# 2017 IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE 2017)

Langkawi, Malaysia
24 – 25 April 2017

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY  12571 USA
Phone:        (845) 758-0400
Fax:          (845) 758-2633
E-mail:       curran@proceedings.com
Web:        www.proceedings.com

CURRAN ASSOCIATES INC.
**proceedings**
.com

# TABLE OF CONTENTS

      a.  Signal Processing

      b.  Industrial Electronics

      c.  System & Network Security & Automation

      d.   Mechatronics & Robotics

      e.  Computer Applications

      f.  Network & Communication

      g.  Computational Intelligence

      h.  Medical Electronics

      i.  Software Engineering & Trusted Computing

      j.  Internet of Things

**Date: 24-04-2017**

**Session I: Signal Processing (08:15 - 10:00 @ Adya 3 & 4)**
**Session Chair: IHSAN MOHD YASSIN**

*Muhammad Syawal Abd Halim (University Teknologi Mara (UiTM)), Normi Abdul Hadi (University Teknologi Mara (UiTM)), Hanifah Sulaiman (University Teknologi Mara (UiTM)), Suhaila Abd Halim (Universiti Teknologi MARA (UiTM))*

This study focuses on the development of algorithm to reconstruct surface of a human head using Beta-Spline technique. The development of algorithm started with the data point extraction from CT scan images to parallel computation. Parallel computation is used to handle with the large number of data points. Ars Cluster, which is a low-cost parallel laboratory in UiTM Shah Alam, is used in this computation on a MATLAB pmode platform with MATLAB Distributed Computing Server (MDCS). The computation time is taken and the results shows that the parallel computation will gives less computation time compared to by using sequential. The computation time and the surface of a human head are displayed on a MATLAB GUI.

*Rehan Akbar (Universiti Tunku Abdul Rahman), Asif R. Khan (Universiti Tunku Abdul Rahman), Dr. Doris Wong Hooi Ten (Universiti Tunku Abdul Rahman), Kiran Adnan (Universiti Tunku Abdul Rahman), Mobashar Rehman (Universiti Tunku Abdul Rahman)*

In IT industry, global software development (GSD) is becoming popular since the past few decades. GSD is the process whereby companies are doing development of software using different locations. GSD has adopted by the IT companies to get the advantages of multi-site development, reduce development cost and access large group of skilled labor. Despite the leverage benefits of GSD several challenges also associated with GSD. However, a number studies have been addressed disciplined processes and standards to cope with these challenges. These studies are conducted in different part of the world but not particularly in Malaysia. The literature on the use of software practices due to GSD in Malaysia is still scarce. Therefore, the present study has suggested further researcher on this topic. We present our future research plan in Malaysian software companies that are involved in GSD and project outsourcing. The findings of future researcher will help to know the trends of software processes in Malaysia as well as the GSD factors that effect in the selection of a process. Moreover, present study also presents a preliminary framework for process selection.

*Moslem Balali (ACECR institute of higher education, Isfahan branch), Abdalhossein Rezai (ACECR institute of higher education, Isfahan branch), Haideh Balali (Isfahan University of Technology), Faranak Rabiei (Universiti Putra Malaysia), Saeid Emadi (IPE Manager School)*

Quantum-dot Cellular Automata (QCA) technology is one of the most important technologies, which can be suitable replacement for conventional technologies at Nano-scale. The principle logic elements in QCA technology are majority gates and inverters. In this paper, a novel design is proposed for 5-input majority gate in the QCA technology. The proposed 5-input majority gate uses based on half distance to improve the performance. QCADesigner tool version 2.0.3 is used for verifying majority gate layout and functionality. The Simulation results demonstrate that the proposed design of the 5-input majority gate resulted in significant improvements in designing logical circuits in terms of the number of required cell and area in comparison with other majority gates.

**87. A Completed Modeling of Shearing and Half Rotation Invariant Texture Descriptor for Deformed Images Acquired by Scanners.....17**

*Omar M Wahdan Al Hasan (Ryerson University), Dimitrios Androutsos (Ryerson University), Mohammad Faidzul Nasrudin (Universiti Kebangsaan Malaysia)*

In this paper, a completed modeling of Shearing Invariant Texture Descriptor (SITD) is proposed and half-rotation (180deg rotation) invariant features are achieved for scanners texture images applications. The main deformations generated during the image acquisition process from physical paper using flatbed scanners are shearing and half-rotation. It's very common that a sheet of paper is slightly rotated on the scanner. The acquired image is therefore deformed with irregular rotation, which produces a shearing transform. Furthermore, the image can easily be scanned upside down when the query image is acquired. This problem produces an image deformed with 180deg rotation. Recently, by decomposing image local patterns into sign and magnitude components, the authors proposed the SITD only based on the first component. In this paper, we proposed a generalization approach called the Completed SITD (CSITD) employs to extract additional discrimination features based on the second component and concatenate them with their complementary from the SITD. The CSITD is however invariant only to the shearing deformation. To achieve the half-rotation invariance, a new method developed to maintain the sequence of the features of CSITD. The experimental results based on real paper texture images showed that the half-rotation invariant features of SITD (RSITD) achieved 98.1%, which is superior over the tested state-of-the-art descriptors. Implementing the half-rotation invariant method with CSITD features (CRSITD) exhibited an improvement over the RSITD with 1.9%.

**55. A Novel Method for Identification of Obstructive Sleep Apnea.....22**

*Abdulnasir Hossen (Sultan Qaboos University)*

A novel and robust non-invasive method for identification of patients with obstructive sleep apnea (OSA) is introduced in this paper. Most sleep clinics suffer from the large number of patients with snoring who think that they have OSA and needs full overnight polysomnography. Thus, a need for simple non-invasive methods is of great importance to screen this large number of patients before the polysomnography. The method used in this paper depends on the continuous-wavelet transform and to be considered one of the methods with high-identification efficiency. A clear advantage of this method is its consistency with changing the wavelet-filter type. The data used in this paper are downloaded from MIT data bases. 60 subjects (40 OSA and 20 normal) are to be divided equally for both training and testing cycles.

