2015 IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE 2015)

Langkawi, Kedah, Malaysia
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TECHNICAL PROGRAM ABSTRACT

Network & Communication Technologies
(08:30 - 10:15 @ Ruby Room)
Session Chair: ASSOC PROF MOHD TARMIZI ALI

55. Handover Parameter Optimization for Self-Organizing LTE Networks   1

Ili Nadia Md Isa (FKE, UiTM), Mohd Dani Baba (Universiti Teknologi MARA), Azita Laily Yusof (UiTM), Ruhani Ab Rahman (UiTM)

Self-Organizing Network (SON) mechanism comprises of three components of self-configuration, self-optimization and self-healing which can contribute to optimize the performance of the next generation broadband network such as the Long Term Evolution (LTE) networks. The aim of this study is to propose a self-organizing handover procedure based on the Self-Organizing Network (SON) concept for LTE network. The simulation of the proposed SON-based handover mechanism was conducted using the QualNet software. The two main handover parameters that have been modified are the Hysteresis (Hys) and Time-To-Trigger (TTT). The outcome of the simulation shows the network performance is better after optimizing the Hys and TTT of the handover parameters. The LTE network performance shows remarkable improvement in terms of network throughput, delay and jitter.

56. A Reconfigurable Band-Rejection Filtenna Using Open Stub for Ultra Wideband (UWB) Applications.   7

Nurfarahin Miswadi (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (Uitm), Shah Alam, Selangor), Mohd Tarmizi Ali (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (Uitm), Shah Alam, Selangor), Mohd Nor Md. Tan (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (Uitm), Shah Alam, Selangor), Fatimah Nur Mohd Redzwan (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (Uitm), Shah Alam, Selangor), Noor Hasimah Baba (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (Uitm), Shah Alam, Selangor), Hadi Jumaat (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (Uitm), Shah Alam, Selangor)

In this paper, design of a filtenna with reconfigurable band-rejection for Ultra Wideband (UWB) communication applications is presented. The proposed antenna is a simple circular radiation patch structure with half ground plane. The band-rejection characteristics is achieved by integrating straight open stub in the feed line to overcome the interference Wireless Local Area Network (WLAN) that operated in the UWB frequency band. One RF switches is mounted at the open stub to active and deactivate the corresponding band-notch and hence band-rejection reconfigurability is achieved. Two reconfigurable states are achieved in the UWB frequency band which during the ON state the presented antenna is capable to operate in the WLAN band-rejection mode while during the OFF state it is capable to operate in full FCC band. The proposed antenna shows the wide impedance bandwidth with WLAN band rejection and multi-function switchable properties.

18. Flux Density through Twisted Optical Fibers with PEMC Mediums   11

Muhammad Abuzar Baqir (Institute of Microengineering and Nanoelectronics, Universiti Kebangsaan Malaysia 43600 UKM Bangi, Selangor, Malaysia), Pankaj Kumar Choudhury (Institute of Microengineering and Nanoelectronics, Universiti Kebangsaan Malaysia 43600 UKM Bangi, Selangor, Malaysia), Syed Samar Abbas (Department of Mechanical Engineering, NED University of Engineering and Technology 75270 Karachi, Pakistan)

The paper reports wave propagation through twisted clad optical fiber under the situation when a sheath helix comprised of perfect electromagnetic conductor (PEMC) is introduced at the core-clad interface. Flux density characteristics for this fiber are reported under the excitation of two different hybrid modes, and two different orientations of the helix structure, and the effects due to fiber dimension as well as the PEMC helix orientations are illustrated.

7. Performance Analysis of Resource Block Preserver scheduling algorithm for the downlink in LTE Networks   15

Sinan Abid Ali (UiTM), Mohd Baba (UiTM), Mohd Mansor (UiTM)

Long Term Evolution (LTE) is a breakthrough in broadband technology which aims to support several high level quality and real time multimedia services for the mobile users. This paper proposes a resource block preserver (RBP) scheduling algorithm which optimizes the performance of the downlink transmission system in LTE network. The resource block preserver algorithm has two layers, upper and lower. The upper layer of the RBP exploits the LTE frame concept which contains multiple numbers of sub-frames. The lower layer of the RBP algorithm adopts the concept of proportional fair (PF) algorithm to schedule the non real time (NRT) flows. While for the real time (RT) flows, different scheduler algorithm's metrics are utilized. The simulation results show that the performance of the RBP scheduling algorithm has outperformed the non-RBP algorithm in terms of higher throughput and fairness when allocating their services.

30. RB Preserver Downlink Scheduling Algorithm for Real-Time Multimedia Services in LTE Networks   21

Sinan Abid Ali (UiTM), Mohd Baba (UiTM), Mohd Mansor (UiTM)

Long Term Evolution (LTE) is a breakthrough in broadband technology, which aims to support several high level quality and real time multimedia services for mobile users which were important concern in the preceding generation of mobile networks. In this paper, a Quality-of-Service (QoS) aware packet scheduler for Real Time (RT) downlink communication in LTE was designed. A resource block (RB) preserver scheduling algorithm that has two layers is proposed. The upper layer exploits the LTE frame features of aggregating multiple numbers of sub-frames. As for the lower layer, different scheduling algorithm's metrics were computed in order to achieve the QoS. Furthermore, a comparison between these algorithm metrics was done to select the best one that can satisfy the QoS requirements. Simulation results show that the proposed approach satisfies the QoS requirement for the RT flows.

