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TECHNICAL PROGRAM / ABSTRACT
Day 1: 30-05-2016

Network & Communication Technologies
(08:30 - 10:15 @ Jintan Room)

Session Chair: Husna Zainol Abidin (Universiti Teknologi MARA)

08.30-
8.45 **WSN based Intruder Detection System based on Territorial Predator Scent Marking Algorithm (TPSMA) Sensor Node Placement Scheme (Paper ID: 65) 1**

Husna Zainol Abidin (Universiti Teknologi MARA), Shu Raj Subramaniam (Universiti Tenaga Nasional), Norashidah Md Din (Universiti Tenaga Nasional), Nurul Asyikin Mohamed Radzi (Universiti Tenaga Nasional)

An effective sensor node placement in a Wireless Sensor Network (WSN) is one of the ways to provide a WSN with maximum coverage, maximum connectivity, minimum deployment cost and minimum energy consumption. Territorial Predator Scent Marking Algorithm (TPSMA) has been recently proposed by the authors. This paper presents an intruder detection system based on TPSMA. The performance of the TPSMA intruder detection system are evaluated based on coverage ratio and connectivity probability through simulation and hardware experimentation. The results show that the simulation and hardware experimental results are of similar trend with some expected differences due to various factors.

8.45-
9.00 **Cost Effective Software Defined Radio Approach to Cross-Platform LTE Vector Signal Analysis (Paper ID: 36) 7**

Jeng-kuang Hwang (Department of Communications Engineering, Yuan Ze University), Cheng-feng Li (Smart Network System Institute, Institute for Information Industry), Chien-min Chen (Department of Communications Engineering, Yuan Ze University), You-wei Pan (Department of wireless communication technique, Mediatek)

To measure and verify various LTE UE and eNodeB chips and modules, the LTE vector signal analyzer (VSA) is often needed to measure the physical layer for both the FDD and TDD modes. Without using those costly off-the-shelf VSAs, this paper presents a software-defined radio (SDR) approach to develop cross-platform LTE VSA. The VSA SDR platform is clearly divided into the signal acquisition (SA) hardware and the PC-based core software (CS). The CS embodies functions for SA control and LTE receiver signal processing. Hence, this

SA-CS SDR approach has the merit of flexible operation using different SA hardware. Real-world experiments showed that the proposed VSA can achieve an EVM result comparable to that obtained by costly commercial LTE VSA.

9.00-
9.15 **Fair Boundary Scheduler for LTE system (Paper ID: 20) 11**

Abdul Aziz Abdul Rahman (Telekom Research & Development Sdn Bhd.), Abdullah Man (Telekom Research & Development Sdn Bhd.), Ahmad Kamsani Samingan (Telekom Research & Development Sdn Bhd.), Chun Yeow Yeoh (Telekom Research & Development Sdn Bhd.), Ishak Suleiman (Telekom Research & Development Sdn Bhd.)

Scheduling technique plays a significant role in distributions of Resource Blocks (RBs) in LTE system. In order to ensure the LTE system operates efficiently, the scheduler needs a good trade-off between the overall cell throughput and the fairness to all the users' equipment (UEs) in its respective cell. Improving the overall cell throughput while maintaining its fairness level is very crucial in order to ensure all UEs have been served fairly and efficiently. The proposed scheduler technique, which is referred to as Fair Boundary (FB) Scheduler is shown to improve the overall cell throughput while maintaining a high level of fairness among UEs. Our simulation showed that the Fair Boundary Scheduler achieved up to 13 percent improvement in term of the overall cell throughput. Furthermore, our simulation results also showed that the proposed scheduler exhibited better fairness compared to the widely used Proportional Fair (PF) and Round Robin (RR) schedulers.

9.15-
9.30 **Implementation and Analysis of Fast Locking 5GHz Phase Locked Loop (Paper ID: 51) 16**

Dewmini Sudara (University of Moratuwa), Vikum Wijesinghe (University of Moratuwa), Dakila Serasinghe (University of Moratuwa), Dumindu Thilakarathne (University of Moratuwa), Thayaparan Subramaniam (University of Moratuwa)

Due to the continuous improvements in process technology, it is made possible to design IP cores running at higher speeds using less complex architectures. In this paper we present the implementation of a phase locked loop operating at 5GHz. Implementation of basic blocks such as phase frequency detector, charge pump, loop filter, clock divider and voltage controlled oscillator are discussed. Modeling and simulating the design in MatLab Simulink with simulation results are also presented.

9.30-
9.45 **IEEE 802.3 100Gbps Ethernet PCS IP Design Challenges and Solutions (Paper ID: 48) 21**

Udara Piumal De Silva (University of Moratuwa), Anusha Lokumarambage (University of Moratuwa), Hasantha Malavipathirana (University of Moratuwa), Chathuranga Mohottala (University of Moratuwa), Subramaniam Thayaparan (University of Moratuwa)

This paper identifies the challenges involved in designing the 100 Gigabit per second (Gbps) Ethernet Physical Coding Sublayer (PCS) Semiconductor Intellectual property (IP) compliant with IEEE 802.3 standard. Challenges are discussed under the two topics, implementation challenges and verification challenges. Furthermore, our solutions to identified challenges are presented in the paper.