**2. Teardrop Shaped Breast Surface Change assessment via Digital Fringe Projection.....28**

*Rajendaran Vairavan (School of Microelectronic Engineering,Universiti Malaysia Perlis, Pauh Putra Campus, 02600 Arau, Perlis, Malaysia.), Vithyacharan Retnasamy (School of Microelectronic Engineering,Universiti Malaysia Perlis, Pauh Putra Campus, 02600 Arau, Perlis, Malaysia.), Zaliman Sauli (School of Microelectronic Engineering,Universiti Malaysia Perlis, Pauh Putra Campus, 02600 Arau, Perlis, Malaysia.), Siang Leng Lai (of Microelectronic Engineering,Universiti Malaysia Perlis, Pauh Putra Campus, 02600 Arau, Perlis, Malaysia.), Mukhzeer Mohamad Shahimin (Department of Electrical and Electronic Engineering, Faculty of Engineering, National Defence University of Malaysia (UPNM), Kem Sungai Besi, 57000 Kuala Lumpur, Malaysia), Nestor Rubio Ong (3Faculty of Engineering, University of Santo Tomas, Espana, Boulevard, Manila, Philippines), Supap Kirtsaeng (3Faculty of Science, Silpakorn University, Mueang, Nakhon Pathom, 73000, Thailand)*

Digital fringe projection method are emerging as evaluation tool of human forms in biomedical field due to its non-contact nature, non-invasive and provides whole field measurements. Nevertheless, its application for breast carcinoma detection is relatively minimal. Thus, in this work, a novel application of digital fringe projection for breast carcinoma detection is reported based on phase shift technique. The digital fringe projection system was utilized to analyze the breast surface changes of teardrop shaped breast prosthesis due to the presence of 1cm breast lump. Comparison was done between breast without lump and with lump.The initial results have confirmed that digital fringe projection is capable in detecting breast surface changes.

**22. Optimal Accelerometer Placement for Fall Detection of Rehabilitation Patients.....N/A**

*Nor Surayahani Suriani (UTHM), Noryuzailin Yunos (UTHM)*

The development of health monitoring system using wearable sensor has gain lots of attention in the scientific community and industry. The aim and motivation in this field is to increase the achievement in wearable health monitoring system while reducing the development cost. The

wearable sensor such as accelerometer used to emphasis the clinical applications of fall detection during rehabilitation treatment. This paper focuses to determine the optimal sensor placement especially for lower limb activity during rehabilitation exercise. Accelerometer data were collected from three different body locations (hip, thigh and foot). The lower limb activities involve normal movement such as walking, lifting, sit-to-stand and stairs. Other unexpected activity such as falls might occur during normal lower limb exercise movement. Then, acceleration data for various lower limbs activities was classified using k-NN and SVM classifier. The result found that, the hip was the best location to record data for lower limb activities including when fall occurs.

## Session II: Industrial Electronics (10:15 - 12:00 @ Adya 3 & 4)
## Session Chair: NOR FARAHAIDA ABDUL RAHMAN

### 9. Weighted PLUME Digital Predistorter Model with a Reduced-Complexity Identification Algorithm.....32

*Ibrahim Abdulateef (American University of Sharjah), Lutfi Albasha (American University of Sharjah), Hasan Mir (American University of Sharjah), Oualid Hammi (American University of Sharjah)*

This paper investigates the implementation of a robust linearization technique for high-efficiency power amplifier using a digital predistortion technique. First, a modified model of the conventional PLUME predistorter, termed as weighted PLUME (W-PLUME), is developed by augmenting the conventional PLUME model with an input power-dependent weighting function. The W-PLUME model accounts for the different trends of the power amplifier behavior at different input power levels. Second, a reduced-complexity digital predistorter identification algorithm is proposed in order to select the significant coefficients among all the DPD coefficients extracted using standard Least Squares algorithm. The model and the identification technique are assessed using LTE-based experimental data. A numerical comparison between the size-reduced proposed DPD and the full size digital predistorter model shows that up to 75% reduction in the number of coefficients (from 174 to 43) can be achieved while maintaining the DPD performance within 0.1dB in terms of ACPR and 0.4dB in terms of NMSE.

### 35. 4 Transistor and 2 Memristor based Memory.....37

*Kazi Fatima Sharif (Ahsanullah University of Science and Technology), Riazul Islam (Ahsanullah University of Science and Technology)*

This research proposed a new type of memory cell designed by using only nMOS transistors and memristors. The memory cell consumes less power and also occupies minimum amount of silicon area. The stability of the data during successive read operation and noise margin are in the promising range. Extensive simulation results demonstrate the validity and competency of the proposed model.

### 88. Studies on Relationships between Extraction Algorithms and Voltage Controllers for Shunt Active Power Filter.....41

*Nor Farahaida Abdul Rahman (Universiti Teknologi MARA), Rahimi Baharom (Universiti Teknologi MARA), Siti Zaliha Mohammad Noor (Universiti Teknologi MARA)*

In the operation of Shunt Active Power Filters (SAPFs), the choose of extraction algorithm and voltage controller is very essential. Hence, this work focuses in investigating the relationship of different extraction algorithms and voltage controllers on the operation of SAPFs. Two types of extraction algorithms and voltage controllers are applied. There are Type 1 and Type 2 extraction algorithms and Proportional (P) and Proportional-Integral (PI) voltage controllers respectively. In this work, each extraction algorithm implements both voltage controllers at different time interval. Then, the effectiveness of each extraction algorithm in generating reference signal and how it affects the SAPF performance is studied. The simulation work has validated that the operation of both extraction algorithms and voltage controllers are related to each other. The performance of SAPF is varied with the different combination of extraction algorithms and voltage controllers. The use of Type 1 extraction algorithm is more flexible than Type 2 extraction algorithm.

