



PROGRAM BOOK

International Conference on Electrical, Electronic, Communication and Control Engineering 2017

5-6 December 2017 UTM Kuala Lumpur

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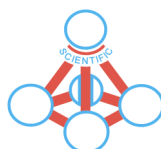
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Welcome to ICEECC 2017

First of all, I would like to express my heartiest congratulation to the organizing committee of this **2nd International Conference in Electrical Electronic Control and Communication 2017 or ICEECC 2017**, who has worked hard to organize and to ensure this conference will be a success. It is my pleasure and great honour indeed to welcome all the participants to this conference and to Universiti Teknologi Malaysia.

This conference represents an important part of our commitment to provide a platform for ICEECC members and participants to maintain an active networking and productive collaborative alliances in future. It is our hope, and I am sure it is yours as well, that this ICEECC 2017 will bring us opportunities to share and to start a good professional relationship and networking, as well as possible research collaboration amongst us and our institutions in the coming years. I also hope that this conference will continue to be held annually to ensure continuity in the endeavor for excellence for all the ICEECC participants, the sponsors and all the collaborators involved.

I am looking forward to see you and we will be delighted to have you at the conference, and I sincerely hope that you will find the conference both valuable and enjoyable.

Professor Dr Johari Halim Shah Osman Dean
Faculty of Electrical Engineering



Welcome to ICEECC 2017

On behalf of the organizing committee, it is my great pleasure to welcome all participants from around the globe to attend the 2017 International Conference on Electrical Electronics Communication and Control Engineering (ICEECC 2017). The conference are scheduled from December 05 to 06, 2017 at the Universiti Teknologi Malaysia Kuala Lumpur.

The main objective of this conference is to provide an international platform for researchers, engineers, academicians as well as industrial professionals from all over the world to share the findings from latest research and developments in Electrical Engineering subject area, which covers control and instrumentation, communication, electronics and power engineering. It is also hope that this conference would create diverse opportunities in networking as well as knowledge and ideas sharing for future collaborations. A total of 215 papers have been submitted to this conference. Only 170 papers are accepted for oral presentation after the reviewing process, which contribute to 79% acceptance rate.

I would also like to express my sincere thanks to our keynote speaker Dr. Mazlan Abbas, CEO of FAVORIOT Sdn Bhd, Prof. Dr. Tharek A. Rahman, Director of Wireless Communication Centre (WCC), Universiti Teknologi Malaysia, Dato Ir Dr Ali Askar Sher Mohamad, Managing Director, Sher Engineering & Consultancy Sdn. Bhd.(Ex COO SEDA Malaysia) Assoc. Prof Dr Gary Tan from School of Computing, National University of Singapore. Also thanks to the authors and attendees for their technical contributions to ICEECC 2017, the sponsors, the supporters, the exhibitors, the committee members and the secretariats of our conference. Finally, I wish you will completely enjoy the conference and your stay in Kuala Lumpur.

Professor Dr Mohamad Kamal A Rahim
General Chair
ICEECC 2017

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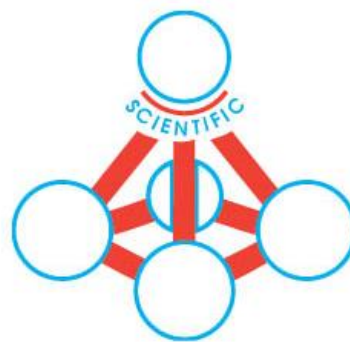
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Keynote Speakers

Keynote 1: Moving Up or Down the IoT Value Chain



Dr. Mazlan Abbas
CEO of FAVORIOT Sdn Bhd

Keynote 3: Renewable Energy- What next?



Dato Ir Dr Ali Askar Sher Mohamad
Managing Director
Sher Engineering & Consultancy Sdn Bhd
(Ex COO SEDA Malaysia)

Keynote 2: Journey Toward 5G



Prof. Dr. Tharek A. Rahman
Director of Wireless Communication
Centre (WCC)
Universiti Teknologi Malaysia



Assoc. Prof. Dr. Gary Tan
School of Computing
National University of Singapore

TENTATIVE PROGRAM

ICEECC 2017 PROGRAM AT A GLANCE					
Tuesday, 05 Disember 2017					
	Dewan Seminar, Anjung Razak, UTMKL				
0800 - 0900	Registration				
0900 - 0930	Welcoming Speech				
0930 - 1015	Keynote 1 <i>Moving Up or Down the IoT Value Chain</i> Speaker <i>Dr. Mazlan Abbas,</i> <i>FAVORIOT Sdn. Bhd., Malaysia</i>				
1015 - 1045	Morning Break				
1045 - 1130	Keynote 2 <i>Journey Toward 5G</i> Speaker <i>Prof. Dr. Tharek A. Rahman,</i> <i>Universiti Teknologi Malaysia, Malaysia</i>				
1130 - 1215	Keynote 3 <i>Renewable Energy</i> Speaker <i>Dato Ir Dr Ali Askar Sher Mohamad</i> <i>Managing Director</i> <i>Sher Engineering & Consultancy Sdn Bhd</i> <i>(Ex COO SEDA Malaysia)</i>				
1215 - 1300	Keynote 4 <i>Symbiotic Simulation –</i> <i>Running Real-time “What If?” Scenarios for Crisis</i> <i>Management</i> Speaker <i>Assoc. Prof. Dr. Gary Tan</i> <i>School of Computing</i> <i>National University of Singapore</i>				
1300 - 1400	Lunch				
	Room 1	Room 2	Room 3	Room 4	
1400 - 1540	CE 1	ECE 1	CME 1	EPE 1	
1540 - 1600	Afternoon Break				
1600 - 1740	CE 1	ECE 1	CME 1	EPE 1	

Wednesday, 06 December 2017

	Anjung Razak, UTMKL				
0800 - 0900	Registration				
	Room 1	Room 2	Room 3	Room 4	
0900 - 1040	CE 2	ECE 2	CME 2	EPE 2	
1040 - 1100	Morning Break				
1100 - 1240	CE 2	ECE 2	CME 2	EPE 2	
1240 - 1400	Lunch				
	Room 1	Room 2	Room 3	Room 4	Room 5
1400 - 1540	CE 3	ECE 3	CE 4	CE 5	ECE 4
1540 - 1600	Afternoon Break				
1600 - 1740	CE 3	ECE 3	CE 4	CE 5	ECE 4