9.45-10.00 **Sensor Node Development for Street Lighting Monitoring System (Paper ID: 63) 26**

Yusnani Mohd Yussoff (UiTM), Mustaffa Samad (UiTM)

The paper presents the development of a low cost sensor node for street lighting based on the criteria needed by the industry. The function of the sensor node is to sense or detect the motion or movement of an object or a car. The sensor node will act or response whenever there is an object passing through it. The street light will turn on and transmit data to another pole. Once the object has passed the sensor node, the light will turn off. The paper focus on the development of a cost effective sensor node. This sensor node will save the power supplied to the light by preventing it from turning on all night. This will also help reduce maintenance cost and save on power consumption.

**Signal & Image Processing/Medical Electronics
(10:45 - 12:45 @ Jintan Room)**

Session Chair: Iza Sazanita Isa (Universiti Teknologi MARA)

10.45-11.00 **New Image Enhancement Technique for WMH Segmentation of MRI FLAIR Image (Paper ID: 25) 30**

Iza Sazanita Isa (Universiti Teknologi MARA), Siti Noraini Sulaiman (Universiti Teknologi MARA), Muzaimi Mustapha (Universiti Sains Malaysia), Noor Khairiah A Karim (Universiti Sains Malaysia), Mohd Firdaus Abdullah (Universiti Teknologi MARA), Nooritawati Md Tahir (Universiti Teknologi MARA)

This paper proposed new image enhancement technique for FLAIR image based on intensities and contrast mapping techniques. The proposed algorithm consists of partial contrast stretching, contrast limiting enhancement, window sliding neighborhood operation and new pixel centroid replacement. The fluid attenuated inversion recovery (FLAIR)

sequences of MRI images which are used for segmentation have low contrast. Therefore, contrast stretching is used to improve the quality of the image. After improving the quality of image, the regions of high intensity are determined to represent potential WMH area. The result shows that the image has moderate enhancement on WMH region which significant to image contrast enhancement. With complete brightness preservation, the proposed method gives a relatively natural brightness improvement on WMH of the periventricular region.

11.00-
11.15 **Influences of Languages in Speech Emotion Recognition : A Comparative Study Using Malay, English and Mandarin Languages (Paper ID: 29) 35**

Rajesvary Rajoo (Nilai University), Chee Aun Ching (Nilai University)

Emotion recognition plays a significant role in affective computing and adds value to machine intelligence. While the emotional state of a person can be manifested in different ways such as facial expressions, gestures, movements and postures, recognition of emotion from speech has gathered much interest over others. However, after years of research, recognizing the emotional state of individuals from their speech as accurately as possible still remains a challenging task. This motivates an attempt to study to understand the factors that influence identification of Speech Emotion Recognition (SER) such as gender and age. The aim of this study is to investigate whether a SER system can identify the emotional state of a person regardless of the language used. To investigate the influence of languages in SER, we explored how spoken expressions of four selected emotions (anger, sad, happiness and neutral) varied in the three languages of interest; Malay, English and Mandarin. In addition, the perceptual outcomes were studied in relation to identifying the advantage of speech emotion expression produced by native speakers. While supporting the fact that SER is language independent, the study reveals that there are language specific differences in emotion recognition in which English shows a higher recognition rate compared to Malay and Mandarin. This study also demonstrated that emotions expressed by native speakers have higher accuracy rates.

11.15-
11.30 **Malaysian Automatic Number Plate Recognition System using Pearson Correlation (Paper ID: 46) 40**

Wong Weng Keong (Sunway University), Vahab Iranmanesh (Sunway University)

Automatic Number Plate Recognition (ANPR) system helps to monitor and track down a large number of vehicle registration number plates by reading the vehicle plates as input and recognize the plates' characters as output automatically. In

fact, inaccuracy of recognition can be caused by various factors such as rotation of the plate and non-uniform illumination during image acquisition. In this paper, de-skewing operations and template matching technique are proposed to maintain the accuracy of the car plate at the high level. The suggested system achieved 91.1% of overall accuracy in the recognition process in the system.

11.30- **Development of EMG Circuit to Detect Leg Movement**
 11.45 **(Paper ID: 73) 46**

Hisham Mohd Desa (Faculty of Electrical Engineering Universiti Teknologi MARA), M.s. Zuber Zuber (Faculty of Electrical Engineering Universiti Teknologi MARA), Rozita Jailani (Faculty of Electrical Engineering, UiTM), Nooritawati Tahir (Faculty of Electrical Engineering, UiTM)

This research focuses on development of EMG circuit to detect the EMG signal from quadriceps muscle. The circuit used Surface self-adhesive electrodes to capture muscle activity during the knee extension. The two electrodes were placed at a distance 10mm from each other in the middle rectus femoris muscle. The investigation was the first effort to present the output signal stage by stage from EMG circuit. The EMG circuit consists of several circuits. There were amplification, filtering and rectification. In this experiment, the output signal from EMG circuit had shown the successfully voltage output as required for next process. Finally, the circuit was tested on 5 healthy subjects with different leg dominant in data collection for signal analysis.