51. Throughput Measurement in 4G Wireless Data Networks: Performance Evaluation and Validation   27

Saeid Abolfazli (YTL Communications and Xchanging, Malaysia), Zohreh Sanaei (YTL Communications and Xchanging, Malaysia), Shen Yuong Wong (YTL Communications), Ali Tabassi (YTL Communications), Steven Rosen (YTL Communications)

Wireless data networks, particularly 4th generation (4G) and long-term evolution (LTE) are rapidly gaining ground as predominant telecommunication services to provide high quality services to wireless end-user consumer (WEC). This growth is in response to insatiably increasing popularity and penetration of mobile devices among individual, corporates, business, and government service consumers. Beside adequate resource provisioning and design, ensuring the quality of service (QoS) to WEC is the key in successful adoption of such state-of-the-art wireless communication technologies in national/international scope. Network throughput is one of the key network performance metrics for QoS among end-users. However, demonstrating reliability and validity of network throughput measurement deployed in vendor end-point is a critical task. Moreover, WECs demand reliable, accurate, and consistent tools and methodology that help them to measure network throughput at their end-point. Network service vendors are also interested to predict the future throughput based on historical data from the past. In this paper, we devise a methodology to accurately measure throughput of the 4G WiMAX data network in real wireless environment from end-users perspective. We experimentally and mathematically evaluate the performance of the proposed model and validate our findings using the observed results from OOKLA as a predominant network monitoring tool. Based on the results, we suggest an intelligent monitoring system in corporation of both Iperf and OOKLA that not only can measure the momentous throughput, but also can predict the future throughput based on previous throughput data.

70. Transparent Antenna using Aluminum Doped Zinc Oxide for Wireless Application   33
Mardhiah Awalludin (UiTM Shah Alam), Dr. Mohd Tarmizi Ali (UiTM Shah Alam), Dr. Mohamad Hafiz Mamat (UiTM Shah Alam)

In this paper, transparent antenna using aluminum doped zinc oxide has been presented. Quartz and glass has been used as dielectric substrate, while for the radiating element and ground both using AZO. From the simulations results, simulated return loss at 2.4 GHz for transparent antenna using quartz substrate are 23.3 dB while for antenna using glass as substrate are 18.32 dB. Transparent antenna using quartz as substrate recorded high gain which are 4.056dB.

Signal & Image Processing/Medical Electronics
(10:45 - 12:45 @ Ruby Room)
Session Chair: IHSAN YASSIN

65. On Analyzing Various Density Functions of Local Binary Patterns for Optic Disc Segmentation   37

Nur Ayuni Mohamed (Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia 43000 Bangi, Malaysia), Mohd Asyraf Zulkifley (Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia 43000 Bangi, Malaysia), Aini Hussain (Department of Electrical, Electronic and Systems Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia 43000 Bangi, Malaysia)

In building an automated glaucoma detection system, optic disc segmentation is the first step that needs to be implemented follows by optic cup segmentation in order to quatify the severity level of glaucoma. Glaucoma is an ocular eye disease that can lead to gradual vision loss and permanent blindness if it is not treated in the early stage. Many glaucoma patients are unaware of their disease since they rarely encounter any symptom that can lead to glaucoma. Thus, detecting glaucoma during the early stage is very important to reduce the treatment risk. This paper proposes optic disc segmentation by using local binary patterns operator (LBP), a feature for textural classification in image processing. LBP is utilized only on red channel of RGB fundus image because of higher contrast between optic disc and its surrounding area compared to the blue and green channels. Smoothing technique, specifically, histogram equalization is performed to improve the quality of input image before LBP method is applied. Lastly, morphological operation and filtering are applied to filter out the artifacts and remove the noise from the segmented image. RIM-One database is used to validate the simulation results with Exponential distribution achive better performance with average accuracy and precision of 0.8951 and 0.7390 respectively.

45. Estimating Location of Land Cover Patch in Super-Resolution Mapping By Hopfield Neural Network   42

Siti Khadijah Mohd Zaki (Universiti Kebangsaan Malaysia), Anuar Mikdad Muad (Universiti Kebangsaan Malaysia)

Super-resolution mapping (SRM) aims to locate sub-pixel class fractions geographically in the area represented by a mixed pixel. The accuracy of small sub-pixel class patches are represented by the popular SRM method is explored. It is shown that the accuracy of predicted patch location from the Hopfield Neural of SRM is a function of patch size. Specifically, the accuracy with which patch location is predicted varies inversely with patch size, with very small patches subject to large mis-location errors. A means to reduce the magnitude of mis-location error through the use of multiple sub-pixel shifted imagery is illustrated and the

implications to popular site-specific accuracy assessment discussed. The use of multiple sub-pixel shifted images was able to reduce the error in patch location by more than half for very small patches and represents a simple but effective enhancement to SRM applications.

40. Multicolour Object Detection using Multithreading   48
Nur`ain Saaidon (International Islamic University Malaysia), Wahju Sediono (International Islamic University Malaysia)

As image and video processing applications are leaning towards real-time requirement, the program control for the system must be designed efficiently while taking the processing time factor as one of the main considerations. This paper presents the method of detecting multicolour objects and the processing time comparisons of designed algorithms.Algorithm with multithreading approached is compared to the usual sequential approach of image processing. The number of threads created in multithreading's algorithm is depending on the number of colours to be detected. Time processing for multicolour object detection using multithreading is shown to be significantly less compared to sequential process as the number of detected colours increases. Multithreading programming method are useful to improve efficiency of the system's application and take the benefit offered by multicore processor in most of the computer nowadays.

27. Coding Structure and Performance of High Efficiency Video Coding (HEVC) and H.264/AVC   53
Mohammed Saleh (Universiti Teknologi MARA), Habibah Hashim (Universiti Teknologi MARA), Nooritawati Tahir (Universiti Teknologi MARA)

In this paper, the Coding Structure and Performance of video compression standard H.264/AVC and the modern compression standard High Efficiency Video Coding (HEVC) are discussed as well as the testing of their quality performance. The study is made in terms of the technical design and the results of the tests that have been done on both standards individually. According to the experimental results using same encoding configuration and parameters, it clearly indicates that HEVC encoder can produce the same quality encoded video as that produced by H.264/AVC but with an approximately 50% decrease in bit rate.