**70. Design of a Controlled Solid State Device for Fault Current Limitation and Arc Flash Suppression.....48**

*Safana Alsalemi (Qatar University), Salma Almadhoun (Qatar University), Marzyeh Najad (Qatar University), Ahmed Massoud (Qatar University), Ramadan Soliman (Qatar Petroleum)*

This paper presents a solution to High Fault Current (HFC) in low voltage distribution systems by surveying different types of Fault Current Limiter (FCL) devices, shedding light on Solid State FCL (SSFCL) particularly the single-phase full bridge inverter type. Regarding the inverter functionality, it offers two alternatives of HFC reduction. One is achieved by introducing a virtual impedance to the system, whereas the other applies a sufficient amount of voltage at the instant of fault. Accordingly, the rms fault detection technique and the three-consecutive current readings are chosen together to achieve a reliable fault detection. Furthermore, the arc flash problem is investigated in terms of High Impedance Fault (HIF) and HFC, focusing mainly on resolving the arc flash caused by HFC through utilizing the SSFCL. A single phase SSFCL full bridge inverter-based is prototyped and tested in the lab. Experimental results are provided to substantiate the presented concept.

**72. Design of a Low Voltage DC Grid Interfacing PV and Energy Storage Systems.....54**

*Heba Elfeqy (Qatar University), Amna Al-rumaihi (Qatar University), May Shahin (Qatar University), Ahmed Massoud (Qatar University), Adel Gastli (Qatar University)*

A design of a Photovoltaic (PV) power system architecture with energy storage system for low voltage dc grid applications is presented in this paper. The system components include the following: PV panels with non-isolated dc-dc interleaved boost converters, batteries with non-isolated bidirectional buck converters. The PV converter is controlled using perturb & observe for maximum power point tracking. The batteries' converter is controlled to regulate the dc bus voltage. These parts are linked together with the utility grid through a 600V dc bus. An energy management system is used to control the power flow between the system components. As an example for the low voltage dc grid system integration; a total number of 1,008 panels can be installed on the rooftop of a building, with a total power of 320kWp. Different scenarios are considered for the connections of both PV and batteries. A scaled-down experimental prototype, for the PV system with an energy storage system, is used to validate the presented concept.

**86. A High Performance Dynamic Logic with nMOS based Resistive Keeper Circuit.....60**

*Riazul Islam (Ahsanullah University of Science and Technology. Dhaka), Kazi Fatima Sharif (Ahsanullah University of Science and Technology. Dhaka), Abdullah Al Mamun (International Islamic University Chittagong. Chittagong), Md. Shah Miran (International Islamic University Chittagong. Chittagong), Satyendra N. Biswas (Ahsanullah University of Science and Technology. Dhaka), Sunil R. Das (University of Ottawa. Ottawa), Mansour Assaf (University of South Pacific, Suva), Voicu Groza (University of Ottawa. Ottawa)*

Dynamic logic is highly in demand for designing low power VLSI circuits. It need less number of transistor though but the performance of the dynamic logic is not so promising due to prolonged contention time and higher leakage power. Present research proposes a new nMOS based resistive circuit in order to reduce the contention time for minimum leakage power. Simulation results using LTspice tools demonstrate that the proposed model significantly reduces the contention time as well as the leakage power.

**1. Finite Element Modelling of thermal performance of LED Lamp using open source software - Salome and Elmer.....65**

*Siang Leng Lai (Universiti Malaysia Perlis (UniMAP)), Vithyacharan Retnasamy (Universiti Malaysia Perlis (UniMAP)), Zaliman Sauli (Universiti Malaysia Perlis (UniMAP)), Rajendaran Vairavan (Universiti Malaysia Perlis (UniMAP)), Mukhzeer Mohamad Shahimin (Universiti Malaysia Perlis (UniMAP)), Nestor Rubio Ong (University of Santo Tomas), Supap Kirtsaeng (Silpakorn University)*

Light emitting diodes (LEDs) has presented its outstanding performance compared to other present lighting sources such as fluorescent and incandescent. Thus, LEDs has become the favourable lighting source in this decade. However, the heat generated from the LEDs has limited its overall performances. This paper has demonstrated the use of simulation technique to access the thermal performance of the LED lamp. The modelling and simulation was performed using the open source software - Salome and Elmer. The thermal simulation was conducted by considering LED chip, metal core printed circuit board (MCPCB) and heat sink. After achieving the grid independence, the result from the simulation model shows the highest

temperature of 131.928 °C on the LEDs and the lowest temperature of 126.974 °C for the heat sink.

---

**Session III: Industrial Electronics, System & Network Security & Automation, Mechatronics & Robotics (12:00 - 13:00 @ Adya 3 & 4)**
**Session Chair: MOHD SAUFY ROHMAD**

---

*Hadi Abdullah (University Tun Hussein Onn Malaysia), Muhammad Mahadi Muhammad Mahadi Abdul Jamil (University Tun Hussein Onn Malaysia), Faridah Faridah Mohd Nor (Universiti Kebangsaan Malaysia)*

Human bones can provide vital information about the person it belonged to, using different analytical methods. Histomorphological method can use only fragments of bone to estimate age and sex. Different researches have been conducted using these methods in which researchers have selected microstructural parameters according to their requirement. This paper presents automated haversian canal detection from bone sample image. This detection is part of a developing system for automated sex determination system. This sex determination system can identify sex from human bone sample by using microstructural image processing. The system is divided into two parts. In first part bone samples are selected, manually analyzed and differences in microstructural parameters in males and females are observed. While in second part these observations are used to design computer aided automation system. Lastly this paper concludes system while giving its importance in multiple aspects

*Maizan Muhamad (UiTM)*

This paper discusses on the differential LNA design on pHEMT based technology for wireless application, and the standard 1µm pHEMT is implemented throughout the design. The LNA design has been completed with two stages, with the purpose of successfully enhance the gain and noise performance. The proposed LNA design has the functionality of application for 26 ± 4 dB gains with noise figure that is less than 1.5 dB. The input return losses (S11) of -13.59 dB and power consumption of 124 mW are provided in this paper. The interested frequency range from 0.4 until 2 GHz is allocated in L band, hence making the design unconditionally stable within the desired frequency range.