11.45- **Classification of Autism Children Gait Patterns using**
 12.00 **Neural Network and Support Vector Machine (Paper ID:**
70) 52

Suryani Ilias (Faculty of Electrical Engineering,Universiti Teknologi MARA (UiTM) ,40450 Shah Alam, Selangor, Malaysia), Nooritawati Md Tahir (Faculty of Electrical Engineering,Universiti Teknologi MARA (UiTM) ,40450 Shah Alam, Selangor, Malaysia), Rozita Jailani (Faculty of Electrical Engineering,Universiti Teknologi MARA (UiTM) ,40450 Shah Alam, Selangor, Malaysia), Che Zawiyah Che Hasan (Faculty of Electrical Engineering,Universiti Teknologi MARA (UiTM) ,40450 Shah Alam, Selangor, Malaysia)

In this study, we deemed further to evaluate the performance of Neural Network (NN) and Support Vector Machine (SVM) in classifying the gait patterns between autism and normal children. Firstly, temporal spatial, kinetic and kinematic gait parameters of forty four subjects namely thirty two normal subjects and twelve autism children are acquired. Next, these three category gait parameters acted as inputs to both classifiers. Results showed that fusion of temporal spatial and

kinematic contributed the highest accuracy rate for NN classifier specifically 95% whilst SVM with polynomial as kernel, 95% accuracy rate is contributed by fusion of all gait parameters as inputs to the classifier. In addition, the classifiers performance is validated by computing both value of sensitivity and specificity. With SVM using polynomial as kernel, sensitivity attained is 100% indicated that the classifier's ability to perfectly discriminate normal subjects from autism subjects whilst 85% specificity showed that SVM is able to identify autism subjects as autism based on their gait patterns at 85% rate.

**Network & Communication Technologies/Computational Intelligence / Medical Electronics
(14:00 - 15:30 @ Jintan Room)**

Session Chair: Kama Azura Othman (UiTM)

14.00-14.15 **Analysis of Kinematic Gait Parameters in Chronic Stroke Survivors (Paper ID: 69) 57**

Nurhazwani Anang, Rozita Jailani, Nooritawati Md Tahir, Haidzir Manaf, Nadia Mustafah

This paper presents the gait pattern classification between stroke survivors and normal subjects. 18 subjects has been recruited (nine stroke subjects and nine normal subjects) with range of age between 40 to 65 years old. Additionally, all subjects must be able to walk freely without any cane or mechanical aid during walking. In this study, Vicon® Nexus Plug-in-Gait is used to compute the kinematic gait parameters. Movements in anatomical planes is used as a reference during walking. This paper focus on the sagittal plane only. From the results, it is found that there is a significant difference in the maximum angle of knee between stroke and normal subjects. As a conclusion, the significant value which is 0.003 only can be observed from the maximum knee angle between both groups. The results of this study may be varies due to several aspects such as physical body structure and also age. Keywords—Stroke, gait pattern, lower limb, kinematic angle, anatomical planes, sagittal plane, Vicon Nexus

14.15-14.30 **Adaptive Routing Algorithm In x-Folded TM Topology (Paper ID: 28) 63**

Mehrnaz Moudi (Universiti Putra Malaysia), Mohamed Othman (Universiti Putra Malaysia), Kweh Yeah Lun (Universiti Putra Malaysia), Amir Rizaan Abdul Rahiman (Universiti Putra Malaysia)

In recent days, more complicated interconnection topologies have been replaced with previously simple topologies that also exhibit high performance. x-Folded TM network is a TM network that is folded according to the imaginary xaxis in interconnection networks. For an x-Folded TM network, there is a reduction in the average distance and diameter which corroborates the efficient performance. Also many routing algorithms can be applied to interconnection network for the efficient use of network resources. This paper presents the effectiveness of the x-Folded TM network with the average latency and network throughput under the adaptive routing algorithm to improve dynamic communication performance. We evaluate the communication performance with simulating the topology under the adaptive routing algorithm. It is found from the result that the performance of an x-Folded TM network has been improved compared with other topologies.

14.30-
14.45 **A Krill Herd Algorithm For Efficient Web Text Document Clustering (Paper ID: 34) 67**

Laith Abualigah (Universiti Sains Malaysia), Ahamad Khader (Universiti Sains Malaysia), Mohammed Al-betar (Al-Huson University College, Al-Balqa Applied University), Mohammed Awadallah (Al-Aqsa University)

Recently, due to the huge growth of web pages, social media and modern applications, text clustering technique has emerged as a significant task to deal with a huge amount of text documents. Some web pages are easily browsed and tidily presented via applying the clustering technique in order to partition the documents into a subset of homogeneous clusters. In this paper, two novel text clustering algorithms based on krill herd (KH) algorithm are proposed to improve the web text documents clustering. In the first method, the basic KH algorithm with all its operators is utilized while in the second method, the genetic operators in the basic KH algorithm are neglected. The performance of the proposed KH algorithms is analyzed and compared with the k-mean algorithm. The experiments were conducted using four standard benchmark text datasets. The results showed that the proposed KH algorithms outperformed the k-mean algorithm in term of clusters quality that is evaluated using two common clustering measures, namely, Purity and Entropy.