Tuesday, December 5**Tuesday, December 5, 08:00 - 09:00****Registration**

Room: Dewan Seminar, Anjung Razak, UTMKL

Tuesday, December 5, 09:00 - 09:30**Welcoming Speech**

Room: Dewan Seminar, Anjung Razak, UTMKL

Tuesday, December 5, 09:30 - 10:15**Keynote 1**

Moving Up or Down the IoT Value of Chain

Dr. Mazlan Abbas (FAVORIOT Sdn Bhd. Malaysia)

Room: Dewan Seminar, Anjung Razak, UTMKL

Current service providers evolved from two “camps” – (i) Traditional telco (ii) OTT Players. Just like WiMAX, the industry has seen the IT sector enter the broadband service provider market. We saw the 4G battle between WiMAX and LTE. Finally, LTE won the 4G battle when WiMAX lost the two-year window of opportunity. There’s a similar “war” on-going to win the IOT network i.e. between LoRa, SigFox and NB-IOT. However, there’s no clear winner in this space yet. And we see again in the battle for the best IoT Service Provider – will it be from the incumbent telco or the ISP or ASP? Or probably new players such as Google, Apple or Samsung? IoT requires co-opetition rather than competition or cooperation alone. In many parts of the market, these companies compete, but depending on the adoption of the IoT market in that country, the companies sometimes need to cooperate in providing

a full end-to-end IoT solution. Look at the IoT value chain, in which area can we work together? Are we going to take the “wait-and-see” stand? What’s the best strategy – “build and it will come”? What’s the ROI for such deployment? What’s the best business model? Consumer or Enterprise customers? Private or Public Cloud? This Keynote will try to address these issues and probably help you in your IoT journey

Tuesday, December 5, 10:15 - 10:45

Morning Break

Tuesday, December 5, 10:45 - 11:30

Keynote 2

Journey Towards 5G

Prof. Dr. Tharek A. Rahman (University Teknologi Malaysia)

Room: Dewan Seminar, Anjung Razak, UTMKL

Over the past few decades, there has been significant progress made to mobile communication networks. The promise of LTE Advanced (4G) as next generation of mobile broadband offers huge potential to service providers, application developers and wireless consumers. Beyond LTE Advanced which also known as 5G will enable the long term Networked Society and realized the vision of unlimited to information and shared data available anywhere and anytime to anyone and anything. The presentation will cover the evolution of mobile communication towards 5G that will support mobile broadband, low latency and massive connected devices which enable to realize the Networked Society.

Tuesday, December 5, 11:30 - 12:15

Keynote 3

Renewable Energy

Dato. Ir. Dr. Ali Askar Sher Mohamad (Sher Engineering & Consultancy Sdn Bhd)

Room: Dewan Seminar, Anjung Razak, UTMKL

Review of achievements in Malaysia so far under different mechanisms including SREP, FiT and LSSS. The problems encountered under each mechanism and possible solutions. The way ahead for RE – forever to remain a fringe solution or possible to become mainstream? Distributed generation will lead the way

Tuesday, December 5, 12:15 - 13:00

Keynote 4

Symbiotic Simulation - Running Real Time "What If" Scenarios for Crisis Management.

Gary Tan (School of Computing (National University of Singapore)

Room: Dewan Seminar, Anjung Razak, UTMKL

Symbiotic simulation is a promising new technique for providing “What-If?” analysis of systems in real-time. This kind of decision-support tool is exactly what crisis management needs to enable a modern approach to managing crises through information superiority. Unfortunately, no tools at present focus

on integrating the decision-support aspect of crisis management with the hindsight and foresight studies that comprise its remaining parts. Here, we will present a conceptual overview of a “perennial” framework for crisis management. We will conclude with a summary of implementation case studies, such as for evacuation, and traffic management. This framework acknowledges cutting-edge simulation techniques such as virtual worlds, and provides an excellent way of creating crisis management simulations to maximum effect.

Tuesday, December 5, 13:00 - 14:00

Lunch Break

Tuesday, December 5, 14:00 - 15:40

CE 1

Communication Engineering 1

Room 1

14:00 Adaptive Interference Mitigation with User Grouping for Fast Transmission in Cellular Networks

Hadhrami Ab Ghani (Multimedia University, Malaysia); Azlan Abdul Aziz (Multimedia University, Melaka, Malaysia); Azizul Azizan (Universiti Teknologi Malaysia (UTM), Malaysia)

Designing uplink systems which group users with adaptive interference mitigation techniques is the objective of this research. Reduction in error rates and improvement in the energy efficiency is expected with this approach in addition to spectral efficiency. This paper reports a study on interference mitigation and transmission designs for groups of users in the uplinks. New formulations for the interference mitigation are produced based on the minimum mean square error and successive interference cancellation approach. By reducing the interference, the energy efficiency can be maintained and improved although the number of users per group increases. The measured error rates of this approach with user grouping achieve gains between one to two dB against that of the existing approach. With reduced complexity, the proposed scheme should be viable for practical deployment.

14:15 Channel Sharing Utility Function of Power Control Game in Cognitive Femtocell Network

Anggun Fitriani Isnawati (Gadjah Mada University (UGM) & Telkom School of Telematics (ST3 Telkom), Indonesia); Risanuri Hidayat (Gadjah Mada University (UGM), Indonesia); Selo Sulistyo (Gadjah Mada University, Indonesia); I Wayan Mustika (Universitas Gadjah Mada, Indonesia)

Shared use of channel simultaneously has become the trend in telecommunication technology particularly in network with distributed users as the allocation of frequency spectrum becomes more crowded. Proposed power control method in cognitive femtocell network is based on game theory (commonly known as power control game, PCG). This method uses utility function formula used as goal of game theory with power strategy in power update process. Utility function formula of Proposed PCG includes channel sharing factor that aimed to accommodate system requirement of channel sharing. The result showed that the implementation of channel sharing factor in utility function formula affected SINR, power, and user utility function, yet it did not have significant influence in rate convergence.