*Mohd Ashraf Ahmad (Universiti Malaysia Pahang), Raja Mohd Taufika Raja Ismail (Universiti Malaysia Pahang)*

This paper presents a novel model-free sigmoid-based PI for angular velocity tracking of dc motor driven by a dc/dc buck converter. A global simultaneous perturbation stochastic approximation (GSPSA) is employed to optimize the sigmoid-based PI parameters such that the angular velocity error is minimized. The main advantage of the proposed method is that it can achieve fast PI parameter tuning without any plant model by measuring the I/O data of the system. Moreover, the proposed PI parameters that are varied based on sigmoid function of angular velocity error has great potential in improving the control performance as compared to the conventional PI controller. In order to validate our model-free design, a well-known buck converter driven DC motor model is considered. In addition, the performances of the proposed method are examined in terms of angular velocity trajectory tracking and duty cycle in comparison with other existing approaches. Simulation results show that the model-free sigmoid-based PI method provides better control performances as compared to existing methods.

*Mohd Saufy Rohmad (Faculty of Electrical Engineering,UiTM Shah Alam), Habibah Hashim (Faculty of Electrical Engineering,UiTM Shah Alam), Azilah Saparon (Faculty of Electrical Engineering,UiTM Shah Alam)*

Internet of Things (IoT) will change how we interact with our physical world. It will enable total sensing and controlling of most of the things around us. However, the practical acceptance of IoT from the market is determined by the level of confidence perceived by the user. This is

why IoT security has become a major concern in real world IoT deployment. IoT security requires a lightweight encryption engine that can make the encryption process very efficient and fast. Here we simulate the implementation of lightweight block cipher on VHDL that can be further realized on real hardware in the form of ASIC or FPGA chips. The results are compared from three points of view; security, physical size on hardware and performance. Achieving the balance between these 3 areas is the key success to efficient cryptography implementation for IoT systems.

**Session IV: Computer Applications, Network & Communication I (14:00 - 15:00 @ Adya 3 & 4)**

**Session Chairs: HUSNA ZAINOL ABIDIN, NANI FADZLINA NAIM**

**43. Malay Speech Recognition for Different Ethnic Speakers: An Exploratory Study.....91**

*Rafizah Mohd Hanifa (UTHM), Khalid Isa (UTHM), Shamsul Mohamad (UTHM)*

Speech technology has become an alternative medium of communication. It could help those on smart wheelchair to use their voice to ease their movements from one location to another. However, most of the speech technology that has been developed is based on the English language and limited for other languages. This project contributes to the literature by developing a program on speech technology for Malay speech recognition using Visual C# to determine the quality of the program in advancing the state-of-the-art. The developed program has been tested using the speech by 13 subjects from different ethnic backgrounds to evaluate its quality and limitations. Results indicate that the voice, including the volume, accent and word emphasis to be important elements in influencing the quality of recognition.

**44. Semi-Active Suspension Control for Formula SAE Car using Magneto-Rheological Fluid.....97**

*Azizan As'arry (Sound and Vibration Research Group, Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Fahad Mohammad Naseer (Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Tuan Ahmad Zahidi Tuan Abdul Rahman (Sound and Vibration Research Group, Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Khairil Anas Md Rezali (Sound and Vibration Research Group, Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Mohd Zarhamdy Md. Zain (Department of Applied Mechanics and Design Faculty of Mechanical Engineering, Universiti Teknologi Malaysia (UTM) 81310 Johor Bahru, Johor, Malaysia)*

The Magneto-rheological (MR) fluid damper is prevalent in the field of semi-active suspension whose viscosity changes by the change of magnetic field passing through the damping fluid. In thirdsz as a plant. The Bingham model of MRF damper is exploited with PID and Fuzzy + PID controllers. The current is controlled by the controllers according to the quarter car chassis disturbance. The step road profile is used as an input disturbance to the suspension system. The displacement of sprung mass is analyzed in terms of time and frequency domain. The maximum power spectral density of acceleration for step response with Fuzzy + PID is reduced by 87.28 % as compared to passive suspension whereas PID reduced only 79.95 %. This indicates that the MRF damper with right tuned Fuzzy + PID controller provide a safer ride compared to PID controller and passive suspension.

**79. Optical Network Monitoring System using Residual Power of EDFA and Fiber Bragg gratings.....102**

*Nani Fadzlina Naim (Universiti Teknologi MARA), Asyira Najad (Universiti Teknologi MARA), Suzi Seroja Sarnin (Universiti Teknologi MARA), Norsuzila Yaa'cob (Universiti Teknologi MARA), Latifah Sarah Supian (Universiti Pertahanan Nasional Malaysia)*

This paper presents an Optical Network Monitoring System using residual power of Erbium Doped Fiber amplifier (EDFA) for Ethernet Passive Optical Network (EPON). The 1490 nm and 1550 nm signals will be transmitted from Optical Line Terminal (OLT) and will be amplified by the EDFA. The signals will be distributed to all distribution fibers by using optical power splitter. The reflection spectrum of Fiber Bragg Grating (FBG) is used as the branch identifier for each distribution fiber. The FBG will reflect the residual power of the EDFA. The

FBGs reflection spectra is observed using an Optical Spectrum Analyzer (OSA). The results show that with -27.16 dBm received monitoring power, this optical network monitoring system can serve up to 40 costumers. The downstream signal power for 1490nm is -45.39 dBm. The least power budget measured is 13.23 dBm.