14.45-
15.00 **A Framework for Cloud Computing Use to Enhance Job Productivity (Paper ID: 40) 73**

Sek-kit Teh (Multimedia University, Cyberjaya, Malaysia), Sin-ban Ho (Multimedia University, Cyberjaya, Malaysia), Gaik-ye Chan (Multimedia University, Cyberjaya, Malaysia), Chui-hong Tan (Multimedia University, Cyberjaya, Malaysia)

Increasing effectiveness and efficiency in job productivity is one of the most critical goals for businesses because a productive labor force is crucial in reducing the budget impact in business costs and in boosting job creation. While Cloud computing is an important technological development in this generation, its effect on job productivity is unclear. Cloud computing may promise lower cost and the capability to quickly scale resources up or down as workloads demanded, thus leading organizations in both the public and private sectors to consider shifting their applications and data to the Cloud. Although Cloud computing provides many advantages but barriers of Cloud usage such as security breaches, incompatibility with existing applications and unreliability of Cloud service reduce job productivity. This research hence aims to propose a framework on demography, Cloud characteristics and learning styles for Cloud computing usage, documentation and productivity. This research uses a systematic and methodological plan to coordinate research for optimum resource allocation. The intended population where data will be collected under this study will be 500 Cloud service users in a local region in Malaysia.

15.00-
15.15 **Development of Computer-Based Assessment for Brain Electrophysiology Technique of Dyslexic Children (Paper ID: 64) 79**

Sabrina Mohamad (Universiti Kuala Lumpur – British Malaysian Institute), Wahidah Mansor (Universiti Teknologi MARA), Yoot Khuan Lee (Universiti Teknologi MARA)

This paper presents the design and delivery procedure for a computer based assessment for brain electrophysiology technique of dyslexic children. Electrical activities of the brain are recorded using electroencephalograph where analysis can then be made and results can lead towards an objective diagnosis assessment of dyslexia. The benchmark of the assessment design is based on methods employed by the Dyslexia Association of Malaysia. There are six tasks in the overall assessment that looks into the subject visual and phonics processing, along with their reading, writing and spelling proficiencies. Eight electrode positions were applied on the scalp based on the brain learning pathway to look into areas of activation, C3, C4, CZ, P3, P4, F8, F7 and T7. The computer based assessment provide the basis of activities to be presented to a dyslexic subject with an age range of 7 to 12 that evaluates their learning capabilities and present the marker that can lead towards the diagnosis of dyslexia. Coupled with EEG recording, it provides a view on the working of the brain giving information for practitioner in the design of pedagogical approach or even neurofeedback protocol

15.15- **Virtual Market Implementation using Global System for**
15.30 **Mobile Communications (GSM) (Paper ID: 62) 84**

Kama Azura Othman (UiTM), Mohd Huzaifah Zianal (UiTM)

This project aims to implement virtual shopping arcade via GSM network implementation. The new innovation on online shopping requires people to have internet networking connection. This project however is developed to target mobile phone users to do shopping virtually without the needs of having data subscription account in their mobile phone. The system is built using several tools such as visual basic (VB), XAMPP, Adobe Dreamweaver, with GSM module. A personal computer (PC) is used as the virtual arcade server with GSM module attached to it. Text is sent by users from their phone using a formatted virtual market Short-Message-Service (SMS). This system is developed to allow for offline-networking using mobile phones which do not require users to stay connected via the internet while purchasing the items

Trusted Computing & Secure Systems
(15:30 - 17:15 @ Jintan Room)

Session Chair: Kah Ho Lee (Universiti Utara Malaysia)

15.30- **Social Login with OAuth for Mobile Applications: User's**
15.45 **View (Paper ID: 24) 89**

Kah Ho Lee (Universiti Utara Malaysia), Norliza Katuk (Universiti Utara Malaysia)

Social network credentials can be used to login to native applications installed in smartphones or tablet computers. This approach is known as social login (SL) where its implementation is carried out using OAuth protocol. Communication between applications and social network servers involves with browser redirection. Applications could redirect token to any URL including malicious applications that intend to steal users' credential. This issue can be improved by developing a built-in module that handles the authorization process. An approach known as OAuth Manager Module is presented in this paper. A prototype application was developed to demonstrate the approach. Facebook SL was also provided as the authentication mechanism. The prototype is evaluated through a controlled experimentation of real users. The users interacted with the prototype and gave their views on the security of the module. The security of the module is compared with the common mobile browser implementation. The result suggests that users see that communication using the module is more secure than the mobile browsers.

15.45- **Social Login Privacy Alert: Does It Improve Privacy**
16.00 **Awareness of Facebook Users? (Paper ID: 26) 95**

Kah Moey Lee (Tunku Abdul Rahman University College (TARUC)), Norliza Katuk (Universiti Utara Malaysia), Mohd. Hasbullah Omar (Universiti Utara Malaysia)

Social login (SL) allows web application providers to obtain authentication service from social network providers for users who own the social network accounts. By approving a consent dialogue, users are granted access to the web applications when login using the SL. It also allows web application providers to access personal information that is associated with the users' social network credentials (SNC). This can be a source to privacy leakage if the users simply approve the consent dialogue without understanding the contents. Therefore, this research intends to explore users' privacy awareness when they login to web applications using SL for the first time particularly using Facebook SNC. An experimental study was conducted to evaluate the effects of SL permission messages on users' privacy awareness. The results suggested that the permission message with privacy alert has significantly increased the participants' awareness on the privacy of their personal information obtained through SNC. The outcome of this study provides an opportunity as a guide to increase users' awareness on the privacy of their personal information obtained from SNC.