41. Effect of Fixed Point Computations on Anger Classification in Speech   59
Syazilawati Mohamed (RMIT UNIVERSITY), Paul Beckett (RMIT UNIVERSITY), Margaret Lech (RMIT UNIVERSITY)

This paper investigates the effect of fixed point calculations on the accuracy of automatic emotion detection from speech signals. The tests used natural emotional speech recordings representing 16 speakers expressing two emotions: anger and neutral (unemotional) state. The feature set was derived from the Teager energy operator (TEO) and the speech was classified using the Gaussian mixture model (GMM) method. The results showed that with decreasing

fixed point resolution from 16 bits down to 6 bits, the average classification error for the TEO increases from 0.0% to 6.6%. At 8 bit resolution, the error was an acceptable 2.4%, which implies that the TEO can be efficiently calculated using low-cost hardware.

46. Subcutaneous Veins Detection and Backprojection Method Using Frangi Vesselness Filter   65

Aamir Shahzad (Universiti Teknologi PETRONAS), Mohamad Naufal Mohamad Saad (Universiti Teknologi PETRONAS), Chong Meng Goh (Universiti Teknologi PETRONAS), Nicolas Walter (Universiti Teknologi PETRONAS), Aamir Saeed Malik (Universiti Teknologi PETRONAS), Fabrice Meriaudeau (University of Burguny)

Blood vessels detection is a common task performed in numerous medical procedures. During regular medical treatments venipuncture procedures are performed for invasive medication and blood sampling. Near infrared imaging technology can be used to visualize the subcutaneous veins in cases of difficult venous access. In this paper the methods for veins centerline detection and back projection is presented. In order to highlight the suitable veins for venipuncture, the centerline of larger veins are detected and back projected to the original image. The method is applied on the near infrared images of subjects selected from four different classes of skin tone. This can be helpful to medical staff to select suitable vein for venipuncture procedures. The method is based on Frangi vesselness filter for 2D images. The artifacts like hair and small vessel-like structures are removed with morphological operations. The presented method shows consistent performance in terms of vascular structure detection for all skin tone classes.

67. Iris Segmentation Methodof Pterygium Anterior Segment Photographed Image   69
Siti Raihanah Abdani (Smart Engineering System Research Group Department of Electrical, Electronic and Systems Engineering Faculty of Engineering and Built Environment,UniversitiKebangsaan Malaysia 43600 UKM Bangi, Malaysia), W Mimi Diyana W Zaki (Smart Engineering System Research Group Department of Electrical, Electronic and Systems Engineering Faculty of Engineering and Built Environment,UniversitiKebangsaan Malaysia 43600 UKM Bangi, Malaysia), Aini Hussain (Smart Engineering System Research Group Department of Electrical, Electronic and Systems Engineering Faculty of Engineering and Built Environment,Universiti Kebangsaan Malaysia 43600 UKM Bangi, Malaysia)

Pterygium is an eye disease that commonly affects people living in areas near the equator such as Malaysia, Indonesia etc.and who are expose to excessive wind, sunlight, or sand. It is a form of tissue overgrowth found in the eye. Recently, anterior segment photographed images (ASPIs)have been used for early detection of the disease by incorporating digital image processing (DIP) techniques which has triggered our interest to investigate such possibilities. As such, this paper reports the early results of iris segmentationof ASPIs that can be usedlater for pterygiumdetection. The work involves using the normalized HSV colour space of the iris ASPIs. By using the subtraction method, the iris threshold value was calculated to segment the

iris. It is found out that the proposed algorithm can correctly segment the iris with pterygium cases.

64. Image Retrieval System for Medical Applications   73
Ling Chei Siong Ling (Smart Engineering System Research Group, JKEES, Fakulti Kejuruteraan dan Alambina UKM), W Mimi Diyana W Zaki (Smart Engineering System Research Group, JKEES, Fakulti Kejuruteraan dan Alambina UKM), Aini Hussain (Smart Engineering System Research Group, JKEES, Fakulti Kejuruteraan dan Alambina UKM)

This paper discusses the review of image retrieval system for medical applications. For decades, image retrieval system research has been popular and as such, it is widely used in the market today. But in the medical field, there are only a few systems available and they have limitations. Text-based Image Retrieval Systems (TBIRSs) have been used in many hospitals but such systems are not efficient especially when dealing with large databases. Thus, Content-based Image Retrieval System (CBIRS) was proposed to overcome the inefficiency in TBIRS. However, CBIRS also has some limitations in medical field and requires further research to improve it. To begin with, this paper intends to present a study on hybrid system involving both the TBIRS and CBIRS as its components. Additionally, it suggests a prototype for the TBIRS.

Computational Intelligence/Bioinformatics & Computational Biology
(14:00 - 15:30 @ Ruby Room)
Session Chair: MEISAM ESLAHI

12. CLUSTER BASED DATA REDUCTION METHOD FOR TRANSACTION DATASETS 78
Mohammed Alweshah (Al-Balqa Applied University), Wael Alzoubi (Al-Balqa Applied University), Abdulsalam Alarabeyyat (Al-Balqa Applied University)

The common feature of transaction datasets is that it is very huge in size, so it is so important to develop a technique for dataset reduction. The process of dataset reduction must not change the features of the original dataset; this will increase the effectiveness and efficiency of extracting association rules from these datasets without affecting the original data. Disjoint clusters that have different number of transactions will be introduced in order to minimize the search space, this in turn will decrease the time required to mine the desired rules by dealing with each cluster individually. The support and confidence measures will be used to determine the frequent itemsets and exclude the others.