### 45. Application of K-Means Clustering in Hot Spot Detection for Thermal Infrared Images.....107

*Mohd Rizman Sultan Mohd (Universiti Teknologi MARA), Sukreen Hana Herman (Universiti Teknologi MARA), Zaiton Sharif (Universiti Teknologi MARA)*

K-Means Clustering is one of the method for image segmentation which will subtract the interest area from background. By using K-Means Clustering, thermal image is divided into 2 layers which separates the hotter region from the background image. This will ease the hot spot detection on thermal infrared images. This paper presents work on the implementation of K-Means Clustering onto thermal images. The algorithm for thermal infrared image segmentation using K-Means Clustering was developed and executed using MATLAB R2015a software. It was proven that K-Means Clustering ease the hot spot detection from the thermal images.

---

### Session V: Computational Intelligence & Medical Electronics (15:15 - 17:00 @ Adya 3 & 4)
### Session Chairs: ERNA UTAMI, ABDULNASIR HOSSEN

---

### 30. Chaotic Fractal Search Algorithm for Global Optimization with Application to Control Design.....111

*Tuan Ahmad Zahidi Tuan Abdul Rahman (Sound and Vibration Research Group, Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Azizan As'arry (Sound and Vibration Research Group, Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Nawal Aswan Abdul Jalil (Sound and Vibration Research Group, Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor), Raja Mohd Kamil Raja Ahmad (Department of Electrical and Electronic Engineering, Faculty of Engineering, Universiti Putra Malaysia 43400 Serdang, Selangor)*

This paper presents chaos-embedded optimization algorithms named as Chaotic Fractal Search (CFS). These algorithms are improved variance to original Stochastic Fractal Search (SFS) algorithm. The influence of two chaos maps which are Chebyshev map and Gauss/Mouse map on the convergence speed and fitness accuracy of SFS are investigated in this study. Four well-known benchmark test functions with different dimension levels and landscapes were employed in order to evaluate the performance of proposed CFS algorithms in comparison to their predecessor algorithm. Furthermore, the proposed approach is implemented in optimal tuning of conventional PID and PD-type fuzzy logic controllers for a twin rotor system (TRS) in hovering position. The simulation study indicates that CFS algorithm with Gauss/Mouse chaotic map in both Diffusion and First Updating process outperforms other CFS algorithms and original SFS algorithm. In addition, PD-type fuzzy logic controller shows superiority over PID controller in twin rotor system control design.

### 18. Emperical Analysis of Hyper-heuristic Search Algorithms in Expensive Numerical Optimzation.....117

*Jia Hui Ong (Evolutionary Computing Lab Faculty of Computing and Informatics Universiti Malaysia Sabah Sabah, Malaysia), Jason Teo (Evolutionary Computing Lab Faculty of Computing and Informatics Universiti Malaysia Sabah Sabah, Malaysia)*

Expensive optimization problems refer to real-world problems that will require a large amount of resources to run and solve. This has attracted significant recent interest from researchers to investigate simple yet highly efficient search methodologies for solving this problem domain. The main goal of this problem domain is to be able to locate desirable solutions within a short number of search iterations. In this paper, the implementation of a hyper-heuristic framework for solving expensive optimization problems is presented. Hyper-heuristics utilize a set of low-level heuristics that work together to search for optimum solutions. Although hyper-heuristics have been shown to outperform many other search methodologies in discrete optimization, to the best of our knowledge, hyper-heuristics have yet to be investigated for expensive optimization problems. Two variants of hyper-heuristics are used in this paper, Simple-Random

All Moves Acceptance (SRAMA) and Tabu Search All Moves Acceptance (TSAMA). The Congress on Evolutionary Computation 2015 (CEC2015) expensive optimization benchmark problems and the top performing algorithm from that competition, which is the Mean Variance Mapping Optimization (MVMO), were used to benchmark and compare the suggested hyper-heuristics. The results obtained were very encouraging when compared against the top performing expensive optimization algorithm MVMO using this comprehensive benchmark test set.

### 5. Reservoir Zone Prediction Using Logging Data - Multi Well Based On Levenberg-Marquardt Method.....122

*E Utami (Dept of Electrical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya), A. D. Wibawa (Dept of Computer Engineering, Institut Teknologi Sepuluh Nopember, Surabaya), T. R Biyanto (Dept of Physics Engineering, Institut Teknologi Sepuluh Nopember, Surabaya), M. H Purnomo (Dept of Computer Engineering, Institut Teknologi Sepuluh Nopember, Surabaya)*

Well logging is a well-known and effective method for oil and natural gas exploration in new fields to enhance their production. It is defined as an acquisition method to qualitatively and quantitatively evaluate the existence of hydrocarbon. In this research, we exploited the qualitative relations between well logging data and reservoir zone in Salawati basin, Irian Jaya area. Four well logs which are input data attributes are Log Gamma Ray (GR), Log Resistivity (ILD), Log Density (RHOB), and Log Neutron (NPHI). In addition, reservoir zone data are target data which are previously interpreted to log curve. However, logging data are complex and nonlinear. Training and testing process in this work, therefore, applied Levenberg - Marquardt method to find the optimal solution of the damped least squares problem. The objective of this work is to build decision support system to automatically find reservoir zone based on well logging data. The results of this work revealed Mean Absolute Percentage Error (MAPE) of training for reservoir zone prediction by exploiting Levenberg - Marquardt is 0.3803 % with 500 iterations. Validity test results based on ROC curve with cross-validation folds 10 is 84.9984% and area of under ROC is 0.992. Based on this area under ROC, reservoir zone with levenberg - marquadt has an excellent performance. Therefore, an area which has the same attribute response with producing field's yard is predicting for new prospect reservoir.