14:30 Handover Algorithm Based VLP Using Mobility Prediction Database for Vehicular Network

Arfah Ahmad Hasbollah and Sharifah Hafizah Syed Ariffin (Universiti Teknologi Malaysia, Malaysia); Nurzal Effiyana Ghazali (Universiti Teknologi Malaysia & Universiti Teknologi Malaysia, Malaysia); Kamaludin Mohamad Yusof (Universiti Teknologi Malaysia, Malaysia); Hiroaki Morino (Shibaura Institute of Technology, Japan)

This paper proposes an improved handover algorithm method for vehicle location prediction (VLP-HA) using mobility prediction database. The main advantage of this method is the mobility prediction database is based on real traffic data traces. Furthermore, the proposed method has the ability to reduce handover decision time and solve resource allocation problem. The algorithm is simple and can be computed very rapidly; thus, its implementation for a high-speed vehicle is possible. To evaluate the effectiveness of the proposed method, QualNet simulation is carried out under different velocity scenarios. Its performance is compared with conventional handover method. The superiority of the proposed method over conventional handover method in deciding the best handover location and choosing candidate access points is highlighted by simulation. It was found that VLP-HA has clearly reduced handover delay by 30% compared to handover without VLP, give high accuracy, hence low complexity algorithm.

14:45 Web Based Water Turbidity Monitoring and Automated Filtration System: IoT Application in Water Management

Siti Noorjannah Ibrahim (International Islamic University Malaysia & International Islamic University Malaysia, Malaysia); Ani Liza Asnawi, Noreha Abdul Malik, Nor Fadhilah Mohamed Azmin, Farah Nadia Mohd Isa and Ahmad Jusoh (International Islamic University Malaysia, Malaysia)

Water supplied to residential areas is prone to contaminants due to pipe residues and silt, and therefore resulted in cloudiness, unfavorable taste, and odor in water. Turbidity, a measure of water cloudiness, is one of the important factors for assessing water quality. This paper proposes a low-cost turbidity system based on a light detection unit to measure the cloudiness in water. The automated system uses Intel Galileo 2 as the microprocessor and a server for a web-based monitoring system. The turbidity detection unit consists of a Light Dependent Resistor (LDR) and a Light Emitting Diode (LED) inside a polyvinyl chloride (PVC) pipe. Turbidity readings were recorded for two different positionings; 90° and 180° between the detector (LDR) and the incident light (LED). Once the turbidity level reached a threshold level, the system will trigger the filtration process to clean the water. The voltage output captured from the designed system versus total suspended solid (TSS) in sample water is graphed and analyzed in two different conditions; in total darkness and in the present of ambient light. This paper also discusses and compares the results from the above-mentioned conditions when the system is submerged in still and flowing water. It was found that the trends of the plotted graphs decline when the total suspended solid increased for both 90° and 180° detector turbidimeter in all conditions which imitate the trends of a commercial turbidimeter. By taking the consideration of the above findings, the design can be recommended for a low-cost real-time web-based monitoring system of the water quality in an IOT environment.

15:00 Exploiting 2-Dimensional Source Correlation in Channel Decoding with Parameter Estimation

Muhammad Izzat Amir Mohd Nor, Mohd Azri Mohd Izhar, Norulhusna Ahmad and Hazilah Mad Kaidi (Universiti Teknologi Malaysia, Malaysia)

Traditionally, it is assumed that the source coding is perfect and therefore, the redundancy of the source encoded bit-stream is zero. However, in reality, this is not the case as the existing source

encoders are imperfect and yield residual redundancy at the output. The residual redundancy can be exploited by using Joint Source Channel Coding (JSCC) based on Markov chain in the source. In several studies, the statistical knowledges of the sources has been assumed to be perfectly available at the receiver. Although the result is better in term of BER performance, but practically, the source statistics are not always available at the receiver and thus it could affect the reliability of the outcome. The source correlation on all rows and columns of the 2D sources are well exploited by using a modified Bahl-Cocke-Jelinek-Raviv (BCJR) algorithm for the channel coding. In addition, a parameter estimation technique is used with the decoder to estimate the source correlation statistics. Hence, this research aims to investigate the parameter estimation for 2D JSCC which reflects a practical scenario where the source statistics are not always available. We compare the performance of the proposed joint decoding and estimation technique with the ideal 2D JSCC system with perfect knowledge of the source statistics. Simulation results reveal that our proposed coding scheme performs very close to the ideal system although with unknown correlation parameter.

15:15 An Early Drowning Detection System for Internet of Things (IoT) Applications

Muhammad Ramdhan Mohd Suhaili, Kamaludin Mohd Yusoff and Samura Ali (Universiti Teknologi Malaysia, Malaysia); Nurzal Effiyana Ghazali (Universiti Teknologi Malaysia & Universiti Teknologi Malaysia, Malaysia); Muhammad Ali (Universiti Teknologi Malaysia, Malaysia)

Drowning is the leading cause of injury or even death for children and young adults. Designing a drowning detection device by implementing an Internet of Thing (IoT) is needed. An Early Drowning Detection System (EDDS) is a system that gives an alarm to the parents and lifeguard if the detector triggered an abnormal heartbeat and the victims are submerged under the water for a long time. A microcontroller was used to control the signal received from a pulse sensor (for detecting heartbeat) and time for the signal lost under the water before it is transmitted to the access point. Access point acts as a data forwarding to the database via an internet connection. UART 433MHz RF-Transceiver has been used to create the wireless communication between drowning detection device and monitoring hub. A triggered warning signal will be transmitted to the parent and lifeguard via mobile apps and also monitoring web page.

ECE 1

Electronic and Computer Engineering 1

Room 2

14:00 Finite Element Simulation of Microfluidic Biochip for High Throughput Hydrodynamic Single Cell Trapping

Mohd Ariffanan Mohd Basri, Amelia Ahmad Khalili and Mohd Azhar Abdul Razak (Universiti Teknologi Malaysia, Malaysia)

In this paper, a microfluidic device capable of trapping a single cell in a high throughput manner and at high trapping efficiency is designed simply through a concept of hydrodynamic manipulation. The microfluidic device is designed with a series of trap and bypass microchannel structures for trapping individual cells without the need for microwell, robotic equipment, external electric force or surface modification. In order to investigate the single cell trapping efficiency, a finite element model of the proposed design has been developed using ABAQUS-FEA software. Based on the simulation, the geometrical parameters and fluid velocity which affect the single cell trapping are extensively optimized. After optimization of the trap and bypass microchannel structures via simulations, a single cell can be trapped at a desired location efficiently.