35. Solving Examination Timetable Problem using partial exam assignment with Hill Climbing Search 84
Ashis Kumar Mandal (University Malaysia Pahang), M N M Kahar (University Malaysia Pahang)

This paper describes a method that combines graph heuristics and hill climbing for addressing the examination timetable problem. In this approach, all exams are ordered with graph heuristic ordering approach and partial exams are considered for scheduling. These partial scheduled exams are then improved using hill climbing until all exams have been successfully scheduled. Various exam assignment values with different graph heuristics ordering have been investigated. The proposed approach has been tested over the twelve Toronto benchmark datasets. The experimental results and comparison with other methods demonstrate that the proposed approach is able to produce good quality timetable.

26. An Analysis and Comparison for Popular Video Encryption Algorithms   90
Mohammed Saleh (UiTM), Habibah Hashim (UiTM), Nooritawati Tahir (UiTM)

The security of video in the communication field become the major concern especially after the rapid development of multimedia technology (internet and mobile devices). Since the using of multimedia data transmission become more and more due to the wide internet using all around the world, the video protection techniques, is become necessary to keep that information not accessible by irrelevant public or malicious attackers. The researchers have designed different type of encryption algorithms to secure the multimedia data, that algorithms have their strength and weakness points. In this paper, we will focus on introducing and comparison between the three popular encryption algorithms, DES, RSA and AES, as well to choose which encryption algorithm can be used to exchange video safely, and maintain the balancing between the security and computational time.

60. Ant Colony Optimization of Feeder Bus Routes for Electric Train Service   95
Siti Fatimah Mohammad Azam (Universiti Teknologi PETRONAS), Micheal Drieberg (Universiti Teknologi PETRONAS), Fong-woon Lai (Universiti Teknologi PETRONAS)

The Electric Train Service (ETS) was introduced as a faster, safer, greener and more reliable mode of public transportation between the major cities of Ipoh and Kuala Lumpur. This service holds great potential in benefitting the society and the nation. A significant issue which affects the effectiveness of the ETS however, is the absence of an efficient feeder bus system. This paper presents a research to design a efficient and effective feeder bus route using the Ant Colony Optimization (ACO) technique. The objective function is designed such that the optimized route should provide the broadest service coverage, highest operation profit, shortest total travel time, and meet the highest demand. For the intents and purposes of this research, the Ipoh, Perak ETS station has been selected as a case study. The results obtained from simulations show that solving the route optimization problem using ACO can yield a wide coverage route which provides highly efficient and effective feeder bus service.

69. Evaluation on Non-detection Zone of Passive Islanding Detection Techniques for Synchronous Distributed Generation   100
Amalina Izzati Md Isa (University Technology MARA), Hasmaini Mohamad (University Technology MARA), Zuhaila Mat Yasin (University Technology MARA)

An effective islanding detection technique is extremely important in safeguard Distributed Generation (DG) from incur a great impact due to unintentional islanding. Among commonly employed techniques, passive detection is known as the simplest and cheapest detection technique, but suffers large Non-Detection Zone (NDZ). This paper present an evaluation on NDZ of passive islanding detection technique based on the combination of passive techniques i.e Rate of Change of Frequency (ROCOF) and Rate of Change of Voltage (ROCOV). The NDZ is identified by performing simulation study on a distribution system. A systematic

approach to locate the specific zone is carried out by varying active and reactive power imbalance at the Point of Common Coupling (PCC) when the system is subjected to islanding. The performance of combination technique is compared with Over/Under Frequency (OUF) and Over/Under Voltage (OUV). The results show the combination technique has a smaller NDZ and is capable to detect islanding within a shorter time.

63. Comparison between PSO, NE, QR, SVD for Solution of Linear Least Squares System Identification of DC Motor   105
Siti Muniroh Abdullah (UiTM Shah Alam), Ahmad Ihsan Mohd Yassin (UiTM Shah Alam), Nooritawati Md. Tahir (UiTM Shah Alam)

System Identification (SI) is a control engineering discipline that have been used to find a compact and accurate mathematical model of a dynamic system based on their input and output measurement. There are two important step in System Identification (SI) process; structure selection, parameter estimation. The structure selection part have been done previously. Thus, this paper present an analysis of comparison between Particle Swarm Optimization (PSO) and Orthogonal Least Squares (OLS) method for parameter estimation of the Nonlinear Auto – Regressive with Exogenous (NARX) model for a Direct Current (DC) motor. The findings indicate that PSO and OLS are comparable in solving the Least Squares (LS) problem posed in NARX model.

Trusted Computing & Secure Systems/Cloud Computing/Software Engineering
(15:30 - 17:15 @ Ruby Room)
Session Chair: DR. HASMAINI MOHAMED

48. The use of Tin Can API for Web Usage Mining in e-learning apps based on social network 113

Wan Mohd Amir Fazamin Wan Hamzah (UNIVERSITI MALAYSIA TERENGGANU), Noraida Ali (UNIVERSITI MALAYSIA TERENGGANU), Md Yazid Mohd Saman (UNIVERSITI MALAYSIA TERENGGANU), Mohd Hafiz Yusoff (UNIVERSITI MALAYSIA TERENGGANU), Azliza Yacob (UNIVERSITI MALAYSIA TERENGGANU)

Nowadays, the usefulness of the social network is very widespread. Besides used to socialize, business and advertising, the social network is also used for learning. In this study, Facebook is used as a medium of learning. E-learning applications have been embedded into Facebook as Facebook applications. This is to facilitate access to e-learning applications. Previous research has shown that web usage mining method could only track users who access e-learning applications on the social network. They did not track the behaviour of users in e-learning applications. Therefore, the use of Tin Can API is proposed to overcome this issue. Integrating e-learning applications with Tin Can API enables user behaviour can be tracked and recorded. In this paper, the use Tin Can API for web usage mining in e-learning applications on the social network   is   explored.