### 54. Hybrid BCI Utilising SSVEP and P300 Event Markers for Reliable and Improved Classification Using LED Stimuli.....127

*Surej Mouli (University of Kent), Ramaswamy Palaniappan (University of Kent)*

This paper investigates the possibilities of developing a hybrid brain-computer interface based on Steady State Visual Evoked Potential (SSVEP) and P300 responses. SSVEP classification accuracy is improved using P300 event detection as a secondary validation technique in this study. SSVEP events are generated using a hybrid visual stimuli consisting of four independent radial chip-on-board green LED rings flashing at frequencies 7, 8 9 and 10 Hz, which are controlled by four 32-bit microcontrollers to ensure precise generation of flashing frequencies. P300 events are generated with a flash stimulus controller that produces random red LED flashes using high power single LED located inside each of the four radial rings. The P300 flashes are marked as events along with the recorded SSVEP EEG. The study analysed the EEG data recorded from five participants comprising of five trials each, which included both SSVEP and P300 events to identify the classification effectiveness for hybrid BCI. The EEG data was band-pass filtered and events extracted using custom MATLAB algorithms showed that SSVEP classifications could be improved using P300 events for reliable BCI applications.

### 20. ComTrack: Implementation of Innovative Computer Lab Management Tool for Academic Institutions.....132

*Nur Athiqah Harron (Universiti Teknologi MARA Pulau Pinang), Aini Hafizah Mohd Saod (Universiti Teknologi MARA Pulau Pinang), Siti Azura Ramlan (Universiti Teknologi MARA Pulau Pinang), Faridah Abd Razak (Universiti Teknologi MARA Pulau Pinang), Nurul Huda Ishak (Universiti Teknologi MARA Pulau Pinang), Shahidah Sadimin (Universiti Teknologi MARA Pulau Pinang), Anith Nuraini Abdul Rashid (Universiti Teknologi MARA Pulau Pinang), Nadiah Ismail (Universiti Teknologi MARA Pulau Pinang)*

this paper presents an innovative computer lab management tools to improvise traditional computer lab management. This is due to a few issues such as security, operation management and managerial decision support have to be faced by most of the computer lab management. The factors such as lack of access control and inadequate security have caused a significant

direct loss. Therefore, this research prompted to develop a Window-based computer monitoring system, ComTrack, that can force user to login with the registered user id such as student id or staff number before they can use the computer. These interactive systems also have a capability to trigger the lab owner when there is any issue reported by users. Thus, it is essential for laboratory management to have absolute user login, logout and the issue reported details for each of the computer they are handled. The design and implementation of this application is discussed in this paper.

### 37. Android-Based Elderly Support System.....136

*Aini Hafizah Mohd Saod (Universiti Teknologi MARA Pulau Pinang), Siti Julia Amira Mat Ghani (Universiti Teknologi MARA Pulau Pinang), Nur Athiqah Harron (Universiti Teknologi MARA Pulau Pinang), Siti Azura Ramlan (Universiti Teknologi MARA Pulau Pinang), Anith Nuraini Abdul Rashid (Universiti Teknologi MARA Pulau Pinang), Nurul Huda Ishak (Universiti Teknologi MARA Pulau Pinang)*

This paper proposes an android-based elderly support system as an alternative way for existing care homes or health care centers. The aims of the study are to monitor the users based on their location via GPS tracking method and detect the user's heart rate using a portable pulse sensor. This project can be divided into two parts; development of android application and hardware implementation. Android application is developed to integrate a caretaker subsystem with the controller. A caretaker subsystem acts as an admin of the system which responsible for monitoring the users. Hardware implementation involves construction of a prototype equipped with Arduino microcontroller, GPS module, GSM modem, Bluetooth module and power supply unit. A set of data collection is analyzed to evaluate the consistency of the heartbeat monitoring function. The proposed project offers a portable day care service for elderly people via android smart phone in a low cost manner.

### 99. Mycobacterium Tuberculosis Modelling using Regression Analysis.....142

*Raja Umi Kalsom Raja Mohd Radzi (Universiti Teknologi MARA), Wahidah Mansor (Universiti Teknologi MARA), Juliana Johari (Universiti Teknologi MARA)*

The conventional diagnosis method used to detect the Mycobacterium tuberculosis is non-invasive which requires the blood is taken from the patients or tissue is removed from the patient's organ. The non-invasive detection tool is not available and there is no electronic-based model to examine the detection mechanism and predict its performance. This paper describes the modelling of the sensitive type of the Mycobacterium tuberculosis using regression analysis. The collection rate of Mycobacterium tuberculosis obtained from the previous studies served as the basis for the model creation and optimal model selection. Two types of the LC circuits, the first order, and the second order were investigated in this work. Regression analysis and one-way analysis of variance were carried out to confirm the optimum model. The second order LC circuit provides the least error and variation and could mimic the sensitive type of Mycobacterium tuberculosis.

---

### Session VI: Computational Intelligence, Software Engineering & Trusted Computing (17:00 - 18:00 @ Adya 3 & 4)
### Session Chair: SYED FARID SYED ADNAN

---

### 93. Analysis of Asymmetric Encryption Scheme, AA$_\beta$ Performance on Arm Microcontroller.....146

*Syed Farid Syed Adnan (UiTM Shah Alam, Malaysia), Mohd Anuar Mat Isa (UiTM Shah Alam, Malaysia), Habibah Hashim (UiTM Shah Alam, Malaysia)*

Security protection is a concern for the Internet of Things (IoT) which performs data exchange autonomously over the internet for remote monitoring, automation and other applications. IoT implementations has raised concerns over its security and various research has been conducted to find effective solution for this. Thus, this work focus on the analysis of an asymmetric encryption scheme, AA-Beta (AA$_\beta$) on a platform constrained in terms of processor capability, storage and random access Memory (RAM). For this work, the platform focused is ARM Cortex-M7 microcontroller. The encryption and decryption's performance on the embedded microcontroller is realized and time executed is measured. The performance is then compared to our previous work on System on Chip (SoC).

