel 32 that was programmed to take the measurements to calculate the required data. In addition, it contains an Xbee module that will receive results from MCU and send them to a coordinator Xbee module that exists in the main host server. Furthermore, Fuse was used to protect the components from large current.

Each Smart Meter Socket has its unique address (ID) that will enable the main host server to recognize this (SM-Socket) or equipment. In the software design, a Coordinator Xbee Module was added to receive all data by wireless from all nodes of network. The Visual Basic 2006 was programmed to establish the GUI. The user can access the program by entering his/her password, and then start choosing a room that he wants to monitor its consumed power, cost and other information. Another feature was added to the user by saving data for future use of power consumption history.

This project will achieve several benefits such as save energy, cut down costs, Rationalization of electricity consumption at home, increasing reliability and transparency between supplier and consumer by available analysis of data. Finally, this project was supported by Abu Dhabi Water & Electricity Authority (ADWEA).



Smart Meter Socket (SM-Socket)



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Obstacles Facing the Implementation of Functional Magnetic Resonance Imaging (fMRI) of Brain in Jeddah City

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ABSTRACT

INTRODUCTION: Functional magnetic resonance imaging (fMRI) is a relatively new technique that uses MRI to measure the hemodynamic response (change in blood flow) related to neural activity in the brain. Physicians perform fMRI to monitor the growth and function of brain tumors and understanding functional brain disorders and it is useful tool in investigating some diseases such as Alzheimer disease, epilepsy, schizophrenia and behavior changes. Functional MRI will provide useful information in future for field of neurology, neurosurgery, psychiatry, psychology.

AIM OF WORK: The aim of this research is to explore and identify the obstacles facing the implementation and applications of fMRI in radiology departments within Jeddah city.

MATERIALS AND METHODS: Field visit to all MRI units within Jeddah city to collect the data regarding the fMRI and its clinical application by direct interview and questionnaire that was delivered to all the staff working in MRI units and physicians who request functional MRI. The data is analyzed by using Microsoft Excel program.

RESULTS: From the collected data:

Public Hospitals: We found 35.7% of the responses indicated that functional MRI is under utilization and another 35.7% never used, just 28.6% used fMRI only for research purpose. The study showed that the reasons behind non use of fMRI are 52.9% of technologists have never been trained in the field of fMRI and 44.4% agree that poor awareness is a reason. The physicians 100% know about fMRI but from them response to question "fMRI is contraindicated in the following cases" it is observe that they didn't have a clear concept about applications of functional MRI which was. 75% of the responses indicate that all the contraindications for routine MRI are applicable to fMRI; whereas 25% of the respondents are not sure about contraindications of fMRI as they did not tick the question that includes comatose patient.

Private Hospitals: It was found that out of eleven private hospitals providing MRI services that only one hospital has the fMRI application installed in MRI machine. The most frequent reason behind the unavailability of fMRI in technologists opinion was the fMRI was not requested 55.56% and in radiologists' opinion was the MRI machine technology is very old and the fMRI was not requested 26.67%. It was found that only few percent 11.11% of the technologist knew about the fMRI by self training & hands-on whilst the majority 88.89% of the sample never received any training. Also, it was found only few percent 7.69% of radiologist received a proper training for more than 3 months or knew about the fMRI by self training & hands-on whilst the majority 84.62% of the sample never received any training. 90% of the physician sample knew about fMRI and their responses about fMRI contraindications as follow: the majority 66.67% said that all the contraindications for routine MRI are applicable while 11.11% were not sure and only 22.22% that said all the contraindications for routine MRI plus comatose patients which is the right answer.

CONCLUSION: From this research work we can conclude that functional magnetic resonance imaging (fMRI) is not performed in all hospitals in Jeddah city except KAUH where it is performed for research purpose, no clinical use and the major obstacle is lack of awareness of fMRI among medical professionals and their training.

SIGNIFICANCE TO THE RELEVANT FIELD: Get over the obstacles that are keeping us from catching up with the newest medical technology and provide advanced medical services.

Real-Time Systems: Inefficiencies and Solutions

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ABSTRACT

There is no denying that Real-time systems are of major importance in the world of technology today. They have been used in everything from electronic engines at bottling plants, cruise controllers in vehicles and satellite tracking systems to name a few. The systems respond to stimuli from its surroundings; there is time-constraint in which a response must be produced for a system to operate successfully. They are easily applied, their results are predictable and they also ensure worst-case latency.

Although the systems have many advantages there are still some malfunctions that need some attention. They are very hard to maintain and update; due to their expansiveness and complexity. With systems that are large in capacity and diverseness it is difficult to bring them up to date, with the world's activities' and technologies' fast-paced changes and developments. In most instances codes will be altered and maintained by someone other than the original programmer. This would create a lot of problems when the code is very difficult to read or understand, and someone who did not write it and does not know what the exact objective of each step is would not understand it. Also with technology evolving every second adapting a complex code to these needs will take a lot of time and energy and it may cost a fortune that some programmers and companies cannot afford. There is also the issue o the race condition, which occurs when a trunk has been allocated to two different jobs; which results in a clash. Some race conditions are quite complex and need to be recognized at an earlier time.

Some of the solutions that would be suggested and will be discussed in detail in this paper are to make the real-time system simple in its design and coding, so that it would be easier to modify and preserve in order to adapt to the ever-changing technology. When applying this solution it has been observed that many programmers felt more comfortable while adapting the code, it was easier for them to add new methods that would meet the needs of new technology breakthroughs. Also programmers were able to accomplish more tasks and pay more attention to detail in order to avoid complications Assessing and studying the program and code closely in order to fully identify any race condition that might apply can solve the issue of the race condition; in order to be fully prepared to handle it easily and with confidence. This solution helped in making programmers more aware of the race conditions that would result in many unwanted effects on multiple situations. It helped reduce the corruption of information, and many life-threatening situations.

Touch.Edu A Learning Platform for Dyslexic Children

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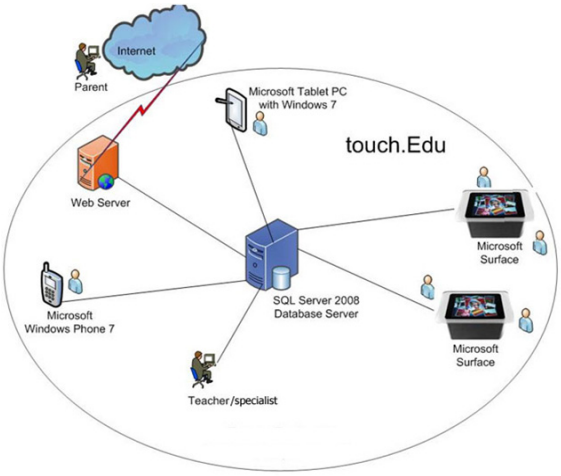
ABSTRACT

Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with reading decoding, reading comprehension and/or reading fluency. Although dyslexia is the result of a neurological difference, it is not an intellectual disability. People with this disorder usually have a normal to above normal IQ levels. The difference is that their brains are wired to have a different thinking and learning styles than a normal person and because of that they are made to feel inferior. According to UNESCO, Dyslexia occurs in 5-10% of the world population. Problems with current methods of teaching can vary but the most common ones are the lack of storage ability, lack of interactions with students, no record keeping of students' performance and above all students don't find it interesting enough to use existing systems to tackle this problem.



In order to overcome these issues we have studied the teaching methods used to overcome the difficulties introduced by dyslexia and developed a platform that can grow and evolve to contain the improvements in the field of dyslexia teaching methods.