14:15 A Flexible Optical Sensor for Microalbuminuria Spectroscopy

Suhaila Isahak, Yusmeerah Yusof, Khairunnisa Mohd Yusof and Khoo Ming Kwan (Universiti Teknologi Malaysia, Malaysia)

A flexible optical sensor unit was developed for the detection of albumin level in human urine. It consists of polydimethylsiloxane thinfilm with the microscopic glass as the substrate. A gradual increase of albumin level may indicate signs of health problem such as diabetes, hypertension, and endothelial dysfunction. The experimental results showed a spectral shift and increase in intensity of light with sodium urate at different concentration as a substitute of urine sample. The transmittance and reflection of PDMS was determined in the 400-1400 nm wavelength range using halogen-detrium as the excitation light source to predict the sensor sensitivity based on the Beer-Lambert law. The results exhibited that the light intensity increases as the concentration of the sodium urate increases. This performance of prototype sensor ignites an alternative for albumin detection using flexible structure

14:30 Full Bridge Resonant Inverter for Blade Induction Heating Application

J Haema (KMUTNB, Thailand)

This paper presents blade induction heating application using full bridge resonant inverter including six parts: step-down transformer, full wave bridge rectifier, Pulse Width Modulation PWM signal, full-bridge Inverter by using power MOSFET, high frequency transformer, and workpiece. The workpiece is 2.5-cm width and 15-cm length with 6-turns coil. The result shows that the blade is heated for 60 seconds with the temperature not less than 657.2 °C. The output power of heating is generated appropriately 1.10 kW, at full load

14:45 IoT: Electrocardiogram (ECG) Monitoring System

Kristine Joyce P Ortiz, John Peter Davalos, Elora S Eusebio and Dominic Tucay (Malayan Colleges Laguna, Philippines)

Internet of Things (IoT) has many applications in the medical field. With remote-information gathering, healthcare professionals can evaluate, diagnose and treat patients in remote locations using telecommunications technology. This study aimed to develop a small-scale electrocardiogram (ECG) monitoring device that will measure heart rates and waveforms and send the data in a database and a web server. An ECG acquisition device is developed using a single-lead heart rate monitor sensor and an Arduino microcontroller. A program which will process, analyze and upload the ECG data is coded using MATLAB and C# programs. The collected information is viewed in a Graphical User Interface (GUI) display, coded using C# and in a webpage. Rapid Application Technology (RAD) is used in the methodology, which began with a quick design of the system. The hardware and software systems underwent a prototyping cycle for development. Once finished, integration of the system is conducted to construct a complete IoT based ECG monitoring system. For testing using t-test, a sample size of 18 and a $\alpha = 0.05$ is used. Testing resulted into t-test values that lie in the non-critical zone for all ECG parameters, denoting that there is no significant difference between the gathered data. The device's percent reliability in detecting ECG conditions such as normal sinus rhythm, sinus tachycardia, sinus bradycardia and flatline, is 83.33%. The percent difference for the heart rate is 0.35 %, which falls within the acceptable medical standard of 99% accuracy. The device was deemed functional and reliable.

15:00 Determining Best Window Size for an Improved Gabor Transform in EMG Signal Analysis

Ezreen Farina Shair (Universiti Teknikal Malaysia Melaka, Malaysia); Siti Anom Ahmad (Universiti Putra Malaysia, Malaysia); Abdul Rahim Abdullah (Universiti Teknikal Malaysia Melaka, Malaysia); Mohammad Hamiruce Marhaban and Shamsul Bahri Mohd Tamrin (Universiti Putra Malaysia, Malaysia)

Electromyography is a standout amongst the most regularly utilized tools to study human muscle condition. But due to the intricate attributes of the EMG itself, time-frequency distributions such as Gabor transform and spectrogram are more preferred than the simpler time distribution and frequency distribution. These techniques have been broadly utilized as it can provide both time and frequency information. However, both techniques have a fix window size for all frequency values, thus there exist a problem of determination of the window size, where excessively limit window and too wide window, will result in poor frequency resolution and time resolution, respectively. Along these lines, the point of this study is to choose the best window size so as to be utilized with Gabor transform to screen human muscle activity during core-lifting task. Four electrodes were placed on the right and left biceps brachii, and left and right erector spinae. In this study, the results of five acceptable window sizes (300, 400, 430, 450 and 520) were shown, despite the fact that other window sizes were also tested. Three criteria have been considered during the determination of the best window size, which are good time resolution, good frequency resolution, and high accuracy. Results demonstrate that window size of 450 is the best compared to others. As an additional analysis, the result is compared to a spectrogram and it can be seen that Gabor transform is better as it has the flexibility in choosing the window size, thus affects the resolution and accuracy.

15:15 Low Power CMOS Electrocardiogram Amplifier Design for Wearable Cardiac Screening

Yusmeeraz Yusof (Universiti Teknologi Malaysia, Malaysia)

The trend of health care screening devices in the world is increasingly towards the favor of portability and wearability. This is because these wearable screening devices are not restricting the patient's freedom and daily activities. While the demand of low power and low cost biomedical system on chip is increasing in exponential way, the front-end electrocardiogram (ECG) amplifiers are still suffering from flicker noise for low frequency cardiac signal acquisition, 50 Hz power line electromagnetic interference, and the large unstable input offsets due to the electrode-skin interface is not attached properly. In this paper, a CMOS based ECG amplifier that suitable for low power wearable cardiac screening is proposed. The amplifier adopts the highly stable folded cascode topology and later being implemented into RC feedback circuit for low frequency DC offset cancellation. By using 0.13 μm CMOS technology from Silterra, the simulation results show that this front-end circuit can achieve a very low input referred noise of 1 pV/Hz^{1/2} and high common mode rejection ratio of 174.05 dB. It also gives voltage gain of 75.45 dB with good power supply rejection ratio of 92.12 dB. The total power consumption is only 3 μW and thus suitable to be implemented with further signal processing and classification back end for low power wearable biomedical device.