16.00- **Security Metrics Maturity Model for Operational Security**
16.15 **(Paper ID: 27) 101**

Sri Murugarasan Muthukrishnan (Malaysian University Science and Technology), Sellapan Palaniappan (Malaysian University Science and Technology)

Information Technology (IT) is continuously evolving at faster rate and enterprises are always trying to keep pace with the changes. So do the threats. As the complexity of IT increase, the unprecedented threat environment and security challenges also have increased multi fold over the years. Security Managers are continuously having challenging task not only protecting their company but also convincing the stakeholders on the security investments. The well informed stakeholder demands higher level transparency, Return on Investment (ROI) and security. Security metrics plays a key role in responding to these demands. However the security metrics alone are not enough but must be substantiated. The stakeholders always question and challenge the metrics provided. They are always sceptical on the numbers shown in metrics. As such, more information is needed to substantiate

the metrics claims. Therefore, this research will explore the identification of quality security elements to determine the matured security metrics within operational security environment. The research will categorize the metrics maturity into three types: infant, evolving and matured metrics. The classification is performed by analyzing the quality of a metric through a scorecard and by providing a scoring. Towards the end Security Metrics Maturity Index (SM-Mi) is introduced to label a company on how trustable and confidence on can feel when look into the metrics. The entire classification uses operational security taxonomy for better understanding. The end result of this research will be a guide for the Security Managers to produce a convincing and close to accurate report for C Level management of an organization. This research will look into various studies done on existing measurements and security elements for Security Metrics and produce a method that will portray the maturity of security metrics used in an organization..

16.15- **Cooperative Network Behaviour Analysis Model for**
16.30 **Mobile Botnet Detection (Paper ID: 72) 107**

Meisam Eslahi (UiTM), Habibah Hashim (UiTM)

Recently, the mobile devices are well integrated with the Internet and widely used by normal users and organizations which employ Bring Your Own Device (BYOD) technology. However, the mobile devices are less protected in comparison to computers. Therefore, the mobile devices and networks have now become attractive targets for attackers. Amongst several types of mobile threats, the mobile HTTP Botnets can be considered as one of the most sophisticated attacks. A HTTP Bots stealthily infect mobile devices and periodically communicate with their controller called Botmaster. Although the Bots hide their activities amongst the normal web flows, their periodic pattern has been used as a measure to detect their activities. In this paper we propose a cooperative network behaviour analysis model to identify the level of periodicity posed by mobile Bots. Finally three metrics is proposed to detect Mobile HTTP Botnets based on similarity and correlation of their group activities. Test results show that the propose model can efficiently classify communication patterns into several periodicity categories and detect mobile Botnets.

16.30- **Timing Analysis of the Lightweight AAE Encryption**
16.45 **Scheme on Embedded Linux for Internet of Things**
(Paper ID: 66) 113

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

Internet of Things (IoT) is an interconnection of physical objects to the Internet which enables data exchange. When things are connected to the internet it becomes an open path for adversaries to unlawfully gain data over the internet leading to unaccountable security issues in pertaining to data integrity and privacy. The need to secure the data gathered from sensors is important as this eventually gives trust to the larger data, the big data. Furthermore, connected objects in IoT are resource constrained though having smaller processors, storage capacities and battery power thus putting constraints on the 'Things' by having extra computation such as cryptographic computation. Instead of having a middleware secure connection, this paper proposes to implement a lightweight asymmetric encryption on-board the Things itself. Thus, this paper presents an analysis of a lightweight asymmetric encryption, the AA β (AA-Beta) that might be feasibly implemented on the 'Things' to secure the IoT networks.

16.45-
17.00 **Observing the Presence of Mobile Malwares using Low-Interaction Honeypot (Paper ID: 60) 117**

*Wira Zanoramy Ansiry Zakaria (CYBERSECURITY MALAYSIA),
Faiszatulnasro Mohd Maksom (CYBERSECURITY MALAYSIA),
Kilausuria Abdullah (CYBERSECURITY MALAYSIA)*

The large user base of mobile devices, such as smartphones and tablets equipped with high-speed Internet connectivity and abundance of apps, this portable yet powerful computing devices has become an interesting target for cyberattackers. Based from incident reports received by MyCERT, there is a rising trend of malware attacks on mobile platforms. The ubiquitous, fast response and lack of protection nature of these devices more or less has helped the spreading of cyberthreats on mobile devices. This paper review and investigates the utilization of low-interaction honeypots in detecting and learning about mobile malwares.