31. Periodicity Classification of HTTP Traffic to Detect HTTP Botnets   119

Meisam Eslahi (UITM), Hamid Nilsaz (Islamic Azad University), Maryam Var Naseri (APU), N.m. Tahir (UITM), H Hashim (UITM)

Recently, the HTTP based Botnet threat has become a serious challenge for security experts as Bots can be distributed quickly and stealthily. With the HTTP protocol, Bots hide their communication flows within the normal HTTP flows which make them more stealth and difficult to detect. Furthermore, since the HTTP service is being widely used by the Internet applications, it is not easy to block this service as a precautionary measure and other techniques are required to detect and deter the bot menace. The HTTP Bots periodically connect to particular web pages or URLs to get commands and updates from the Botmaster. In fact, this identifiable periodic connection pattern has been used in several studies as a feature to detect HTTP Botnets. In this paper, we review the current studies on periodic communication techniques in the detection of Botnets as well as the shortcomings of these methods. Consequently, we propose three metrics to be used in identifying the types of communication patterns according to their periodicity. Test results show that in addition to detecting HTTP Botnet communication patterns with 80% accuracy, the proposed method is able to efficiently classify communication patterns into several periodicity categories.

72. Simulation of RSA and ElGamal Encryption Schemes using RF Simulator   124
Syed Farid Syed Adnan (UiTM Shah Alam, Malaysia), Mohd Anuar Mat Isa (UiTM Shah Alam, Malaysia), Khairul Syazwan Ali Rahman (UiTM Shah Alam, Malaysia), Mohd Hanif Muhamad (UiTM Shah Alam, Malaysia), Habibah Hashim (UiTM Shah Alam, Malaysia)

Advancements in sensor nodes technology and lightweight encryption protocols have made great impacts on the security of Internet of Things (IoT) and Cloud Computing. Sensor nodes commonly rely on wireless transmission media such as radio frequency (RF) and typically run on top of CoAP and Trivial File Transfer Protocol (TFTP) protocols which do not provide any security mechanisms. One method of securing sensor node communication over RF is to implement a lightweight encryption scheme. In this paper, we present a RF Simulator v1.1 which simulates lightweight security protocols for RF device communication using any encryption scheme. The RF Simulator can be used for a quick trial and debugging for any new wireless security protocol in the simulator before the actual or experimental implementation of the protocol in the physical devices. In a previous work, we have shown that the RF Simulator can support a cryptographer or engineer in performing quick product test and development for Diffe-Hellman Key Exchange Protocol (DHKE) and Rivest Shamir Alderman (RSA) protocols. In this work, we present the simulation result of implementing the RSA and ElGamal encryption scheme using SW-ARQ protocol in sensor node RF communication. The simulation was performed on the same testbed as previous works which comprised of ARM Raspberry Pi boards and HP DC7800 PCs.

84. Sieving Technique to Solve Discrete Log Hard Problem in Diffie-Hellman Key Exchange   129
Yasin Fitri Alias (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Anuar Mat Isa (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Habibah Hashim (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

Timing attack is a type of side-channel attack directed at weakly secured computing devices and aims at extracting private keys from cryptosystems. The incidence of timing attacks is expected to rise in the age of Internet of Things (IoT) where devices are mostly power-constrained and cryptographic implementations are minimal. These types of attacks rely on precise timings obtained from cryptographic operations and reconstructing the cryptographic key from such information. This paper presents a method to implement timing attack in the Diffie-Hellman Key Exchange (DHKE) algorithm in an embedded system environment. The approach discussed in this paper aims at decreasing the key search area to reduce the time taken to solve the Discrete Log Hard Problem (DLHP).

73. Parallel Extended Gate MOSFET pH Sensing System   134
Wan Fazlida Hanim Abdullah (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

This project presents a pH sensing monitoring system using parallel extended gate structure that capture the sensor response to changes in ionic activities in solutions. The objective of this project is to propose a sensing array of conventional MOSFETs that allows detachable sensing membranes. The main task of the intended application is to find the pH value of an ionic solution that is being tested. The sensing membrane is a layer deposited on a conductive substrate, attached with a wire to form an extended gate. The task of the readout circuit is to detect the threshold voltage changes through Vout of the sensing MOSFET, treating the new threshold voltage as a combined effect of reference electrode/solution/extended membrane/sensing MOSFET. A model is constructed to demonstrate the ability of the extended gate setup to detect three pH states of three parallel solutions. The interfacing circuit biases the sensing MOSFET with a constant drain current of 100?A and 0.5 V drain-source voltage to maintain the MOSFET in isothermal region.

74. SMART WATER GRADE CONTINUOUS MONITORING FIBER OPTIC SENSING SYSTEM   138
Wan Fazlida Hanim Abdullah (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

This project presents a water grade monitoring system using fiber optics to continuously monitor multiple waterrelated parameters. The objective of the project is to construct a system that can detect the changes in parameters of the riverwater parameters continuously for long distances and alert the authorities if necessary. The system is an alternative approach to overcome limitations of current solutions that result in water body structures unmonitored due to labour intensiveness. The design methodology is divided into the following scope of work: (i) system design, covering interfacing and information processing, (ii) optical fiber network setup, and (ii) sensing modules, covering electronic sensors applications and interfacing of sensors. A water body model is constructed to demonstrate action of four parameter sensing: pH, oil detection, water flow and water level electrical sensors. Results show that difference in electrical sensor voltage output is able to induce pressure to FBG through servomotors. This action causes a shift on central wavelength along the optical fiber network. This information will be detected and analyzed by Agilent VEE. Analysis covers model data with pH ranging from 4 to 12 in 4 levels, presence of oil, water level rise between 5 to 15 cm and water flow rate change of in litres/min.

85. Comparison between Linear Discriminant Analysis and Singular Value Decomposition for PD Gait Classification 142

Suryani Ilias (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Rozita Jailani (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Nooritawati Tahir (UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

In this study, the effectiveness of Linear Discriminant Analysis (LDA) as feature extraction and dimensionality reduction is evaluated and compared with Singular Value Decomposition (SVD) for gait recognition of Parkinson Disease subjects as compared to normal subjects. Here, three feature vectors of gait namely basic, kinetic and kinematic features are extracted and analysed using LDA and leave one out (LOO) recognition method. Next, ANN classifier is used to compare the performace of LDA versus SVD. Initial findings confirmed that the gait pattern between PD and normal subjects can be classified using the three feature vectors with kinematic features outperformed the other two feature vectors with 86.71% with ANN as classifier and 87.5% using LOO recognition technique.