CME 1

Control and Mechatronic Engineering 1

Room 3

14:00 A Study on PHERB Powertrain Modeling and Analysis

Salisa Abdul Rahman and Siti Norbakyah Jabar (Universiti Malaysia Terengganu, Malaysia)

A study on plug-in hybrid electric recreational boat (PHERB) powertrain with a special energy management strategy modeling and analysis was presented in this paper. Firstly, the boat components are sized to meet the expected power and energy requirements through a power flow analysis. Then, the model is tested numerically in the MATLAB/SIMULINK environment using the existing driving cycle. The accuracy of the model is verified by a comparison of the component between the simulation results from PHERB and advanced vehicle simulator (ADVISOR) software. The simulation results of component, fuel economy and emission of PHERB and hybrid electric vehicle models in ADVISOR are compared.

14:15 Implementation of Controllers in Minimizing the Structural Building Vibration

Normaisharah Mamat (Universiti Teknologi Malaysia, Malaysia); Fitri Yakub (Universiti Teknologi Malaysia & Malaysia-Japan International Institute of Technology, Malaysia); Sheikh Ahmad Zaki Shaikh Salim (Universiti Teknologi Malaysia, Malaysia); Mohamed Sukri Mat Ali (Universiti Teknologi Malaysia & Malaysia-Japan International Institute of Technology, Malaysia)

This paper presents the modelling and simulation of controllers for controlling the position of two degree of freedom (2 DOF) mass spring damper system. Proportional integral (PI), fuzzy logic (FL) and sliding mode controller (SMC) are design to minimize the vibration of the system that represent as building structure towards earthquake. A structural building is simulate based on real earthquake occur in El Centro on May 1940. The algorithm for building structure, actuator and controller is derived. Matlab/Simulink is used to analyze the performance of controllers towards the vibration building structure. At the end of the study the time response for two story building for uncontrolled and controlled system is present. Besides, the result for limitation voltage for each controller is also analyse to determine the maximum voltage consume for the system. The simulation results show the comparison of the controllers' performance in suppressing the building vibration. From performance analysis, SMC provides better performance compared to PI and FL controller based on structural vibration reduction.

14:30 Data-Driven Impedance Matching in Multilateral Teleoperation Systems

Mohd Syakirin Ramli (Universiti Malaysia Pahang, Malaysia); Hamzah Ahmad (University Malaysia Pahang, Malaysia)

This paper describes a tuning approach to improve transparency between master and slave manipulators in a multilateral teleoperation system. The slave manipulators comprised of multi-agents of simple mass are converted into a bilateral system through the passive decomposition technique. There are two main operations being considered, namely; grasping and handling. The object grasping is achieved through consensus control. For handling, an equalizer constructed by a Laguerre function connected in-feedback-loop to the master manipulator is chosen and tuned to achieve impedance matching between both sides of teleoperation. Fictitious Reference Iterative Tuning (FRIT) is adopted to properly tune the selected equalizer. The result shows that by introducing an optimally tuned equalizer improves the overall impedance matching and transparency between

the single master and multi-slave manipulators. Finally, the effectiveness of the proposed tuning algorithm is presented through a numerical example.

14:45 *Modelling and Parameters Identification of a Quadrotor Using a Custom Test Rig*

Mohammad Shafiq Mohammad Ashraf (Universiti Teknologi Malaysia, Malaysia); Mohamad Shukri Zainal Abidin (University of Technology Malaysia, Malaysia); Mohd Saiful Azimi Mahmud, Muhammad Khairie Idham Abd Rahman and Zakarya Mohammed Naser Saleh Motea (Universiti Teknologi Malaysia, Malaysia)

Quadrotor by nature is a very unstable system and flying it without any feedback control algorithm is deemed impossible. However, before designing the control system, system identification need to be conducted as the accuracy of the control system depends highly on the accuracy of the model. Therefore, this paper explained the design of the quadrotor model with an "X" configuration using the Euler-Newton model. Two types of test rig were designed to measure the thrust coefficient, torque coefficient and throttle command relation parameter needed in the model. Other parameter such as moment of inertia was also being measured by separating the quad rotor model into several sections: Motors, Electronics Speed Controllers (ESC) and Central Hub. All parameters needed in the designed quad rotor model has been successfully identified by measuring the parameters using the custom-built quad rotor and test rigs. The parameters found in this paper will be used in designing the control system for the quadrotor.

15:00 *Internet of Things Based Smart Environmental Monitoring for Mushroom Cultivation*

Mohd Saiful Azimi Mahmud, Salinda Buyamin and Musa Mohd Mokji (Universiti Teknologi Malaysia, Malaysia); Mohamad Shukri Zainal Abidin (Universiti Teknologi Malaysia)

Environmental condition is a significant factor that needs to be controlled in mushroom production. Mushrooms are unable to grow if the temperature is higher than 33°C or lower than 25°C. Thus, this work focuses on developing an automatic environmental control system to provide optimum condition to mushroom production house. Environmental factors considered in the system are temperature, humidity and carbon dioxide. For this, DHT11 temperature humidity sensor and MQ135 CO₂ sensor are connected to the ESP8266 Wi-Fi module to become IoT (Internet of Things) sensors that send big amount of data to the internet for monitoring and assessment. This enable users to monitor the environmental condition anywhere whenever accessing the internet. Based on the analysis of the data, the system will automatically on and off the irrigation system to put the temperature at an optimum level.

15:15 *Enhanced Fertigation Control System Towards Higher Water Saving Irrigation*

Muhammad Khairie Idham Abd Rahman (Universiti Teknologi Malaysia, Malaysia); Mohamad Shukri Zainal Abidin (University of Technology Malaysia, Malaysia); Salinda Buyamin and Mohd Saiful Azimi Mahmud (Universiti Teknologi Malaysia, Malaysia)

Water saving in agriculture is increasingly important due to critical issues of water and climatic crisis. The focus of agricultural researches nowadays is to minimize the water consumption and at the same time increasing the agricultural yield. This paper presents the three-types of automatic fertigation controller for irrigation system with different application tools. A weather station, soil moisture and timer based system were used to determine the volume of water supply needed by plants to calculate an accurate irrigation operation timing. The experiment was conducted by supplying water for capsicum annum test crop located in a greenhouse. The plant water demand parameter was

calculated and compared for each application tools and the best application tool was chosen to be implemented in controlling the irrigation system.