Day 2 : 31-05-2016**Industrial Electronics
(08:30 - 10:15 @ Jintan Room)****Session Chair: Khairul Safuan Muhammad** (Universiti Teknologi MARA)**08.30-08.45 Flexible Absolute Circuit For Advanced Power Factor Correction Controller (Paper ID: 45) 122***Khairul Safuan Muhammad (Universiti Teknologi MARA), Rahimi Baharom (Universiti Teknologi MARA), Dylan Dahchuan Lu (The University of Sydney)*

In this paper, a flexible absolute circuit of advanced power factor correction (PFC) control for a bridgeless boost converter is proposed. The proposed circuit are able to eliminate the diode-bridge short-circuit problem if negative sensing signal is required by the power factor correction (PFC) controller. The polarity of the absolute circuit output could be changed just by reversing the polarity of the diodes. In addition, it is also has high input impedance. The proposed circuit could also be applied to other converters that uses hall effect sensor as the current sensing devices. Detailed analysis and design guidelines based on well-known PFC controller, UC3854AN are given.

08.45-9.00 Impact of Switching Frequency Variation to the Power Transfer Efficiency of WPT Converter (Paper ID: 39) 127*Rahimi Baharom (UNIVERSITI TEKNOLOGI MARA), Mohammad Nawawi Seroji (UNIVERSITI TEKNOLOGI MARA), Mohd Khairul Mohd Salleh (UNIVERSITI TEKNOLOGI MARA), Khairul Safuan Muhammad (UNIVERSITI TEKNOLOGI MARA)*

This paper presents the impact of the switching frequency variation to the power transfer efficiency of a wireless power transfer converter. An experimental demonstrator is used to as a model for this study. The transmitter use Würth Elektronik wireless power charging coils, 24 μ H, 10%, which is installed across the output of high frequency half-bridge inverter. The switching frequency is varied from 10kHz in steps of 10kHz until 100kHz. The distance between the coils is fixed at 10mm. The receiving coil is fed with a high frequency full-bridge rectifier and a DC load. Experimental results show that the power transfer efficiency varies when the switching frequency is increased. The power transfer efficiency reached its peak at 72% when the switching frequency is at 30kHz.

9.00- **Simplified SVPWM for Z Source T-NPC-MLI Including**
 9.15 **Neutral Point Balancing (Paper ID: 58) 132**

Bharatiraja Chokkalingam (Tshwane University of Technology), Munda Ji (Tshwane University of Technology)

This study presents a Z Source - T shape - Neutral point Diode Clamped (NPC) - Multi Level Inverter (MLI) power conversion system (Z-T-NPC-MLI) with the help of New Space Vector PWM (SVPWM) scheme. The proposed impedance source inverter combines the advantages of boosting and conversion of DC to AC power. There are research papers reported on T-NPC-MLI to produce the desired voltage conversion and with minimal switching and conduction losses. Though, the reported research on Z-NPC-MLI SVPWM has shown the interest on reduction of Shoot through (ST) options and its predominance enhancement, it not addresses the neutral point fluctuation problems on the DC-Link. Hence, this paper proposed the improved SVPWM schemes for Z-T-NPC-MLI with minimal ST state. The scheme exploits the redundancy switching vector option for both ST and regular switching, which offered a self control neutral point fluctuation. Also the proposed SVPWM maintain the quarter symmetry and harmonic spectra. The deliberate Z-T-NPC-MLI with proposed SVPWM is simulated in MATLAB/SIMULINK environment, and those results are conformed the advantages of the proposed inverter and its simplified PWM scheme

9.15- **A Four-Switch Based Long-Cable-Fed Five-Phase**
 9.30 **Induction Motor Drive System (Paper ID: 22) 139**

Ahmed Elserougi (Texas A & M University at Qatar), Ayman Abdel-khalik (Texas A & M University at Qatar), Shehab Ahmed (Texas A & M University at Qatar), Ahmed Massoud (Qatar University)

In applications where motors are fed from low voltage variable-frequency drive (VFD) through long cables, a step up transformer is commonly used to boost the converter output voltage in order to compensate for the cable voltage drop. For safety-critical applications, employing a multiphase machine generally enhances system reliability, however, a multiphase converter and transformer will be then needed. This paper proposes a simple drive system using a four-switch based five-phase drive system for motors fed through long cables. The system simply comprises a four-switch converter, which is controlled to produce a balanced two-phase output, and a static transformer that converts the two-phase inverter output voltage to five-phase balanced voltages. The proposed system is simulated using MATLAB/SIMULINK to verify the proposed concept.

9.30- **Area tradeoffs in a 3D Programmable Structured ASIC**
9.45 **(Paper ID: 8) 145**

Norhazlin Khairudin (RMIT), Assoc. Prof Paul Beckett (RMIT)

A major obstacle to the uptake of advanced fabrication nodes by small industry is high NRE costs, mainly initial mask generation. The Programmable Structured ASIC (psASIC) is intended to bridge the gap between FPGA and Structured ASIC approaches to application design. The psASIC prototype environment comprises a pair of stacked chips, one containing only logic and the other comprising only interconnect and configuration RAM. Once an application has been prototyped and debugged, the interconnect layer can be replaced with a set of semi-standardized metallization masks in a way that preserves the critical timing paths of the prototype. We analyze the trade-offs between vertical interconnect density and logic size in the psASIC using a 130nm 3D process as an example.