81. Memristor-CMOS Interfacing Circuit SPICE Model 147

Siti Musliha Ajmal Binti Mokhtar *(Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)*, *Wan Fazlida Hanim Abdullah (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)*

Memristor is a nano device that exhibits unique IV pinched hysteresis loop with switching mechanism and has ability to remember its last state. These interesting memristor characteristics encourage researchers to understand the new device and develop its potential applications. The problem is memristor has not yet available in current market due to the cost and technical difficulties in fabrication nanoscale device. In this paper, few SPICE memristor models are selected and their I-V behaviors are compared to a physical memristor to verify model similarity with actual device. Using the models, an interfacing circuit between SPICE memristor model and CMOS circuit is presented. The interfacing circuit is composed by write circuit (to program memristor resistance) and read circuit (to read memristor current) using operational amplifier and current mirror.

Special Session: Advances in Medical Robotics and Informatics
(08:30 - 10:15 @ Ruby Room) Session Chair: Mohd Saufy Rohmad

66. Lightweight Cryptography on Programmable System on Chip: Standalone Software Implementation   151

Mohd Saufy Rohmad (Information Security and Trusted Infrastructure Laboratory,Faculty Electrical Engineering,UiTM Shah Alam), Habibah Hashim (Information Security and Trusted Infrastructure Laboratory,Faculty Electrical Engineering,UiTM Shah Alam), Azilah Saparon (Information Security and Trusted Infrastructure Laboratory, Faculty Electrical Engineering,UiTM Shah Alam)

Embedded systems of today are being designed to be highly reliable, to respond to real-time system demands, to have functional flexibility and most importantly to run on low power sources. These ubiquitous systems are nowadays being employed to handle highly sensitive data including global positioning, health, banking and personal data. Based on these trends, the demands on their security mechanism have increased, not only because of newly emerging threats that embedded systems face but also due to the power resource constraints that compels the revisiting of the security approach. Lightweight cryptosystems becomes a feasible option and in this work we implement two lightweight algorithms namely PRESENT and Clefia, together with their counterpart well-known symmetric encryption algorithms AES and 3DES, on a dual core ARM-based system-on-chip (SoC) platform. We observe the dynamics of implementing the algorithms on such a device and study its performance. The implementation was carried out by means of standalone bare metal software implementation that executes directly on the dual core ARM CPU. The result is presented and compared to normal PC-based Linux implementation.

75. Preliminary Study: Gender Comparison in Walking Gait Analysis on Anatomical Planes for Children   155

Nur Khalidah Zakaria (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

As a part of on-going research gait studies among children, this paper presents a preliminary study on kinematic parameters of walking gait among children.In this study, angles of hip, knee, ankle and pelvic will be collected at Human Motion and Gait Analysis Laboratory, UiTM Shah Alam. There are 16 healthy children consists of 10 boys and 6 girls aged between 6 to 12years old participated in this study. Each parameter will be analyzed to investigatethe differences of walking gait in children for bothgenders.This study will be focused on the kinematic parameters at anatomical plane, which are sagittal, frontal and transverse planes. From the result, the differences walking gait pattern occurredgenerally at frontal plane at angle of hip, ankle and pelvic and at transverse plane differences occurred generally at angle of hip.

59. IBE_TRUST Authentication for e-Health Mobile Monitoring System   160

Nazhatul Hafizah Kamarudin (Universiti Technology MARA Shah Alam), Yusnani Mohd Yussoff (Universiti Technology MARA Shah Alam), Habibah Hashim (Universiti Technology MARA Shah Alam)

Authentication in e-Health is a very important aspect to analyze when we deal with security of the whole e-Health system. It deals with the connection from body sensor network to mobile device and server. By integrating Wireless Sensor Networks (WSN) in the e-health system, it will be able to exchange medical information seamlessly and continuously in real time connection. This paper proposes a password less authentication in mobile e-Health network and introduces a unique identity-based authentication scheme and thus eliminating the need for a third party user which is the e-Health service provider in the e-Health network system.

82. Comparison Between MLP And RBF Network In Improving CHEMFET Sensor Selectivity 165
Nurhakimah Abd Aziz (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Wan Fazlida Hanim Abdullah (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

This paper presents a comparison between two Artificial Neural Network (ANN) approaches, specifically, Multilayer Perceptron (MLP) and Radial Basis Function (RBF) networks, in order to improve selectivity of chemically field-effect transistor (CHEMFET) sensor towards the main ion concentration in mixed solution. MLP and RBF models were developed in Matlab Software. Those models will be able to estimate the main ion in mixed solution by learning the pattern of the input and output based on sensor reading extracted. To validate the architecture of ANN as the optimum model, there are three parameters that will be varied specifically number of hidden neuron, learning rate and momentum. The purposed of parameters optimization is to fit the network outputs to the given inputs. Mean Square Error (MSE) and Regression analysis were used for performance evaluation of the models. The MLP network model showed an absolutely better output than the RBF network model in estimating the main ion concentration in mixed solution.