Our solution which is named as 'touch.Edu' is a multi-touch Microsoft Surface, Windows 7 tablet and Windows phone 7 based interactive learning solution to the above stated problem. This unique solution brings together the following powerful touchscreen platforms by Microsoft: Microsoft Surface, Windows 7 touch and Windows Phone 7, in order to tackle the learning difficulties faced by dyslexic children. Hence not restrict the users to only one device in order to insure maximum accessibility.

'touch.Edu' links the major learning techniques of visual aids, audio, video and handwriting recognition as well as games which are proven to improve the performance of dyslexic children. Games and rewards are unlocked according to students' performance; hence working as an incentive for learning more. It is designed as a platform so that future developments can be done and can also be easily localized. The interface is suitable for the young age users, easy to use for the first time users with large typography, buttons and icons.

Along with the applications designed to improve the student reading, writing, spelling and math skills 'touch.Edu' also provide the teachers/specialist and the parents with an access to real time performance monitoring of the child. This feature can highly aid in designing a suitable program for each child according to their areas of difficulties. This targets one of the problems faced in designing a software that aid in teaching dyslexic children as every child is a special case that would need a specially designed teaching program.

The design of this platform required the use of several technologies which are Microsoft .Net 3.5 & 4.0, Microsoft Windows 7, Microsoft Windows Phone 7, Microsoft Surface, Microsoft Surface Toolkit for Windows Touch Beta, Silverlight 3, Microsoft Visual Studio 2008, Microsoft Visual Studio 2010 (Professional Edition), SQL Server 2008 and Microsoft Windows Server 2008

'touch.Edu' project has the potential to change millions of lives affected by Dyslexia, specially making the learning process full of fun and rewards.

Mobile Based Arabic Sign Language Interpreter using Fuzzy Trees

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ABSTRACT

The deaf and mute have been marginalized in our societies, resulting in the formation of their own satellite communities with little external interactions. The great majority of civil society is unlearned in sign language further expanding the cyst between society and the deaf and mute communities. As sign language is their primary channel of communication, they are unable to integrate in an effective manner. While approaches such as providing an on-site human translator can be helpful to the communication process, it has proven impractical for individuals to each have their own translator tagging along everywhere they went.

There has been little work done on the recognition of Arabic sign languages. But, there has been substantial work in the recognition of other sign languages. However, these systems are impractical due to lack of portability. Two main types of systems exist; glove-based systems and image-based systems that utilize a webcam to capture gestures. Existing systems require the user to be positioned in front of a computer, constrained by the computer's hardware and wired glove or the range of the camera in the case of image-based systems. The WASL(Arabic for connect) Interpreter aims to solve this problem by providing a one-way communication channel from the disabled person to an audience unlearned in sign language. We implement a fuzzy logic decision tree classifier for the classification of Uniform Arabic Sign Language (UASL) gestures. The proposed system interprets UASL into audible Arabic speech utilizing a wireless sensor glove and a host Android application (Figure 1).

Figure 1: System data flow

The WASL Interpreter is partitioned into three major modules. The first is the Data glove, a MEMS (Micro Electro-mechanical System) accelerometer based sensor glove that is used to capture the different hand gestures from the signer. The second is the Network channel, used to transmit the data through Bluetooth to the host Android device. Finally, the Host application implements the classification algorithm and outputs the synthesized Arabic speech.

The WASL Interpreter implements a fuzzy decision tree classifier. Since fuzzy logic is similar to human reasoning, it allows for approximate values and inferences as well as incomplete or ambiguous data. Fuzzy sets have the advantage that an element can possess partial membership to a set. This makes it more suitable for the application at hand, since we are dealing with probabilities and randomness due to human error associated with the signer. The fuzzy classification system consists of three main phases. The first is the "Fuzzification" phase, where physical inputs are made members of fuzzy sets that are defined linguistically. Ternary logic is used to define 3 fuzzy sets, "stretched", "half bent", and "fully bent", referring to the state of the fingers of the glove. The input sensor values for each finger are assigned to each of these sets depending on membership values. The second phase is the Inference engine, where outputs of first phase are applied to a ternary decision tree classifier. The final phase is the "Defuzzification", the output being the membership degrees for each Arabic sign language gesture.

The Fuzzy tree classifier has been implemented and is currently able to recognize 26 out of the 28 letters of the Arabic alphabet. The remaining two letters "س" and "ش" is recognized using the same classifier above and the "tilting" on the index finger. We are currently interfacing the Android application with the Data glove and speech synthesis engine thus completing the final stage of our project.

To the best of our knowledge, the implementation of a mobile phone based sign language interpreter is novel. Due to platform constraints, and the nature of Mobile computing, a fuzzy tree classifier is used for classification in order to simplify the mobile application and achieve real time performance.

Content Based Image Retrieval with Boolean Options for Results Refinement

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ABSTRACT

The accessibility of images through the Internet is a rapidly growing necessity. Research for image search engines currently focuses on Content Based Information Retrieval (CBIR). This approach should remove many of the problems associated with Text Based Image retrieval (TBIR). These drawbacks result in a low accuracy retrieval outcome. From an image, two types of features may be extracted or derived: Low and high level features. Low level feature examples are color, texture, shape or spatial location. High level features would include facial expressions or any other behavior indicator. A query by image similarity depends on extracting features from the query image, forming a feature vector representing the query image and then comparing this vector to those of other images usually stored in an image database. The comparison process evaluates the similarity or dissimilarity of the two images or vectors through a distance measure such as the Euclidean distance. Relevance feedback mechanisms allow for improvement of results based on a user's opinion. A user may therefore view the retrieved images, find that several images with undesirable items or characteristics were retrieved and hence choose the areas where these appear; crop them and identify them as undesirable. Similarly this can be applied to desirable features. The retrieved images can then be further classified to adhere to the user selectivity of desirable or undesirable characteristics. This project aims to build a CBIR/TBIR based system that will:

i Retrieve images from the web based on one or both of the options query by image or query by text.

ii Allow the user to employ visual criteria from the retrieved images to refine the search results. These criteria are feature vectors that represent subimages or Regions of Interest (ROIs) cropped from the retrieved images.

iii Allow for Boolean operations on these selected criteria, e.g. the user can choose to refine the results through the operation:

contains (criterion1 AND criterion2 OR criterion3).

The feature extraction algorithms allowed to be selected by the user are the colored cumulative histogram, the canny edge detection and the Gabor wavelet. These should, to a great extent, cover the important issues of color, shape and texture representing content and that are relevant to images being similar. The classification algorithms used will be the Support Vector Machine (SVM) and the K – Nearest Neighbor (KNN) algorithm. The user will also be able to select the similarity measure or the distance function to be used.

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Analytics: A Tool that Provides Greater Insights

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ABSTRACT

Analytics is the processes, applications and the best performances to convert data into useful information that reach to the most reliable and faster decisions based on facts and statistics. It bonds the study of computer science, statistics and math to do a high-level analysis. In short, it's the science of analysis with the help of software. It analyzes large amounts of data looking for patterns and relationships to solve problems or predict failures.

After a wide research we have realized that the use of analytics is not only used in the financial sector but in recent years it has expanded greatly and moved to other sectors like communications, education, casinos, government, health insurance, hotels, media, utilities, retail and manufacturing.

When a business or an industry faces complex problems it usually takes a lot of resources and a very long time to solve these problems. Instead when analytics was used to solve the same problems, these problems were solved easily with much less time and resources. Hence analytics these days has become an important tool to solve problems that cannot be solved using conventional methods.

Therefore, well-known companies such as IBM is now collaborating with number of universities worldwide so they can teach analytics to students in order to fill the demands for analysts. In addition other universities have developed special curriculums to promote this kind of studies.