9.45- **A Lithium-ion Battery Energy Storage System Using a**
10.00 **Bidirectional Isolated DC-DC Converter with Current**
Mode Control for More Electric Aircraft (Paper ID: 21) 149

Mohd Tariq (Nanyang Technological University), Ali Iftekhhar Maswood (Nanyang Technological University), Chandana Jayampathi Gajanayake (Rolls-Royce Singapore Pte. Ltd), Amit Kumar Gupta (Rolls-Royce Singapore Pte. Ltd)

The present trends in the aircraft industry is a shift towards a "More Electric" architecture, in which electrical power drives aircraft flight surfaces. With the increase in electrical power requirement, a high energy density battery energy storage system (BESS) is required in a More Electric Aircraft (MEA). This paper describes the design and operation of a 50 kW, 6.4 kWh Lithium ion BESS in detail, wherein the circuit parameters are designed considering the required power sharing and the limitation of ripple in voltage and current. A current mode control technique is proposed for the integration of the proposed high energy density Li-Ion BESS with 270 V DC power distribution bus. A bidirectional isolated DC-DC converter is used for the integration. In order to achieve the high performance of the isolated bi-directional DC-DC converter, the system output voltage must maintain good tracking of its reference command, despite transient events and varying operating conditions. The proposed battery configuration is verified under different dynamic conditions using the proposed current mode control with variations in the output current (load). The circuit modeling is done in PSIM simulation environment, and simulation results are presented and discussed in the paper.

- 10.00-
10.15 **Theoretical Investigation on the Effect of Individual Stage-Gain Selection on the 3-dB Bandwidth of Three-Op-Amp Difference Amplifiers (Paper ID: 19) 155**
Reem Aldisi (Qatar University), Fadi Jaber (Qatar University)

The differential gain of a three-op-amp difference amplifier is determined by the product of the gain values of its two stages. Usually, the total desired differential gain is assigned to the first stage while the gain of the second stage is set to unity in order to achieve higher common mode rejection ratio (CMRR) values. On the other hand, the effect of this choice on the frequency response of the amplifier is not fully understood. For this purpose, this paper presents a theoretical study on the influence of gain choice for the first and second stages of the amplifier on its 3-dB bandwidth. To achieve this, the closed-loop transfer function of the amplifier is derived while considering the effect of the finite open-loop gain and bandwidth of the op-amps used to implement this type of amplifier. The equations presented here demonstrate that the 3-dB bandwidth is increased considerably when the gain of the first stage is reduced and that of the second stage is raised while keeping the value of the total differential gain constant. Although this happens at the expense of CMRR, designers of this type of amplifier should consider the tradeoff between the two.

**Industrial Electronics/Automation
(10:45 - 12:30 @ Jintan Room)**

Session Chair: Bukhari Ilias (Universiti Malaysia Perlis)

- 10.45-
11.00 **Performance of a Three-to-Five Matrix Converter Fed Five-Phase Induction Motor under Open-Circuit Switch Faults (Paper ID: 32) 159**

Sherif Dabour (Tanta University), Ayman Abdel-khalik (Texas A & M University at Qatar), Shehab Ahmed (Texas A & M University at Qatar), Ahmed Massoud (Qatar University)

Multiphase machines are conventionally fed from voltage source inverters (VSIs) with bulky dc-link capacitors, which represent a technical drawback in high power medium voltage applications. Alternatively, multiphase matrix converters can offer a direct 3-phase to n-phase conversion without the need for this bulky storage element. Most of the available literature investigates multiphase matrix converter under healthy conditions. This paper introduces the performance of a five-phase induction motor fed by a three- to five-phase matrix converter (3×5 MC) under fault conditions. The indirect space vector modulation (ISVM) technique is employed to modulate the converter switches and the entire system is controlled using open-loop Volts/Hz control. The given study is limited

to open-circuit switch faults due to gate failures with different bidirectional switch arrangements employed. A simulation case study using Matlab/Simulink is carried out to investigate the performance of the whole system under different fault scenarios, and results are compared with the healthy case.

11.00- **A Full Bridge-Based Fault Current Controller for**
11.15 **Distributed Generation Systems (Paper ID: 47) 165**

Safana Alsalemi (Qatar University), Salma Almadhoun (Qatar University), Marzyeh Najad (Qatar University), Ahmed Massoud (Qatar University)

Nowadays the demand of electricity is continuously increasing which necessitates adding more distributed generators, causing the level of fault current to highly increase. The level of Fault Current (FC) could even exceed the ratings of the existing power system infrastructure, causing damage to the system components. Thus, a need exists to limit the FC levels. This paper is surveying different types of fault current limiters (FCLs), especially the solid state-based types shedding light on the design of a controllable single phase full bridge inverter type for low voltage distribution systems. Impedance and voltage-based approaches are proposed for controlling the FC levels. Simulation and experimental results are presented to elucidate the claimed contribution.