76. Respiratory Rate of Photoplethysmogram Signal from Anaesthetic Patients   171
N. Ahmad Zainudin (Faculty Kejuruteraan Elektrik, UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Wahidah Mansor (Universiti Teknologi MARA), Khuan Y Lee (Universiti Teknologi MARA)

This paper presents a novel method in determining the respiratory rate from the photoplethysmogram signal of anaesthetic patients. The respiratory rate is important to be monitored when the patient is in anaesthesia state since the the patient loss all sensations during this state. This study compares two methods of determining respiratory rate; peak detection and Fast Fourier Transform. The methods were tested on a set of data from subjects with mean age of 52 years old. Data were recorded using pulse oximeter as it is the best device to take the

signal of anaesthetic patient. It was found that there is a small difference in the respiratory between both methods; (0.03 – 0.53). This indicates that Fast Fourier Transform can be used to determine respiratory rate of photoplethysmogram signal

78. Discriminating ECG signals using Support Vector Machines   175
Shahrani Shahbudin (University of Technology MARA), Syazwani Nabilah Shamsudin (University of Technology MARA), Hasmaini Mohamad (University of Technology MARA)

Nowadays, a reliable electrocardiogram (ECG) analysis and classification plays an important role for diagnosis cardiac abnormalities. Clinically, a computer-assisted technique for ECG analysis can reduced the burden of interpreting the ECG signals. Therefore, this paper proposed a ECG classification analysis using Continuous Wavelet Transform (CWT) and a Support Vector Machine (SVM) . CWT is apply to remove noise of ECG signal and to extract distinctive features and used as the inputs to the classifier. SVM was employed merely to classify 4 types of beats of ECG signals namely Normal (N), and three abnormal beats; Left Bundle Branch Block (LBBB), Right Bundle Branch Block (RBBB) and Aberrated Atrial Premature (AAPC). Result obtained indicates that the proposed intelligent discriminating system classified ECG signal types with a high accuracy. The analysis and results also show that the proposed approach is efficient, reliable and applicable.

79. Comparison Kinematic Angles between Genders in Children   181
Nur Khalidah Zakaria (UNIVERSITI TEKNOLOGI MARA, MALAYSIA), Rozita Jailani (UNIVERSITI TEKNOLOGI MARA, MALAYSIA)

This paper presents an analysis of lower limb kinematic angle of walking gait in children. Total of 16 healthy children which is 10 boys and 6 girls were participated in this study. Four selected angles of hip, knee, ankle and pelvic were obtained using Vicon® Nexus Plug-in-Gait. The data collected will be separated into two groups which are boys and girls. The result shows that there are a significant difference between boys and girls at angle of pelvic. Additionally, it is shows that boys have greater maximum flexion of hip and knee, ankle dorsiflexion and plantar flexion and anterior pelvic tilt as compared to girls.

Industrial Electronics/Automation, Mechatronics & Robotics/Computer Applications

(10:45 - 12:30 @ Ruby Room)
 Session Chair: DR WAN FAZLIDA ABDULLAH

68. Automated pH Controller System for Hydroponic Cultivation   186

Mohammad Farid Saaid (universiti teknologi MARA), Anuar Sanudin, Megat Syahirul Amin Megat Ali (universiti teknologi MARA), Ahmad Ihsan Mohd Yassin (UNIVERSITI TEKNOLOGI MARA)

Hydroponics is a technique to grow the plant without using the soil. This technique ensures the plant gets all nutrients needed from the water solution. There are many types of hydroponics technique. The Deep Water Culture (DWC) is one of the hydroponics technique types. DWC is a technique that grows the plant by supplying the nutrient direct to the root of the plant until the plant can be harvested. By using this technique, the plant root will be always submerged into the water that contains nutrient and oxygen. However, this technique manually controlled the pH water, which can give bad effect to growing of plant. In this research, the pH level in water solution will be automatically maintained by microcontroller and measured by sensor. Next, the period of pH level started to change and the effects of pH adjuster solution to the water solution are determined. Lastly, this research also focuses on the ability of the system can adjust the pH value in water solution for DWC. : : The water solution from the DWC container is transferred to the main tank to measure the pH level by sensor and make adjustment if needed and then transfer back to the deep water culture container to continue growing the plant. There are six stages in methodology for this project, which are details of study, hardware identification, software identification, hardware and software interfacing, analysis and troubleshooting, data and result collection. The result from the experiment test showed that the system able to decrease the pH level by 0.58 pH and increase the pH level by 1.15 pH.

38. Modified Nonlinear Neural Network Forecasting Models on Malaysian Sand Costs Indices   191

Saadi Ahmad Kamaruddin (International Islamic University Malaysia), Nor Azura Md. Ghani (Universiti Teknologi MARA), Norazan Mohamed Ramli (Universiti Teknologi MARA)

Artificial Neural Networks (ANNs) have been adapted actively in the time series-prediction arena, but the presence of outliers that usually occur in the time series data may pollute the network training data. This is due to its ability to automatically learn any pattern without prior assumptions as well as loss of generality. In theory, the most common algorithm for training the network is the backpropagation (BP) algorithm which leans on the minimization of the ordinary least squares (OLS) estimator or more specifically, the mean squared error (MSE). Nonetheless, this algorithm is not entirely robust when the outliers are present, and it may lead to false prediction of future values. Therefore, in this current study, we present a new algorithm which manipulates the particle swarm optimization on the least median of squares (PSO-

LMedS) estimator for artificial neural network nonlinear autoregressive moving average (ANN-NARMA) model to cater for the outlying issue in time series data. Additionally, the performance of the consolidated model with comparison with the other robust ANN-NARMA models using M-estimators, Iterative LMedS and Particle Swarm Optimization on LMedS with respect to mean squared error (MSE), mean absolute deviation (MAD), root mean squared error (RMSE), mean absolute percentage error (MAPE) and R-squared values are also highlighted in this paper. Meanwhile, the real-industrial monthly data of Malaysian Sand price index from January 1980 to December 2012 (base year 1980=100) were used. It was found that the robustified ANN-NARMA model using Least Median Square with Particle Swarm Optimization produced the best result with R-squared values equal to 100 in all training, testing and validation sets. It is expected that the findings would assist the respected authorities involve in PFI construction projects to overcome cost overruns.