EPE 1

Electric Power Engineering 1

Room 4

14:00 A Preliminary Study on Optimizing the In-Lab Reclamation Process Parameters of Used Transformer Oils Using the Taguchi Method

Sharin Ab Ghani (Universiti Teknikal Malaysia Melaka, Malaysia); Zulkarnain Ahmad Noorden (Institute of High Voltage and High Current (IVAT) & Universiti Teknologi Malaysia, Malaysia); Nor Asiah Muhamad (Universiti Sains Malaysia, Malaysia); Imran Sutan Chairul and Muhammad Asyraf Mohd Khalid (Universiti Teknikal Malaysia Melaka, Malaysia)

In this study, the Taguchi method is used to optimize the in-lab reclamation process parameters of used transformer oils. The main benefit of this method is that one can determine the optimum parameters of the reclamation process in a simple, efficient, and cost-effective manner. The L4 (23) Taguchi design is used to optimize the following process parameters: (1) weight of the Fuller's Earth adsorbent, (2) stirring speed, and (3) oil temperature. These parameters are optimized in order to minimize the AC breakdown voltage, total acid number, and dynamic viscosity of the reclaimed transformer oil samples. The signal-to-noise ratios are determined for each process parameter in order to identify the significance of each factor on the three output responses. Based on the results, the oil temperature has the most significant effect on the AC breakdown voltage whereas the weight of the Fuller's Earth adsorbent has the most significant effect on the total acid number and dynamic viscosity of the reclaimed transformer oils. Tests are carried out to verify the results using the optimum reclamation process parameters and indeed, it is found that there is significant improvement in the mean AC breakdown voltage, total acid number, and dynamic viscosity for the reclaimed transformer oil compared with those for the used transformer oil. It is believed that this method can be an indispensable tool to determine the optimum parameters for the reclamation process without going through the hassle of trial and error associated with conventional experimentation.

14:15 A Review on the Reclamation Technologies for Service-Aged Transformer Insulating Oils

Sharin Ab Ghani (Universiti Teknikal Malaysia Melaka, Malaysia); Zulkarnain Ahmad Noorden (Institute of High Voltage and High Current (IVAT) & Universiti Teknologi Malaysia, Malaysia); Nor Asiah Muhamad (Universiti Sains Malaysia, Malaysia); Hidayat Zainuddin (Universiti Teknikal Malaysia Melaka, Malaysia); Mohd Aizam Talib (TNB Research, Malaysia)

Power transformers are the backbone of electricity transmission and distribution systems throughout the world. The price of power transformers is exorbitant (costing millions of dollars per unit) and therefore, frequent maintenance is necessary to ensure that these systems are highly reliable during their operation. The service life of mineral insulating oils is typically 30 to 40 years for power transformer applications. However, all insulating oils (regardless of their type) are subjected to thermal, electrical and chemical degradation, which will deteriorate the oil-paper insulating system and consequently reduce the capability of the oil as an electrical insulator. For these reasons, service-aged insulating oils are treated by two types of processes (i.e. reclamation and reconditioning) in order to prolong the service life of these oils. Reclamation (regeneration) is used to treat insulating oils with high levels of acidity and sludge. In this paper, a brief review on the reclamation technologies used to treat service-aged insulating oils is presented, covering various aspects such as the standard test

methods that need to be complied with, the types of adsorbents used to reduce acidity and sludge of the used insulating oils, as well as the findings of several key studies related to the evaluation of the effectiveness of the reclamation process. This review will indeed benefit researchers and practitioners in this field since it provides an overall picture of the recent progress in reclamation technologies for service-aged transformer insulating oils.

14:30 Finite Element Analysis of Maximum Electric Field for Air Breakdown Under Various Electrode Configurations

Nur Farhani Ambo and Hidayat Zainuddin (Universiti Teknikal Malaysia Melaka, Malaysia); Muhammad Saufi Kamarudin (Universiti Tun Hussein Onn Malaysia, Malaysia); Jamaludin Mohd Wari (Indkom Engineering Sdn. Bhd, Malaysia); Ayuamira Zahari (Universiti Teknikal Malaysia Melaka, Malaysia)

This paper describes the electric field behavior of air breakdown under various electrode configurations and gap length. By using COMSOL Multiphysics, a Finite Element Method (FEM) software, the values of maximum electric field can be determined based on the air breakdown voltage data obtained from the experiment under AC stress. The results show that R0.5-plane configuration provides a very high electric field upon breakdown, compared to R6-plane, R48-plane and plane-plane configurations. In addition, the comparison between the analytical and simulation results of maximum electrical field gives almost identical results for each electrode configuration except for R6-plane.

14:45 Development of Test Vessel for Gas Insulation Breakdown Test

Ayuamira Zahari and Hidayat Zainuddin (Universiti Teknikal Malaysia Melaka, Malaysia); Jamaludin Mohd Wari (Indkom Engineering Sdn. Bhd, Malaysia); Muhammad Saufi Kamarudin (Universiti Tun Hussein Onn Malaysia, Malaysia); Nur Farhani Ambo and Imran Sutan Chairul (Universiti Teknikal Malaysia Melaka, Malaysia)

This paper discusses a new test vessel developed to investigate the breakdown test performance of gas insulation. The test vessel is equipped with certain specialty including pressure chamber and control measures. The test vessel is able to endure a pressure up to 5 bar (absolute pressure). Through help from a steering, it is provide of controlling the gap length of the electrodes without the need of removing the gas. Other control measures include humidity, temperature, and pressure readings. The humidity and temperature are read wirelessly and from the readings, the necessary atmospheric corrections can be made according to standards. The developed vessel is then tested with AC breakdown test using air with various gap lengths and various electrode configurations. There are two types of electrode configuration used in this project i.e., rod (R0.5)-plane configuration and plane-plane.

15:00 The Impacts of Photovoltaic Distributed Generation (PVDG) on Distribution Power System Network

Norhafidzah Mohd Saad, Muhamad Zahim Sujod, Mohammad Fadhil Abas and Shawal Shawal (Universiti Malaysia Pahang, Malaysia); Ruhaizad Ishak (Universiti Malaysia Pahang & Universiti Kebangsaan Malaysia, Malaysia)

As the rapid development of photovoltaic (PV) technology in recent years with the growth of electricity demand, integration of photovoltaic distributed generation (PVDG) to the distribution system is emerging to fulfil the demand. There are benefits and drawbacks to the distribution system due to the penetration of PVDG. This paper discussed and analysed the interconnection of PVDG units with distribution power systems. The medium voltage distribution network is connected to the grid with

the load being supplied by PVDG. Load flow and short circuit calculation are analysed by using DigSILENT Power Factory Software. Comparisons have been made between the typical distribution system and the distribution system with the penetration of PVDG. Impacts in which PVDG integrates with distribution system are investigated and analysed with the results given from the load flow and short circuit analysis. The results indicate positive impacts on the system interconnected with PVDG such as improving voltage profile, reducing power losses, releasing transmission and distribution grid capacity. It also shows that optimal locations and sizes of DGs are needed to minimize the system's power losses. On the other hand, it shows that PVDG interconnection to the system can cause reverse power flow and increases short circuit level.