11.15- **Modelling Of DC-DC Converters with Continuous Input**
11.30 **Current For High Power PV Applications (Paper ID: 49) 171**

Abdulrahman Alassi (Qatar University), Ahmed Massoud (Qatar University)

Renewable Energy sources integration to the grid is becoming more vital due to the market share increase. The integration of PV farms, for instance, usually requires a DC-DC conversion stage to boost up the source voltage. In addition, DC-DC converters with continuous input current reduce the bulky input capacitor requirements. This saves the cost, and enhances the reliability of the system since these capacitors exhibit short life time. This paper presents a complete mathematical modeling of two appropriate converters for such application, namely the Cuk and SEPIC DC-DC converters. The parasitic non-idealities are included to account for gain deterioration at high duty cycles, which is a vital point in high power applications especially when high gains are required. The performance of both converters is then compared and their small signal models are derived and presented in terms of both the input voltage and duty cycle, which provides an additional path for performance assessment. The theoretical models are verified practically.

11.30- **Solar Car Efficient Power Converters' Design (Paper ID:**
 11.45 **38) 177**

Mariam Elmenshawy (Qatar University), Mena Elmenshawy (Qatar University), Ahmed Massoud (Qatar University), Adel Gastli (Qatar University)

The first solar car racing named as the World Solar Challenge was organised in Australia aiming to trigger the development of solar powered vehicles by researchers all over the world, and so do, various technologies have emerged targeting to make solar powered vehicles perform similar to fuel powered vehicles. Nevertheless, such vehicles still have limitations in terms of energy management technology, including photovoltaic and energy storage system. A solar car energy management system must ensure that the flow of electrical power from the PV and from/to the energy storage devices to the motor are optimised and monitored. Energy efficiency and light weight are important factors for a successful vehicle. In order to achieve that in this work, a 5 kWh Lithium ion battery, 2 kW in-wheel axial flux permanent magnet brushless DC motor with a rated voltage of 48 V, 1035 W monocrystalline PV modules, and silicon carbide devices in power converters are selected to attain such constraints. In addition, ultra capacitor is used as a second energy storage device to take the advantages of the fast charging and discharging. Buck-Boost converters are designed to regulate the output voltage of the three sources which are PV panel, battery, and ultra capacitor. The proposed design was validated with simulations and experiments.

11.45- **A Highly Efficient PV Power System for DC MicroGrids**
 12.00 **(Paper ID: 43) 183**

Hebatallah Elfeqy (Qatar University), May Shahin (Qatar University), Amna Al-rumaihi (Qatar University), Dr. Ahmed Massoud (Qatar University), Prof. Adel Gastli (Qatar University)

Climate change attracted widespread attention to shift towards environment friendly energy sources such as photovoltaics. Considering the facts that there are large numbers of DC loads that are used in today's buildings, the existing infrastructure is an AC power system, and the PV is a DC source, there will be power losses in the DC-AC-DC conversions. Therefore, the concept of using a DC MicroGrid can provide more efficient power to native DC loads directly from the DC green sources, with minimum conversions. This paper attempts to design a highly efficient power system for a DC MicroGrid. One building at Qatar University is selected and considered as a case study for the DC MicroGrid system integration. This paper discusses also the simulation of PV modeling and the maximum power point tracker using

Matlab/Simulink. In addition, a feasibility study is carried out to investigate the viability of the system design through the implementation of two DC-DC converters: interleaved boost converter for the PV system and bidirectional buck converter for the energy storage system. The results are very satisfactory.

12.00-
12.15

A Novel Indoor Mobile Robot Mapping with USB-16 Ultrasonic Sensor Bank and NWA Optimization Algorithm (Paper ID: 59) 189

Bukhari Ilias (Universiti Malaysia Perlis), Shazmin Aniza Abdul Shukor (Universiti Malaysia Perlis), Sazali Yaacob (Universiti Kuala Lumpur), Abdul Hamid Adom (Universiti Malaysia Perlis), Mohd Firdaus Ibrahim (Universiti Malaysia Perlis)

This paper highlights on the development of a Ultrasonic Sensor Bank with sixteen pieces 40 kHz ultrasonic sensor (USB-16) mounted on hexadecagon-based plate on a mobile robot to perform real time 2D and 3D mapping. The purpose of this research is to evaluate the capability of USB-16 in providing an accurate map in terms of the walls perimeter and its shape, where the robot is located. Each wall will be scanned with USB-16 sensor bank to measure the distance between the center of sensor bank and the wall. The Homogeneous Transformation Matrix (HTM) and trigonometrically algorithm is utilized in this research as a wall mapping algorithm and is clearly explained in this paper. An optimum wall mapping algorithm was introduced to minimize measurement error. The optimum wall mapping technique named a Nominal Wall Angle (NWA) using trigonometric approach was introduced to improve the mapping accuracy. This algorithm has the capability to improve the ultrasonic mapping accuracy during the scanning process and is different from data manipulation technique like most of similar researches currently adapted. The comparison of experimental results before and after implementation of the optimization technique in different wall shape (Curve, Square, Rectangle, Triangle and Laboratory environment) will be presented in this paper. The results are very impressive, where the implementation of NWA algorithm is able to produce an accurate wall mapping compared with the actual wall size. LabVIEW software, Basic Atom and BASIC Stamp microcontroller are fully utilized to produce the real time 2D and 3D graph during the USB-16 mapping.

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