In conclusion, although analytics has played a big role in the past, with the widespread use of computer, the Internet and the advancements of computing technologies, the world today is generating massive amounts of data and information which will certainly make the role of analytics more important and greater in the future.

Minimally Invasive Surgery Feedback (MISF) System

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ABSTRACT

Can the medical field be related to engineering? In this project, we will explore one such possibility. This project involves designing and creating a feedback system that can be used in minimal invasive surgery. Minimal invasive surgery is a modern technique that is performed in case of abdominal surgeries by making key-hole incisions instead of traditional, invasive open surgeries. This type of surgery enables patients to have smaller scars and shorter hospital stays. The problem with this kind of surgery is that, unlike open surgery, the surgeon has few control of the operative field and has less sense of the pressure applied to the tissue. Doctors can see but not feel the pressure they apply to the delicate tissues in minimally invasive surgeries. Complications may include: Bleeding due to injury to blood vessels, infections and also injury to internal organs.

This project involves designing and creating an intelligent feedback system that will monitor the force/pressure that surgeons apply with their instruments during surgery and also alert the surgeon when the pressure exceeds some threshold value, specified by the user. Another aim of this project will be to incorporate this final product in some of the commonly used laparoscopic instruments. The purpose of this design is to create an additional tool that will prevent surgeons from making errors and hence to protect patients from any complications that could happen during the surgery. The design process involves a systematic approach to the customer needs, functionality and design constraints. After conducting surveys, it was found that the major audience for this product would be surgeons who are involved in minimally invasive surgery.

The MISF system, as it is named by the team, consists of a pressure sensor mounted in the attachment that fits over the surgical tool to measure the force applied. Piezoelectric sensors and strain gauges were used in this project which would function as variable resistors upon sensing strain or pressure. Depending on the force applied to the sensor, an analog voltage output will be sent which will be digitized, and then compared with an external threshold using a logic gate comparator I.C. that is already embedded on a FPGA processor. The comparator will check if the signal is equal to or greater than the specified threshold, and it will send a feedback signal to the surgeon in the form of light, sound or vibration. An analog circuit with comparators and amplifiers is also one of the viable options to achieve the above results instead of using a processor.

The advantages of this system are its simplicity, the fact that it is automated and that it is easy to operate and flexible to user's needs (the surgeon can set a threshold value which he considers as the safe range). This feedback system, if developed commercially, can also be used for other applications including the other different types of laparoscopic instruments. This system can help the surgeon avoid fatal complications during the surgery causing internal bleeding or injuries due to lack of perception and feel of pressure.

Voice Over IP (VOIP) Forensics

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ABSTRACT

Voice Over the Internet Protocol (VOIP) services convert human voice into a digital signal that travels over the Internet. It is frequently used by people for personal and business communications. The VOIP technology is popular because of its low cost. Nowadays People misuse VOIP services and start illegal business. Several equipments and hardware are utilized such as, computers, routers, switches, telephones and webcams, as seen in the figure below. The equipments mentioned are used for setting an illegal business's over the network. The hosts running such services and networks are called "Call Shops".

The research addresses Forensics analysis of Illegal VOIP usage. In addition, the project introduces awareness and restriction of Illegal usage of the VOIP services as businesses. Users of the VOIP are not aware of the risk associated with misusing the services. In the UAE users of the VOIP pay for leasing Internet lines from the telecommunication companies such as Etisalat, and DU. Since these lines are leased users are obligated to pay fees of over 30,000. The main objective of the project is to research on the illegal usage of the VOIP services using Etisalat facilities. For the project we will be using several network tools to simulate a scenario of making illegal international calls (using the latest VOIP technology). To place the calls we will be to using Netmeeting, skype, VOIPtunnelClient software.

The tools mentioned are mainly what "call shops" use to make the outgoing calls. In real scenarios, the investigation is mainly done by the police's Forensic Department. Investigators attend illegal call shops and confiscate the computers and whatever equipments are used in the business. Secondly, they extract the hard disk of the computer and acquire the data. Acquiring is basically copying the data into an external hard drive and makes a full mirrored copy so the evidence isn't modified. The process takes about two hours to a day depending on the hard disk's capacity. After the acquiring process is done the investigation begins. The analysis to the data is implemented using Encase and FTK Forensics tools. Evidences are collected from the call logs made from the call shops VOIP software that was used for make the outgoing calls. The logs will appear as text and symbols within the Encase software. The final step therefore, is to save the data into an html format for further analysis. Information of the calls generated by the call shop people will then be extracted.

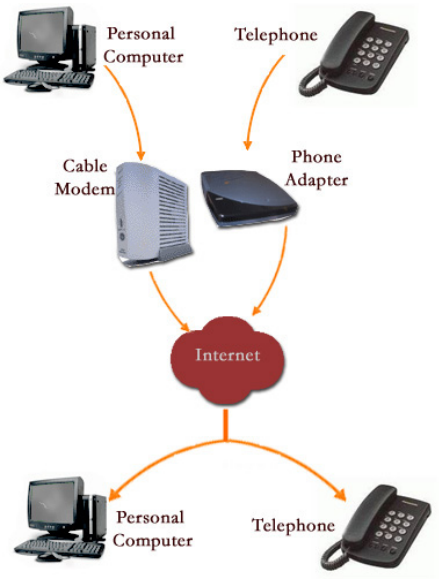

Figure1: VOIP Network Setup

Performance Evaluation Using STP Across Layer-2 VLANs

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ABSTRACT

In a communication network the security and performance aspects are the major factors to be considered for usage level. The network security and the performance are studied in many cases but it requires being explored more based on the size of the network and the functional usage at lower layer of OSI model. There are voluminous steps taken to consider the issues such as Layer - 2 Exploitation, the inability of a device to perform the required services at time due to redundant switch loops. This project is trying to give solution for the security issues and the performance issues together with the analysis of VLAN (Virtual LAN) security perspective and STP (Spanning Tree Protocol) loop free performance aspect. VLAN is a virtual LAN and it is a broadcast domain created by switches. Because switches can talk to each other, you need to configure VLAN when your network gets so large and has so much traffic. VLAN logically divide a switch into multiple, independent switches at Layer - 2. They enhance network security by keeping sensitive devices on a separate VLAN. They increase the number of broadcast domains while decreasing the size of the broadcast domains to reduce overhead. There are VLAN protocols VTP(VLAN Trunking Protocols) and its parameters for instance VTP mode, VTP Domain, VTP password are considered in this study and evaluated accordingly. The Spanning Tree Protocol (STP) is a network protocol that ensures a loop-free topology for any bridged Ethernet local area network. STP solves the performance issue in the network by allowing a network design to include standby links to provide automatic backup paths if an active link fails, without the danger of bridge loops, or the need for manual enabling/disabling of these backup links.

This paper analyses types of STP in relations with PVST (Per VLAN Spanning Tree) and PVST+(Per VLAN Spanning Tree Plus) are considered for network performance in a switch based network. The BPDU (Bridge Protocol Data Unit) are monitored between and the data path. It is a message that is exchanged across the switches within an extended LAN that uses a spanning tree protocol topology.