### 62. An Efficient Stop Word Elimination Algorithm for Urdu Language.....N/A

*Kamran Shaukat (University of the Punjab Jhelum Campus Jhelum), Ahmed Bin Shafaat*

Stop words have multiple occurrence in many sentences and have no semantic importance in the context in which they appear. Stop words cover a major volume of documents without having any semantic importance. So they should be removed for better language processing and classification. In this research study, we have designed and proposed an efficient algorithm for the elimination of stop words from Urdu documents. There have been a lot of work in domains like Natural Language Processing (NLP), sentence boundary disambiguation and stemming for Urdu language but we are unaware of any work or methodology proposed for the elimination of stop words from Urdu language. As per the best of our knowledge, we are first proposing any kind of algorithm for Urdu language stop word elimination.

### 97. Adaptive Authentication: Implementing random canvas fingerpriting as user attributes factor.....152

*Nor Izyani Daud Daud (MIMOS BERHAD), Galoh Rashidah Haron (MIMOS BERHAD), Siti Suriyati Othman (MIMOS BERHAD)*

Previously, canvas fingerprinting can be used as one of the ways to get to know the identity of cyber users. The value contained in fingerprint for each of the users is different. However, due to the development of technology, it is not valid anymore. An experiment has been conducted for canvas fingerprinting and we found out that there are no more uniqueness in canvas fingerprinting value for each of the users. To solve this problem, we introduce random browser fingerprinting technique. In this paper, we include detailed elaboration about how random browser fingerprinting works and how we implemented it in our system. In the last section of this paper, we will discuss about the advantages of having random browser fingerprinting technique in our system.

### 98. Optimization of Locally Linear Embedded for Frontal Gait Recognition using Kinect.....157

*Rohilah Rohilah Sahak (FKE UiTM), Nooritawati Md Tahir (FKE UiTM), Ahmad Ihsan Mohd Yassin (FKE UiTM), Fadhlan Hafiz Kamaruzaman (FKE UiTM)*

This study investigates the potential of gait features as human gait recognition. Firstly, skeleton joints of twenty subjects obtained from Kinect are extracted as features and further selected using the optimized locally linear embedded approach. Next, multi-layer perceptron and support vector machine are employed as classifiers. Result showed that the combination of the optimized locally linear embedded with K=100 and d=94 and support vector machine regularization parameter C=0.001 and linear kernel attained highest accuracy rate in frontal view specifically 96.50% using 94 gait features.

**Date: 25-04-2017**

**Session VII: Software Engineering, Trusted Computing & Internet of Things (09:00 - 10:00 @ Adya 3 & 4)**
**Session Chair: HABIBAH HASHIM**

### 41. A Secure Communication in Location Based Services using AES256 Encryption Scheme.....163

*Nur Nabila Mohamed (UiTM Shah Alam), Hanunah Othman (UiTM Pasir Gudang), Mohd Anuar Mat Isa (UiTM Shah Alam), Nur Afiqah Mohd Noor (UiTM Shah Alam), Habibah Hashim (UiTM Shah Alam)*

Location Based Services (LBS) are any services or software applications that require the geographic location (longitude and latitude) of an entity. Nowadays, with the aid of smartphones, LBSs have improved tremendously in the market with wide range of users. However, in many existing LBSs, the user's information was not private where the service provider is aware with the user's location and may leak this information to any unauthorized entities. To encounter this problem, a symmetric encryption can be used as a solution to encrypt the data sent within client and LBS. An experiment of symmetric encryption using TCP/IP client-server for protecting user's privacy in the communication had been conducted to prove the user's information is encrypted.

### 92. IoT-based Personal Health Care Monitoring Device for Diabetic Patients.....168

*Ruhani Ab. Rahman (Universiti Teknologi MARA), Nur Shima Andul Aziz (Universiti Teknologi MARA), Murizah Kassim (Universiti Teknologi MARA)*

This paper presents a non-invasive breath test to monitor the condition of diabetic patients. It is identified as an easier technique and quick diagnoses of diabetic keto-acidosis (DKA). DKA is a preventable acute complication of type 1 diabetes mellitus. Common diabetic test on patients are done on urinary test and blood ketone test to monitor for diabetes condition. However, those methods are considers as invasive, inconvenient and expensive. Recently, breath acetone has been considered as a new ketone biomarker because it is non-invasive, convenient, and accurate reflection of the body's ketone level. This research presents a method of monitoring ketone level by using breath measurement. Main objective of this research is to present an easy handheld health care on monitoring diabetic level with breath. Method consists of development of hardware connection with Internet of Things (IoT) system to facilitate the process of patients' diagnosis and personal monitoring. In this system, Arduino board is used to read the sensor with sense the breath. Breath value level is log to system using wireless communication. Data collection is interfaced to web page. Ketone level is measured as the amount of breath acetone is collected when patients exhale into a mouthpiece that consists of gas sensor. The reading from Arduino is shared to the database via ESP 8266 Wi-Fi Module and can be accessed by the patients or registered doctors. This research is significant where patients can independently monitor their diabetic health and the IoT system can be alerted directly to medial officers in the hospitals.