20. The Sensor Network Using DC Power Line Communication Bus   197

Gang-neng Sung (National Chip Implementation Center), Chien-ming Wu (National Chip Implementation Center), Chun-ming Huang (National Chip Implementation Center)

This work investigates a sensor network using the power line communication (PLC) in a DC power management system comprising master-slave sensor networks. In the traditional Microcontroller-based master and slave units are designed with the serial communication topology for communication with a controller and used a transmission port to couple the signals with modems at both ends. However, coupling data signals to the power line through modulation interfacing circuits is a challenging task in noising cancelation. In this work, we used time-division multiplexing (TDM) technique to divide into two timings, Powering Time and Communication Time, on the DC power line and can reduce the complexity of the master-slave sensor network and noise effect on the power line.

22. A Quantitative Cross-Architecture Study of Morphological Image Processing on CPUs, GPUs, and FPGAs   201

Christian Brugger (University of Kaiserslautern), Lorenzo Dal'aqua (University of Kaiserslautern), Javier Alejandro Varela (University of Kaiserslautern), Christian De Schryver (University of Kaiserslautern), Mohammadsadegh Sadri (University of Kaiserslautern), Norbert Wehn (University of Kaiserslautern), Martin Klein (Wipotec Wiege- und Positioniersysteme GmbH), Michael Siegrist (Wipotec Wiege- und Positioniersysteme GmbH)

The rapidly growing applications based on morphological operations in image processing and computer vision make efficient implementations of these key blocks an important topic of research. Nevertheless, a detailed comparison of the energy efficiency and performance of these implementations that covers all available major hardware platforms is still missing. In this paper we evaluate the performance and power consumption of the most efficient available morphological image processing algorithms for CPU, GPU, and FPGA platforms in detail. In

addition, we study the suitability of available morphological library units for high-level synthesis and compare the results with an optimized hand-coded FPGA implementation. We demonstrate that even high-end GPUs cannot achieve the throughputs of modern CPUs and FPGAs by far. Our experimental results show that an FPGA implementation is 8-10 times more energy efficient for this application, being comparable in speed to CPUs for large kernels.

32. A Report on Cognitive 802.11 Model for NS2 Simulator   207

Yik Kuan Hiew (UNITEN), Norazizah Mohd Aripin (UNITEN), Norashidah Md Din (UNITEN)

Cognitive radio is a promising solution in improving spectrum utilization efficiency by allowing unlicensed users to access idle licensed spectrum opportunistically. Cognitive Radio Cognitive Network (CRCN) supports multi-interface multichannel functions in Network Simulator 2 (NS-2). However, CRCN only supports cognitive functions to two MAC protocols that is Macng and Maccoon. Both MACs were designed along with CRCN. Existing MAC protocols such as Simple MAC and 802.11 does not support cognitive function. In this paper, modifications were made to support multi-interface multi-channel function and primary user recognition in 802.11 MAC coding. Simulation was run to compare the performance of different cognitive MACs: Simple MAC, 802.11, and Macng, in smart grid communications. The performance metric used was average delay. Simulation results showed that cognitive radio outperforms non-cognitive radio. In addition, cognitive 802.11 has better delay performance than Simple MAC and Macng. This indicates that choice of cognitive MAC protocols affect the performance of smart grid communications.

33. Asynchronous Iterative Water Filling for Cognitive Smart Grid Communications   211

Yik Kuan Hiew (UNITEN), Norazizah Mohd Aripin (UNITEN), Norashidah Md Din (UNITEN)

Asynchronous iterative water filling (AIWF), which is based on Shannon Theory, distributes resources fairly among users. Unlike Game Theory that requires users to exchange packets, AIWF does not require users to exchange packets for achieving Nash equilibrium. Conventionally, AIWF computes optimal transmit power for multiple users in Gaussian Wireless Channel. In this paper, AIWF was implemented upon cognitive radio for smart grid communications. Smart grid data in Advanced Metering Infrastructure (AMI) can be as large as 1000 kbps or 500 kbps for backhaul. Locating a block of spectrum which is available at all smart gird areas for AMI communication is infeasible. Although cognitive radio allows users to detect and utilize idle channels in licensed and unlicensed spectrum bands, the ability of cognitive radio to support high traffic load in AMI is a concern. Hence, AIWF was implemented to maximize the throughput performance in to order to cope with high traffic load environments. AIWF perform repetitive calculations to determine the transmit power of each user. Too low a transmit power causes unsuccessful transmission; while too high a transmit power increases delivery ratio, but it also causes interference to neighboring users. Using AIWF, interference from neighboring nodes are treated as noise, thus, no control packet

exchange is required. AIWF coding was implemented in NS-2 simulator. An AMI communication scenario was simulated. The results show that AIWF improves the throughput performance by 20.35%.

71. Development of Fluorescent Tube Antenna Array for Wi-Fi Application   217

Musfirah Hilmi (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (UiTM), Shah Alam, Selangor.), Mohd Tarmizi Ali (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (UiTM), Shah Alam, Selangor.), Norsuzila Yaacob (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (UiTM), Shah Alam, Selangor.), Hanisah Mohd Zali (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (UiTM), Shah Alam, Selangor.), Hajar Ja'afar (Antenna Research Group (ARG), Microwave Technology Center (MTC), Faculty of Electrical Engineering (FKE), Universiti Teknologi MARA (UiTM), Shah Alam, Selangor.)

The design of plasma antenna array for Wi-Fi application, operating at 2.4 GHz is presented in this paper. Two pieces of fluorescent tube with same dimension of 586 mm length and 24.2 mm diameter was used for this plasma antenna. The antennas are arranged in two parallel side-by-side. The gap between two fluorescent tubes is 10 mm. Both tubes are filled with argon and mercury vapor. The proposed antenna is simulated using CST Microwave Studio to study its performance in terms of return loss, radiation pattern and gain.

Additional Paper:

System and Method for Mitigating Cross VM Attacks in Cloud Computing By Securing the Network Traffic   221