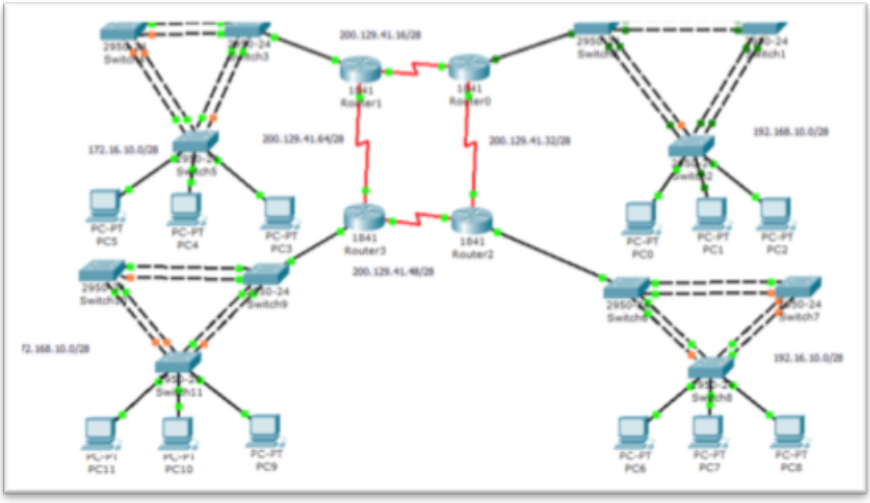

Figure 1: Topology used in the experiment

Figure 1 shows the topology used for the experiment. The simulator used for the study is packet tracer, a powerful network simulator program that allows to carryout experiment with network behavior. The different CLI outputs generated are evaluated security and performance coherently using show commands. This project assesses security and performance by implementing STP types PVST and PVST+ then suggests the best possible STP type for the security enhanced Layer – 2 VLANs.

Design and Implementation of an Intelligent Lab to support Green IT

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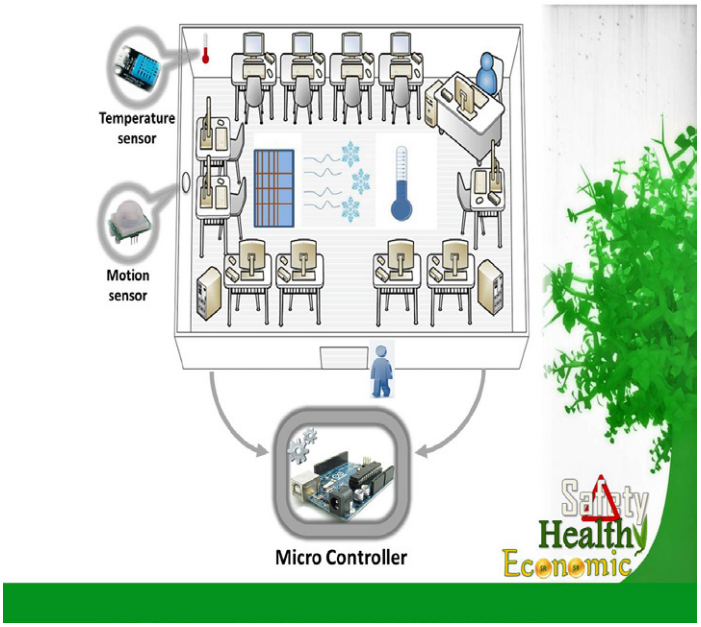
ABSTRACT

We are proposing to solve an energy problem by saving the consumption of power as well as providing comfort environment to students and faculty. In the IT department at the Faculty of Computing and Information Technology (FCIT), Ten labs are critical place for consuming power, at the same time students cannot handle temperature of 16 degree coming from Air Conditioner (AC) while the outside is 22 degree which often happen in the Kingdom of Saudi (KSA). As a spiral project, we started from the labs. point to be noted here that KSA using oil as a major resource on priority to produce electricity, it will not last for ever. The world has shifted thinking now, to use ways to safer the environment and less population.



We are going to save AC power consumption by using Ardunio Micro Controller as the control panel to all Hardware, which has Four sensors. There are three temperature sensors responsible for measuring the temperature for labs, offices faculty Building and outside the building. Beginning from the labs which have two sensors One will be stuck on the roof and the other one on the floor. We/ the Ardunio Microcontroller will take the average of the two, this average will be compared with the sensor that are located outside. Depending on the final result it decide either to balance the labs temperature by lowering or increasing the temperature, or turn off the AC to use fans.Heat comes in case there is Someone inside the lab i.e. the students and Personal Computer (PC) this will lead us to the fourth sensor the Motion Sensor the job of which is to detect any movement inside labs. This can go two way, In the First case if there Is any detection and the sensor, sensed Something then the work flow will continue to temperature sensors.

In the second case, if the sensor doesn't detect anything, which means no human being inside then there will be timer for 15 minutes (because PC sleep mode start after 15 mint if someone is using it, so that means that no heat emitted) once it finishes Sensing, the AC will turn off the compressor and only fans will be turned on.

Robust Performance of MIMO Systems Using Efficient STBC Channel Estimation

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ABSTRACT

Smart antenna gained a lot of popularity in the past few years because of the continued growth in the consumers as well as the availability and development of advanced high rate technological services. The development and availability of these services comes with a few impairments like multiple-path fading and co-channel interference. With the introduction and development of fourth generation (4G) and long term evolution (LTE) technology, service providers want to have stronger base stations to accommodate more users and higher data rates as well as bigger channel capacity. In the literature, several methods were investigated to enhance the wireless channel performance. Some of these methods involve the use of a receiver equalizer to correct the phase shift between multipath propagation signals at the receiver. Other techniques use Rake receivers to reduce multipath fading.

Multiple inputs multiple outputs (MIMO) is a promising technology solving all impairments that effect wireless communication environment by placing multiple antennas at both the transmitter and receiver. Space time block code (STBC) scheme promises great improvement in the diversity and spectral efficiency of wireless MIMO systems. The combination of STBC and MIMO system, shown in Figure 1 below, leads to increasing the capacity, reliability, reaching maximum diversity at the transmitter, and overcoming wireless communication impairments.

This paper comprises of the following sections QPSK in Rayleigh fading channels, MIMO system model, theory of STBC-MIMO systems. Results are obtained from both theoretical models and numerical simulations for BER of STBC-MIMO system over both Rayleigh flat fading and frequency-selective channels. More specifically, a comparison between both theoretical and simulation results for QPSK modulation in single Rayleigh fading channel using STBC-MIMO system is carried out. Our robust STBC-MIMO channel estimation technique is tested and results verify its efficiency, accuracy, and versatility to deal with various channel impairments. A sample result is shown in Figure 2 which displays the bit error rate (BER) for two types of MIMO channels: single path MIMO and multipath MIMO.

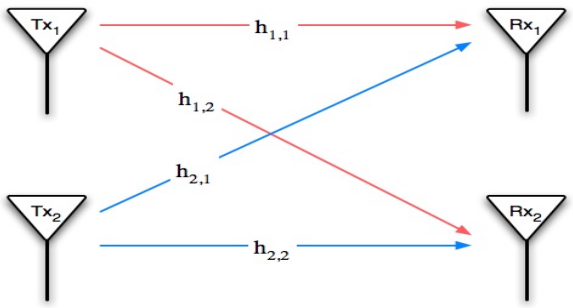

Figure 1: STBC-MIMO system

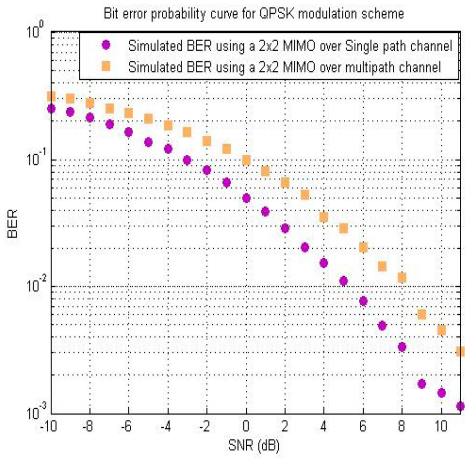

Figure 2: Comparison of single path MIMO and multipath MIMO.