### 71. Conceptual Framework for Implementation of Knowledge Sharing in Global Software Development Organizations.....174

*Rayhab Anwar (Faculty of Information and Communication Technology, Universiti Tunku Abdul Rahman 31900 Kampar, Perak, Malaysia.), Mobashar Rehman (Faculty of Information and Communication Technology, Universiti Tunku Abdul Rahman 31900 Kampar, Perak, Malaysia.), Siak Wang Khor (Faculty of Information and Communication Technology, Universiti Tunku Abdul Rahman 31900 Kampar, Perak, Malaysia.)*

Effective knowledge sharing plays a significant role in the proficient performance of any global software development organization. The lack of ability to share knowledge over time, in globally distributed software organizations, is perhaps the most prominent issue of this digital era. Traditionally, the main focus of the existing literature for knowledge sharing has been on individuals working from same locations rather than globally distributed locations. Therefore, a good amount of research work needs to be done to understand knowledge sharing process for globally distributed software development organizations. To fill this gap, this paper proposes a framework consisting of knowledge sharing factors classified into five main categories 'individual', 'organizational', 'technological', 'cultural' and 'geographical'. The proposed framework incorporates psychological theories including theory of planned behavior (TPB), social cognitive theory (SCT) and subset of Triandis' theory of interpersonal behavior (TIB). Based on literature review, this study suggests that trust, motivation, social interaction, linguistic distance, geographical distance, time zone difference have direct relationships with knowledge sharing behavior whereas organizational and technological support plays a moderating role.

### 83. ECG based unique identity for embedded devices.....179

*Lukman Hakim Adnan (Universiti Teknologi Mara Malaysia), Habibah Hashim (Universiti Teknologi Mara Malaysia)*

In the last decade, sensor nodes have been widely deployed in many application, owing to the their simple attributes and installation process. However, the sensors nodes are vulnerable to many potential threats such as node cloning and identity attack. The threats become more significant when the nodes are used in applications such as bio-medical and e-Health applications where trust, privacy and security are of a major concern. In trusted systems, identity plays an important role in completing the chain of trust. One of the potential attacks on wireless sensor nodes is identity attack namely replication attack where one or more nodes illegitimately claim the identity (ID) of a legitimate node and replicate itself throughout wireless sensor network (WSN). Deployment of high security solutions leads to implementation challenges such overcoming the resource constraints that exist in sensor nodes and the need for arbitration by trusted third parties. This study explores the feasibility of using the human electrocardiogram (ECG) characteristics in generating the identity of the sensor node platform thus eliminating the need to store the identity on the node itself. An identity generation

algorithm is derived from features extraction and reduction signal to cope with the constraint of the sensor node platform and provide the main solution to the above mentioned issues.

---

**Session VIII: Industrial Electronics II, Network & Communication II (10:15 - 11:45 @ Adya 3 & 4)**

**Session Chairs: ASMARASHID PONNIRAN, FARANAK RABIEI**

---

**56. Skype Multimedia Application Traffic Analysis on Home Unifi Network.....184**

*Murizah Kassim (Universiti Teknologi MARA), Siti Fatimah Ramle (Universiti Teknologi MARA), Ruhani Ab. Rahman (Universiti Teknologi MARA), Mat Ikram Yusof (Universiti Teknologi MARA)*

This paper presents an analysis of Skype application network traffic on Home UniFi network. Recently, Skype is identified as one of the most online video media applications used in today's network communication. Before, people communicate through Skype using telephone line where it is very costly. Today, UniFi broadband network give better bandwidth for Skype users and more cheaper solution. However, it is important to determine whether the bandwidth offered by UniFi is fully utilized by the users as they consistently pay for it. The objectives of this research is to analyze multimedia Skype traffic characteristics such as usage of bandwidth, round trip time (RTT), and packet loss, Skype protocol, and Skype traffic model. The method involved establishing both video and voice calls at different time using Skype of home UniFi where one of the users runs the Wireshark to capture the traffic. Data are collected in schedule time and analyzed using MATLAB software. Collected data are analyzed on total of bandwidth usage and type of protocol used. Comparison is being made between different protocols used in time. Then, Skype traffic model is identified by fitted the raw data. Two-parameter Cumulative Distributions Functions (CDF) is generated. Maximum Likelihood Estimator (MLE) technique is used to get the best traffic model which presents the highest MLE value. Result presents that Skype is using UDP protocol more than TCP protocol and the bandwidth usage is underutilized where only 10% of bandwidth is used from the offered committed access rate paid on the access bandwidth line. This study is significant in developing a dynamic committed access rate algorithms line which would benefits the broadband network users.

**10. On the Design of a Miniaturized Planar Elliptically Nested Multiband Antenna.....190**

*Mansour Taghadosi (American University of Sharjah), Lutfi Albasha (American University of Sharjah), Nasser Qaddoumi (American University of Sharjah)*

In this paper, a novel miniaturized printed elliptical antenna is presented. The presented antenna exhibits a multiband frequency response, which makes it suitable for variety of applications such as radio frequency energy harvesting. The achieved multiband antenna response helps in compacting the overall size of such systems by having a single antenna unit operating at different frequency standards. Moreover, the simple planar structure of the antenna eases the fabrication process and reduces the overall cost. The design and evolution of this multiband antenna is addressed in this content. Furthermore, the electromagnetic simulation and measurement results of the antenna are compared. The overall dimensions of this miniaturized multiband antenna unit is 41 mm x 44 mm.

**50. Parameters Design Evaluation in 3-level Flying Capacitor Boost Converter.....195**

*Asmarashid Ponniran (Universiti Tun Hussein Onn Malaysia), Mohd Amirul Naim Kasiran (Universiti Tun Hussein Onn Malaysia)*

Flying capacitor boost converter (FCBC) is one of the possible power converter for high power applications such as solar systems and electric vehicles system and so on. The aim of this paper is to establish relationship between the capacitance of the flying capacitor and output voltage ripple. 3-level FCBC prototype has been constructed for parameters design confirmation. Experimental result shows that the input current ripple is within design value. By identifying the input current ripple, the inductance of the boost inductor is estimated and it needs approximately only 25% compared to the 2-level conventional boost converter. Besides, 3-level FCBC only requires inductor core volume of 35% compared to the 2-level conventional boost converter. Moreover, it is confirmed that the relationship between the capacitance of the flying capacitor and output voltage ripple is independent. This finding is concretely proven by the simulation and experimental results. Therefore, the boost inductor and capacitance of the flying capacitor can be designed independently without considering output voltage ripple.