15:15 *Characteristic and Surge Impedance Variation Impact on Transmission Line Performance*

Muhyaddin Rawa (King Abdulaziz University, Saudi Arabia)

Modeling of power systems is essential to perform various network analyses. Voltage regulation, line losses and transmission line efficiency are greatly affected by transmission line parameters. Hence, accurate modeling of transmission line is required. The aim of this paper is to study the impact of characteristic and surge impedances on voltage profile, voltage regulation and Transmission line efficiency

15:30 *Kalman Filter Estimation of Impedance Parameters for Medium Transmission Line*

Siti Nor Aishah Mohd Amin (UMP, Malaysia); Hamzah Ahmad (University Malaysia Pahang, Malaysia); Mohd Rusllim Mohamed (Universiti Malaysia Pahang, Malaysia); Mohd Mawardi Saari and Omar Aliman (UMP, Malaysia)

Accurate knowledge of impedance parameters in transmission line helps to improve the performance of a system. Nowadays, the estimation of impedance parameters in transmission line has become possible with the availability of computational method. So, the main intention of this paper to develop Kalman filter model by using Matlab simulink in order to estimate the accurate values of resistance (R), reactance (X), and susceptance (B). The accuracy of the parameters can be improved by reducing the unknown errors in the system by using Kalman filter. To demonstrate the effectiveness of the new method, a case study of simulated transmission line is presented and comparison between Kalman filter and the previous proposed method is considered.

Tuesday, December 5, 15:40 - 16:00

Afternoon Break

Tuesday, December 5, 16:00 - 17:40

CE1

Communication Engineering 1 (continue)

Room 1

16:00 *Analysis of Vehicular Congestion Scenario in Kuala Lumpur Using Open Traffic Platform*

Muhammad Ali, Kamaludin Mohamad Yusof and Muhammad Ramdhan Mohd Suhaili (Universiti Teknologi Malaysia, Malaysia)

— Traffic congestion on the roads is mainly the result of overcrowding and this phenomena happens when a great number of vehicles storm the road, resulting in the disruption of the smooth traffic flow.

This greatly affects the daily routines of the people. Not to mention the time that is wasted while a person feels stranded in such situation and it results in the loss of productivity, also deteriorates the societal behavior to a certain extent and have adverse effects on the economy. The natural calamities add to the miseries. It becomes very difficult to manage the traffic flow in situations when there are flash floods or other accidents. Therefore the trend of the traffic seems very unpredictable. The real-time information and the past data are deemed as the significant inputs for the predictive analysis. Modern day researchers perform the predictive analysis using the simulations as it does not seem to have any accurate and exact predictive model, mainly because of the higher complexity and the perplexing situation the researchers face while performing the analysis. Open Traffic seems to be a viable option, as it is an open source and can be linked with the Open Street. This research targets to study and understand the Open Traffic platform. In this regard the real-time traffic flow pattern in Kuala Lumpur area was successfully been extracted and the analysis was performed using Open Traffic. It was observed and deduced from the results that Kuala Lumpur faces congestion on every major avenue, junction or intersection it mostly owes to the offices and the economic and commercial centers during the peak hours. Some avenues experience the congestion problem due to the tourism.

16:15 Backtracking Search Optimization Algorithm for Collaborative Beamforming in Wireless Sensor Networks

Nik Noordini Nik Abd Malik (Universiti Teknologi Malaysia, Malaysia); Lhassane Idoumghar (University of Haute Alsace, France); Nurul Mu'azzah Abdul Latiff, Noor Nabila Ahmad Nazri and Samura Ali (Universiti Teknologi Malaysia, Malaysia)

Due to energy limitation and constraint in communication capabilities, the undesirable high battery power consumption has become one of the major issues in wireless sensor network (WSN). Therefore, a collaborative beamforming (CB) method is introduced with the aim to improve the radiation beampattern in order to compensate the power consumption. A CB is a technique which can increase the sensor node gain and performance by aiming at the desired objectives through intelligent capabilities. The sensor nodes are located randomly in WSN environment. The nodes are designed to cooperate among each other and act as a collaborative antenna array. The configuration of the collaborative nodes is modeled in circular array formation. The position of array nodes is determined by obtaining the optimum parameters pertaining to the antenna array which implemented by using Backtracking Search Optimization Algorithm (BSA). The parameter considered in the project is the side-lobe level minimization. It is observed that, the suppression of side-lobe level for BSA is better compared to the radiation beampattern obtained for conventional uniform circular array.

16:30 POSITIONING OF A WIRELESS RELAY NODE FOR USEFUL COOPERATIVE COMMUNICATION

Tariq Amjad and Elsheikh M A Elsheikh (International Islamic University Malaysia, Malaysia)

Given the exorbitant amount of data transmitted and the increasing demand for data connectivity in the 21st century, it has become imperative to search for pro-active and sustainable solutions to the effectively alleviate the overwhelming burden imposed on wireless networks. In this study a Decode and Forward cooperative relay channel will be analyzed, with the employment of Maximal Ratio Combining at the destination node as the method of offering diversity combining. The system framework used is based on a three-node relay channel with a source node, relay node and a destination node. A model for the wireless communications channel is formulated in order for simulation to be carried out. Firstly, an AWGN channel will be used before the effect of Rayleigh fading will be taken into consideration.