Acoustic Noise Reduction in Two-Microphone Devices

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ABSTRACT

Mobile speech communication is a very important human activity that takes place worldwide and with ever-increasing growth in all markets. Loosely speaking, mobile speech communication can be defined as the capture and transmission of speech from mobile device to mobile device. In this popular scenario, acoustic noise appears as the major source of disturbance in the speech communication, as well as in automatic speech recognition and dialogue systems. Acoustic noise can be defined as any unwanted sound captured by the microphone of the device, such as conversation of people, road traffic, machinery, or any other sound in the background that disturbs the communication between mobile users. Since the mobile device is used in real environments the probability of facing the noise is high.

The aim of this project is to study the reduction (by digital means) of the acoustic noise captured by a handheld mobile device while simultaneously preserving the desired speech signal. Several tentative noise reduction strategies are single-channel, microphone arrays, and dual channel. Several smart-phone manufacturers (Apple, Audience) have recently adopted the dual-channel architecture as an effective computationally feasible solution that is easy to integrate in small handheld devices. In this project we focus on that hardware architecture. With that purpose a dual channel hardware prototype will be built during the project, an existing as well as novel signal processing algorithms will be design and implemented. The performance of the prototype and algorithms will be evaluated over dual channel recordings in real acoustic scenarios. Figure 1.(a) shows the system architecture in a simplistic way, and Figure 1.(b) the hardware prototype already built with off-the-shelf components, which consist of a "hardware modified" PCM 16 kHz 16-bit stereo recorder.

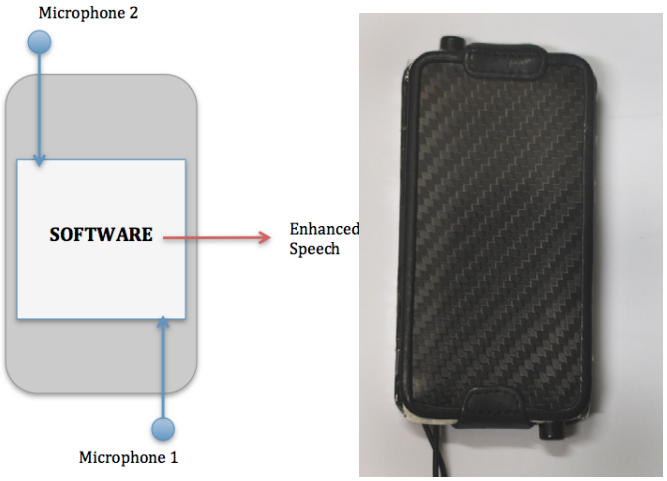

Figure 1: Prototype of two-microphone handheld device

Two tentative signal-processing algorithmic solutions in this scenario are the digital cancellation of the acoustic noise, and the reduction of noise by digital filtering. The choice of one of them (or both) is the primary goal of this study, that is, to understand and measure the signals captured by both channels for the desired speech, the unwanted noise, and its combination. The system identification of the acoustic coupling between both channels is currently being analyzed with adaptive linear finite-impulse-response (FIR) filter techniques, such as the least-mean-square (LMS) algorithms, and its variants (block-LMS, and frequency-domain adaptive filters). These algorithms will be used for extracting the speech signal from the surrounding acoustic environment with an equalize-and-subtract methodology. Realistic cases of device use, such as hands-free, hand-held or on-table, are currently under evaluation. Different types of noise, such as in-car, street, road, mall cafeteria, office are being considered as well. The system performance or improvement will be evaluated with objective measures such as signal-to-noise ratio (SNR), cross-correlation, and Itakura distance, as well as with listening tests.

Autism Communication System

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ABSTRACT

One of the most common problems that children with autism suffer from is that it's extremely hard for them to learn language and social kills. This project aim is developing an application, which turns iPad into an augmentative and alternative communication device (AAC) enabling them to communicate by using original language "Arabic".

Mothers also suffers from difficulty in communication with their autistic child, this application help them to educate the child through pictures.

Through research, interviews and observation on autistic children the problem faced is bringing together the specifications and needs of mothers, teachers and speech therapist to create application for autistic children, which can be portable, affordable and easy to use. This application gives children with nonverbal communication a voice at the tap of picture. The application contains a collection of pictures divided in categories in a library which child can tap on screen to generate spoken sentences and phrases, such as "I need some water" which is customizable by whoever supervising the child.

There are several applications through an iphone or ipad that supported the same idea but none of them support Arabic language, so through this application we give an opportunity to the child and the communication partner to communicate in such manner that simplified the life for both of them. Also whatever sentence the child make through the pictures, the sentence will be sends to the mother as a text to her cellophane in case the child wants something while the mother is not around. It does not matter if an child is having difficulty communicating due to autism, stroke or any other communication disorder, the application will give that child the ability to express themselves through the use of pictured images and corresponding audio.

This application will be developed using Objective_C programming language through an Xcode software and implementing the database for this application using oracle 10g software.

Private E-Clinic Management System

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ABSTRACT

The field of health and medicine has not been away from information revolution which is sweeping all aspects of life. More specifically, today many large hospitals and health centers have abandoned their traditional ways to manage their business, and turn to Information Technology (IT) organize their health services. In fact, IT has the potential to improve the quality, productivity, efficiency, and safety of health care. On the other hand, some physicians may prefer to increase their income and improve their experience through working in small private clinics, which consist of one doctor, and one reception (or nurse). In general, private clinics for solo practitioner doctors mainly provide diseases consultations and diseases diagnosis for their patients. Specifically, the daily activities of a private clinic consists in editing and entering the details of patient's personal records (basic information, medical history, etc.), maintaining the patient's diagnosis record, reviewing and updating exams results (Blood analysis, X-Rays, CT scan and MRI), issuing the prescriptions and saving them in their records, and finally generate the patient's bills. Often, solo practitioner doctors are still running their daily activities manually in their private clinics. One crucial activity consists in managing patients records. In this context, the manual processing of the data could yield many known problems – or standing issues – when it comes to dealing with the manual patient records and paperwork. In fact, several studies have shown that paper based records can't adequately support the task of providing patient care in an efficient manner .Among important issues that are raised by manual management of patient records, we can cite the following:

- Lack of proper information storage.
- Lack of immediate retrieval of patients' records.
- Lack of proper ways of updating the patients' records.
- Enforcing privacy access to patients' information.
- Difficulty to join receptionist.

On the other hand, patients could face two main issues while addressing clinics. The first one is related to appointments. In fact, usually patients have difficulties in joining receptionist to ask for an appointment (whether the line is busy or no one is responding). Furthermore, patients are limited to weekly working days and office hours to request an appointment. The second issue is related to hand written prescriptions that sometimes might be difficult to read, especially by pharmacists; hence increasing medication errors.

In the context of our graduation project, we aim to design and implement software to assist and help a doctor to run its private clinic, by automating the main daily activities. The proposed solution is a web-based application, and its ultimate objectives are the following:

- Increase efficiency and productivity.
- Connect the clinic staff and patients.
- Eliminate paper-based documents and provide patient report/document generation (patient reports, prescriptions, certificates, bills, labs and X-rays orders, etc.).
- Provide the doctor with daily, weekly and monthly agendas.
- Facilitate appointments via a flexible scheduling (doctor/patients).
- Automatic SMS and email appointments reminders (patients).
- Improve accuracy and patient safety through electronic patients' records, hence preventing and reducing medical errors.

The proposed solution has many advantages over a classic desktop application. In fact, it will provide an easy access to the doctor at any time and from anywhere by using a computer with an Internet connection. Also, a web-based application is compatible with any client operating system and browser, so it is not necessary to install any component on the client computer since the web-based application is run from the server.

A Collaborative Website for Researchers at KSU

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ABSTRACT

Research activities play an important role to improve our life style, solve existing problems and to advance our knowledge. King Saud University (KSU) has always been keen on promoting and developing scientific research in the different areas of knowledge. Its main aim is to achieve leadership in scientific research, creativity, and innovation in the various areas of knowledge. For this reason, the College of Computer and Information Sciences has formed several groups for research on different areas of knowledge. These groups need several supporting tools to help their research activities. They need a website to publicize their research activities and to attract researchers to those fields. This website should be dynamic and flexible so that all members of the groups can add/change the contents of it easily. It also needs an interactive environment to support collaboration between the different groups' members (males/females) in the different projects.

Our goal was to support the research groups in KSU and to encourage people to be involved in research activities by simplifying some of the research tasks and by providing a common flexible environment for researchers to exchange information and to have discussion about research issues. This will be achieved by developing a web-site for the research groups in KSU based upon collaborative web-server technologies.

The project is directed to the members of the research groups in KSU and the common users/students who are interested on these research groups. The project is a collaborative web-server based upon the open authorization concept so all groups members have the same rights and they can change any of the contents of the site. The coordinator of the group has two extra rights which are to add members and add sub group to his/ her group. And the administrator have an extra right is add main group to the site and assign coordinator to it.

For the project we have designed the web pages, the supporting tools, the required databases and all the management tools for the site contents. We used PHP as a primary language to build the dynamic pages, CSS for looking and presentation, HTML, MySQL, AJAX and JQuery.

The project provides a proof of concept for how to build a collaborative website. It shows the flexibility and efficiency of this type of websites and shows how the collaboration of large number of members can enrich the contents of the website quickly without much effort. It also helps to keep the information in the website accurate and up-to-date.

Kurdish Dance Training System

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ABSTRACT

Dancing has been considered as one the oldest group activities among human being. As an important part of their culture, it has played an incredible role among different societies in order to bring them together and to let them share their commonalities. Kurdish people, who mainly live in a land which is called Mesopotamia as well as the major parts of the west of Iran, have a tremendous desire in group dancing, which finds its roots in their ancient background. They have celebrated their joys, mourned their losses, and fought their enemies through their group dancing. Hence, it is very important to Kurdish individuals to be able to dance at least a couple of widespread and well-known/easy group dances. However, many among the young generation do not know about the wide-range spectrum and colorful types of Kurdish dancing. Kurdish Dance Training (KDT) is a web based application which targets different kind of users especially those who are interested in learning or enriching their previous skills to receive more knowledge and to self-train themselves to dance different types of Kurdish dance. In addition, the system helps that a very important aspect of Kurdish culture to be introduced not only to the local people but also to the global community who are looking at human being as one kind in general, and those who are interested in Kurdish culture in particulate. Furthermore, alongside training facilities, the system provides the users with the history, background, original area of the dances, original purpose of the dances, and their similar counterparts in other Kurdish areas. For this purpose, the system extensively relies on the multimedia features of information technology. The system has been developed by following a structured approach and at the same time by utilizing Use Case Modeling as the analysis tool. The approach has followed through several steps. In the first step, the requirements were collected and the background of the case was investigated through the literature review. In the second step, the Use Case model was prepared. In the third step, the Entity Relationship Diagram (ERD) and Database design were produced. In the fourth step, using HCI the interface design was prepared. However, these steps seem were not sequential. Indeed, some steps such as Use Case Modeling ERD preparation were done somehow in parallel. Furthermore, the Use Cases led the researcher to find more requirements. Moreover, feedbacks from each step affected the previous ones, positively. Again, in order to manage the project, a plan was prepared alongside risk analysis was prepared at the beginning of the project. However, although there were some changes in the plan, but it was followed in a way that major milestones were met.

As a result, the system's prototype and a complete report including the details of the aforementioned steps were prepared and presented. Moreover, the main plan for the second phase of the project, which generally targets the complete implementation and testing, and preparing the users and installation manuals were introduced.

Kurdish Heritage System

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ABSTRACT

Kurdish people have a long and rich historical background all over a land which is called Mesopotamia as well as another large area which is located in the west of Iran. This is the place which has been called “the cradle of civilization”. As part of this mainland, Iraqi Kurdistan region, as a fast growing area, is currently has found it paramount to its development to introduce the world to its wealthy heritage such as archeological places and handcrafts. Indeed, the capability of information technology has provided a great opportunity to introduce this heritage all over the world through digital media, which not only introduces the Kurdish heritage but also can attract many tourists to the region.

As a result, the Kurdish Heritage System, as a web-based system, has targeted the Kurdish tangible heritage to be documented and introduced to the world. In addition, it helps in preserving and spreading the sense of Kurdish identity by introducing Kurdish arts and culture. The system leads the user to find out the Kurdish background and helps them in understanding the region and its people by reviewing their heritage. Moreover, the system utilizes different presentation types such as videos, photos, and textual explanation about the documented items. In addition, it provides the experts and professionals in the field to share their knowledge about Kurdish archeological items with their peers and other interested users and/or researchers.

The system has been developed through following an adapted software engineering methodology. The approach has followed through several steps. In the first step, the requirements were recognized and prioritized through conducting interviews with professionals, via literature review, and examining other similar systems. In the second step, the system was analyzed and documented using Use Case Modeling approach. In the third step, using the Use Case Model, the Entity Relationship Diagram (ERD) was prepared in order to be use in the database design. In the fourth step, the database design was prepared and using normalization techniques it was normalized to the BCNF. In the fifth step, the interface design was prepared by following Human Computer Interaction (HCI) techniques. However, although these steps seem to have been taken sequentially, neither the methodology nor the real activities seemed so. Indeed, some steps such as Use Case Modeling and ERD preparation were done somehow in parallel. Moreover, in each steps feedbacks of the step affected the previous steps and improved their outputs whenever it was necessary. To manage all these steps and the whole project, a plan and a Gantt chart were prepared at the beginning of the project. The plan was revised in major steps but it was followed in a way that major milestones were met.

As a result, a prototype of the system was prepared and at the same time a second phase plan has been devised, which aims to complete the system implementation and testing, and preparing the users and installation manuals. Moreover, a report which explains the mentioned steps in detail was prepared and presented.

Sulaimaniya Statistic Directorate

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ABSTRACT

SSD (Sulaymania Statistic Directorate) is a web based application that has a useful approach for the users who want to have statistical information about the city. The directorate does not have official website and people have problem in accessing and retrieving needed information. The project makes the population data entry computerized and avoids traditional paper use data entry.

The website has two types of user, one is general user that can access the information they need from the website and they do not need password. Furthermore, the user can leave comments for the admin for improvement. The other user is admin that has user name and password in order to update data. This project is one of the developments to create and design 'Sulaimaniya Statistic Directorate' website which includes the statistical data of different categories. This project can be expanded in the future for the whole region of Kurdistan. The other aim of this study is to collect and gather population data in a protected system. In close future this system will have a huge benefit for people and organization in term of providing services in the city.

The application consists of a web based interface linked to a database, and to make use of this website, all the paper based data should be entered manually, which of course is a huge task and takes some time. Nevertheless, at the end the benefit will be also huge because it protects the history of the city.

The development of information technology area in the region of Kurdistan is slow but the government placed a lot of effort by educating people, opening different type of training and investing money on building a good computerized infrastructure. The existence of computers in governmental offices goes back to a long time but it lacked the appropriate skills that can use it, in another word the information system development started to have more attention.

The web application will be designed using ASP.NET platform with C# language, using MYSQL database. It consists of number of pages for different categories, the intention is to have population data, health and employment data entered, and then this can be extended to have other sectors.

In this paper we describe the designing process of this application which comes in two phases. In the first phase we conducted few surveys in different governmental offices and private sector for the type of data they have and the sources, then we started the analysis phase by preparing the requirements, making the appropriate design decision for the website, the interface design and database relation diagram. Next phase includes the actual design of the website and the database; once the design is completed it will be implemented on a trail base in the Sulaymania Statistic Directorate, using some existing data, of course this includes also some training for the staff in the directorate. Then gating feedback on the whole functionality of the website, then the final part will be the update and maintenance of the website and lunch it permanently in the directorate.

Path Planning and Inverse Kinematics of a Three-Link Robot Arm

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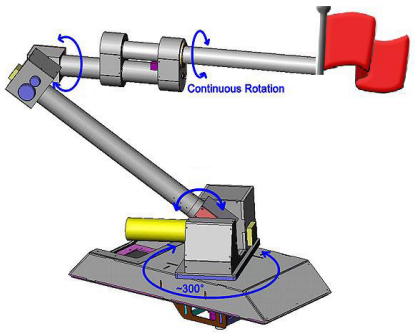
ABSTRACT



This project is to illustrate the use of the numerical method to find a robot to help the traffic to insure the safety for the employees working in the field.

This robot will be placed in the front of each work field in the street. It will have a moving hand to guide the cars to the safe direction and lane. The following figure is a prototype.

The inverse kinematic problem at the position level for a three-link robot is to find the joint angles, and that allow the end-effector (P) at the third link to be at a specified point characterized by the coordinates (□ 1 □ 2 □ 3), (y, x, □), where (y, x) is the Cartesian position and □ is the angle of the end-effector axis with respect to the x-axis.

In this project, we assume that the link lengths are a1, a2 and a3 (in cm). The first link makes an angle with the horizontal axis, the second link makes an angle with the direction defined by the first link, and the third link makes an angle with the direction defined by the second link as depicted in Fig. 1.

By following the schematic representation illustrated in Fig.1, we find the expression of the coordinates, (y, x, □) as a function of the joint angles (□ 1 □ 2 □ 3).

Then we Determine the Jacobian of the robot and give the conditions under which it is singular.

We wish to find the angles so that the arm will move to the position y= 4m x=10m, and orientation □ = 0.4 rad, while starting with initial joint angles of (□ 1 □ 2 □ 3) = (0.5, 0.7, 0.6) (rad). We use the Newton-Raphson formula to find the values of the requested joint angles.

To proceed, write a sub-program implementing the Newton-Raphson algorithm.

Perform up to five iterations or until obtaining an estimated error

It is desired to define a reference continuous path for each joint angle()tq through a third polynomial

Taking the first derivative of ( ) t q and substituting the initial and final conditions we wrote a system a 4 equations as a function of ft and coefficients Where the initial and final conditions

i) - If we want to have the first joint of the robot we go from initial angle of 30° to a final angle of 75° in 8 seconds.

- we Calculate the values of the joint angle at t= 1, 2, 3 and 8 seconds.

- we Plot the variations curves

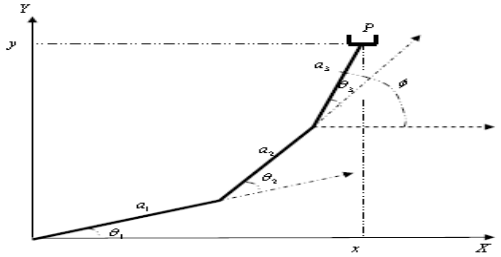


Figure 1: Geometric representation of a three-link rolt arm

ii) – we Repeat questions i) for the same motion to achieve in 5 seconds. We Calculate the joint angle at 1, 2, 3 and 4 seconds and plot the variations curves

iii) - Repeat questions part i) and ii) for a 5th degree polynomial with conditions (2) completed we Draw the position, velocity, and acceleration curves for the motion.

Flexible File Download Service

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ABSTRACT

In partnership with Etisalat, we are investigating a portfolio of measures to reduce the energy intensity of Internet traffic. Part of the solution involves flattening the utilization profile of network resources such as routers, so as to reduce cooling needs at peak time. This project will use simulation techniques to evaluate the potential benefits of offering a flexible file download service in that context. In the chosen scenario, the end-user allows the Internet Service Provider to schedule the actual data transfer at any convenient time within an agreed time window, thereby facilitating efficient traffic management. The study will seek to quantify the influence of variables such as the shape and relative volume of flexible traffic on overall performance.

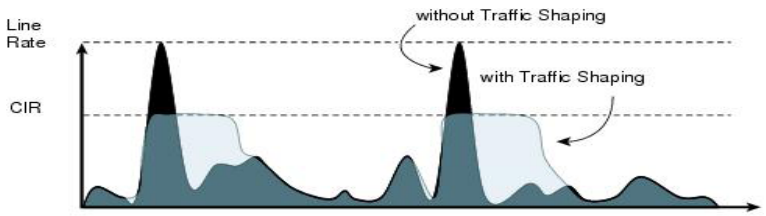
Since data networks were invented and adopted in our practical life, there has been a great trend to optimize them. That is because; many parameters have been in dynamic change like the increasing number of users, the technical limitations and the capabilities of the network devices. Data networks are known of their peaky and bursty responses. During network operation “at a peak time”, where a network interface is fully utilized, devices can no more send or receive data. In this project we aim to implement an algorithm that allows flattening the utilization profile of network resources, where the algorithm will be implemented in the theme of Bandwith Demand Side Management (DSM) & traffic Shaping.

Demand Side Management is the process of implementing measures and standards on the customer side and it is acknowledged as one of the foremost solutions used to fight climate change, since peak demands are condensed along with the required capacity and energy which in return will reduce greenhouse gas emission. It also reduces/postpone the needs for networks extensions and investments in power plants.

In Computer or packet switching networks, information travels in the form of IP packets. These packets form the traffic that streams though the network.

Traffic shaping or (packet shaping) is a recently developed technique, adopted in computer networks for controlling the traffic, optimizing the performance, improving latency and increasing the allocated bandwidth for some kind of traffic by delaying some kind of packets (belong to another kind of traffic), for example reducing the bandwidth for peer-to-peer (P2P) traffic and increase the bandwidth for file transfer protocol (ftp) traffic.

Traffic shaping is carried out mainly by the Internet service provider (ISP) at different network locations to control the size of traffic being injected to it, which is called “bandwidth throttling”, or limit the rate of traffic being sent, which is called “rate limiting”. Traffic shaping can be maintained by many methods; however in most cases it is maintained by delaying data packets. It is applied at the edges or the interfaces of the networks to manage the incoming and the outgoing traffic. The level of latency will increase dramatically when a link or an internet interface becomes saturated, because the traffic will struggle to pass through the allocated bandwidth “either in upstream or downstream”. In this case, traffic shaping can be used to prevent saturation from happening and therefore, it controls and manages network latency. For example, at the Local Area Network (LAN) level, the web administrator can adopt the traffic shaping technique to throttle the bandwidth and avoid congestion and “server crashes”.



Traffic shaping limits the transmit rate of traffic
to a value (CIR) lower than the interface's line rate
by temporarily buffering packets exceeding the CIR

Efficient Technique for Performance Improvement of MIMO-OFDM System using NLMS Adaptive Equalizer

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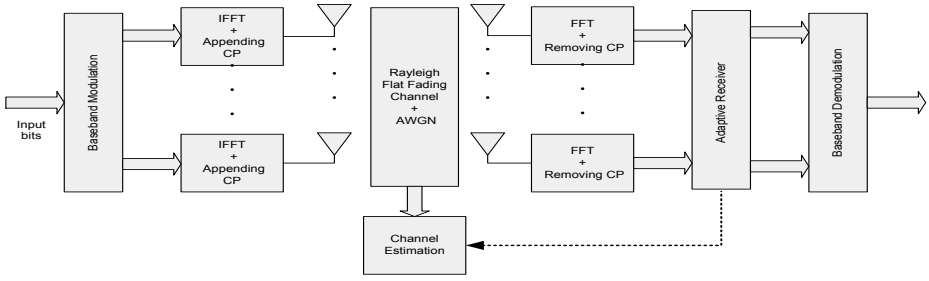
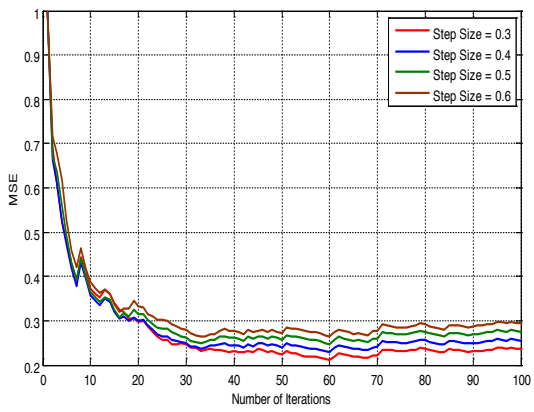
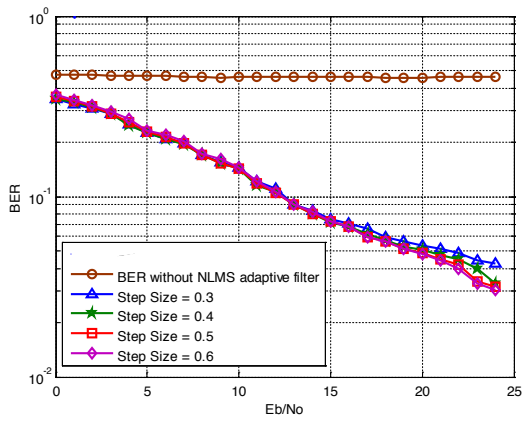
ABSTRACT

In wireless communications, multi-channel transmission is utilized to obtain high capacity and better throughput efficiency. Multiple-Input Multiple-Output (MIMO) Orthogonal Frequency Division Multiplexing (OFDM) is considered as spectrally efficient approach to achieve high throughput communications. In a multi-channel system, frequency selective fading or narrowband interference affects small percentage of sub-channels whereas in a single channel system, a single fade or interference might cause the entire channel to fail. To realize OFDM, we have to maintain orthogonality between sub-channels (i.e., reducing crosstalk between them). Orthogonality can be maintained using cyclic prefix which is the copy of the last part of an OFDM symbol. Cyclic prefix will be appended to the transmitted symbols. This introduces a loss in the signal to noise ratio (SNR). However, the zero inter symbol interference (ISI) mitigates the loss. This system investigates the performance of MIMO-OFDM system using adaptive equalizer in the receiver to estimate the channel when the channel state information is not known at the receiver. One of the simplest, yet robust adaptive filter algorithms is the normalized least mean square (NLMS). The weight vector of NLMS can be changed automatically, while that of LMS cannot .The performances of using various values of the NLMS algorithm's step-size were investigated and an optimum value was chosen, based on a trade-off between the convergence speed and the steady state Mean-Square-Error (MSE). Then, the bit error rate (BER) performance of the proposed NLMS adaptive receiver is compared with that of the conventional receiver to compare the obtained performance improvement. The most important parameter that dominates the NLMS algorithm is the step size. If the step size is set to a large value, the convergence rate of NLMS algorithm will be fast. However, the steady state MSE will increase. On the other hand, if the step size is set to small value, the convergence rate will be slow but the steady state MSE will decrease. If the rate of convergence is fast, the filter will be adapted quickly to a stationary environment of unknown statistics. The developed MIMO-OFDM system is shown below with MSE performance versus number of iterations and BER performance for various values of step-size and the optimum value according to the simulation results showed that 0.3 gives minimum BER and lowest MSE level.







Home Positioning System Using Wireless Sensor Network

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ABSTRACT

Recently the outdoor positioning systems were developed to find places and also as a guidance to these places. The applications of the outdoor Global Positioning System (GPS) become more usable as it's used in the transportation (car, ship, and plane). The concept that's used with the outdoor positioning system is the Line of Sight (LOS) which means there are no any obstacles between the satellites and the used systems and this actually the main reason of developing these systems. Unfortunately, the GPS system cannot be used effectively inside buildings due to its weak reception when there are no Lines of Sight from the satellite and the receiver point; therefore, indoor localization systems use the concept of Non Line of Sight (NLOS) as well. Therefore, this is considered as a challenge regarding the localization and positioning. Nowadays there are a lot of projects for indoor positioning systems. However till today there is no neither technique nor algorithms that are counseled in the use of indoor positioning systems. Wireless Sensor Networks (WSN) is an emerging technology that received remarkable interest by the research and industrial sectors. Moreover, the development of off-the-shelf low cost hardware has enabled the integration of this technology in several real-life applications. Home Positioning System (HPS) aims to develop a localization system that can be used as applications such as assisting blind people to live in their home environments or object tracking and monitoring. The main goal of this system is to assist blind people by providing them the basic information about their location at home, so that a blind person should distinguishes the locations of his home while he is moving around the home area by recognizing which room is arrived (i.e. which room is closed to him/her).

The main idea behind this project is to build a network using wireless sensors that performs and satisfies the goal of the system as shown in Figure 1. As a result, it needs to give the user that basic information about his location through a voice command, for example, if a blind person is closed to the kitchen room or standing at that room, then the system should give him/her this voice command: "kitchen".

The techniques used to proposed solution include proximity and fingerprint techniques which are based on Receiver Signal Strength (RSS). Initially the proximity technique will be implemented in the system in order to provide the zone of receiver (blind person) location, and then the system will be developed by using fingerprint technique to estimate the location of the blind person. Note that this technique is nothing to do with hand fingerprint.

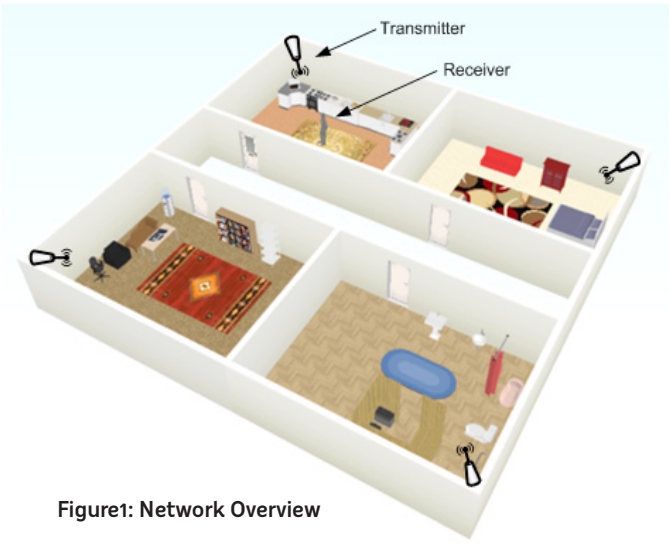

Figure1: Network Overview

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