16:45 Evaluation of MAC's Distributed Queuing Algorithm for Internet of Things Applications

Mabruka Agel (Interanational Islamic University Malaysia, Malaysia); Mohamed Hadi Habaebi (International Islamic University Malaysia (IIUM), Malaysia); Sameha Alnahdi (Interanational Islamic University Malaysia, Malaysia); Md Rafiquil Islam (International Islamic University Malaysia, Malaysia)

Internet of Things and Machine-to-Machine communications have contributed significantly on our daily life. Nevertheless, from the networking aspect they introduced a huge challenge for the performance and quality of services of networks. In this paper, a Distributed Queuing Access for LTE protocol was analysed to enhance the random access performance for Machine to machine (M2M) applications. The M2M communications presented countless solicitations that can over-burden the access channel of the present LTE network. This prompts to an expansion in the collision probability and results in a noteworthy access delay. The introduced protocol does improve the performance of Medium access layer in terms of blocking probability, access delay, energy utilization and number of re-transmissions attempts in comparison with the standard LTE protocol without altering the existing LTE outline structure. The new protocol is intended to ensure that the random access procedure of the ordinary UE gadget will not be affected bringing about consistent implementation for the proposed convention.

17:00 PAPR Reduction Techniques in Generalized Inverse Discrete Fourier Transform Non-Orthogonal Frequency Division Multiplexing System

Iram Maisarah Mokhtar, Norulhusna Ahmad, Hazilah Mad Kaidi and Mohd Azri Mohd Izhar (Universiti Teknologi Malaysia, Malaysia); Norliza Mohamed (Universiti Teknologi Malaysia & Razak School of Engineering and Advanced Technology, Malaysia)

A promising system of Generalized Inverse Discrete Fourier Transform Non-Orthogonal Frequency Division Multiplexing (GIDFT n-OFDM) system can fulfil the requirement of supporting higher data rate in Fifth Generation (5G) technology. However, this system experience High Peak to Average Power Ratio (PAPR) due to massive number of subcarriers signal is transmitted. In this paper, three types of usual PAPR reduction techniques are applied in GIDFT n-OFDM system which are Clipping, Partial transmit Transform (PTT) and Selective Mapping (SLM). The system performance is compared and evaluated using Complementary Cumulative Distribution Function (CCDF) plot. Simulation results show that SLM technique give significant reduction of PAPR 9 dB of the original performance.

17:15 Lesson Learned from the Quality of Experience (QoE) Assesment of 4G Mobile Technology in Indonesia

Muhammad Suryanegara (Universitas Indonesia, Indonesia); Fery Andriyanto (Ministry of Communications and Information Technology, Indonesia); Ajib S. Arifin (Universitas Indonesia, Indonesia)

The purpose of this research is to assess the Quality of Experience (QoE) of 4G mobile technology which is enrolled in the Indonesian market. We analyzed the results and discuss the lesson learned for the stake holder of telecommunications industry. Primary data is obtained by conducting a market survey on May 2017, with a confidence level of 95%, representing the 4G subscriber in the Indonesia market. There are three main subjective aspects of QoE assessment, i.e. service quality, data speed and network quality (indicated by stability of signal). The analyses were conducted based on ACR-HR score, comparing users' experience between 4G subscription and their previous 3G subscriptions. It is found that, in general, the Indonesian market has perceived 4G offers a better experience than 3G.

However, one of the important lessons is that network operators should provide a more stable signal as the market has given a lower score on such aspect.

ECE 1

Electronic and Computer Engineering 1 (continue)

Room 2

16:00 Fusion of Random Projection, Multi-Resolution Features and Distance Weighted K Nearest Neighbor for Masses Detection in Mammographic Images

Viet Dung Nguyen (Hanoi University of Science and Technology, Vietnam); Thai Ha Nguyen (HUST, Vietnam); Le Dong (Chonnam University, Vietnam)

In this paper, we present a novel method for masses detection in mammograms from public Mini-MIAS database. To describe masses, multi-resolution features are utilized. In feature extraction step, we calculate multi-resolution block difference inverse probability (BDIP) features and multi-resolution basic features. Once the descriptors are extracted, we use random projection and distance weighted K Nearest Neighbor (KNN) to classify the detected masses. The result is quite sanguine with sensitivity (SE), false positive reduction and time for carrying out the algorithm

16:15 Power Estimation for Wearable Piezoelectric Energy Harvester

Muhammad Zulhilmi Mohd Zain, Noor Hazrin Hany Mohamad Hanif, Mas Ehsan Rohaimi and Huda Azam (International Islamic University Malaysia, Malaysia)

The aim of this research work is to estimate the amount of electricity produced to power up wearable devices using a piezoelectric actuator, as an alternative to external power supply. A prototype of the device has been designed to continuously rotate a piezoelectric actuator mounted on a cantilever beam. A MATLAB® simulation was done to predict the amount of power harvested from human kinetic energy. Further simulation was conducted using COMSOL Multiphysics® to model a cantilever beam with piezoelectric layer. With the base excitation and the presence of tip mass at the beam, the natural frequencies and mode shapes have been analyzed to improve the amount of energy harvested. In this work, it was estimated that a maximum amount of power that could be generated is 250 μW with up to 5.5V DC output. The outcome from this research works will aid in optimising the design of the energy harvester. This research work provides optimistic possibility in harvesting sufficient energy required for wearable devices. Keyword

16:30 Real-Time Video Processing Using Contour Numbers and Angles for Non-urban Road Marker Classification

Zamani Md Sani (Universiti Teknikal Malaysia Melaka, Malaysia); Hadhrami Ab Ghani and Rosli Besar (Multimedia University, Malaysia); Loi Wei Sen (Universiti Teknikal Malaysia Melaka, Malaysia); Azizul Azizan (Universiti Teknologi Malaysia (UTM), Malaysia)

Road users make vital decisions to safely maneuver their vehicles based on the road markers, which need to be correctly classified. The road markers classification is significantly important especially for the autonomous car technology. The current problems of extensive processing time and relatively lower average accuracy when classifying up to five types of road markers are addressed in this paper. Two novel real time video processing methods are proposed by extracting two formulated features namely the contour number, $N_C(t)$ and angle, θ to classify the road markers. Initially, the camera position is calibrated to obtain the best Field of View (FOV) for identifying a customized Region of

Interest (ROI). An adaptive smoothing algorithm is performed on the ROI before the contours of the road markers and the corresponding two features are determined. It is observed that the achievable accuracy of the proposed methods at several non-urban road scenarios is approximately 96% and the processing time per frame is significantly reduced when the video resolution increases as compared to that of the existing approach.

16:45 *The Analysis of Soft Error in C-Elements*

Norhuzaimin Julai (Universiti Malaysia Sarawak & Universiti Malaysia Sarawak, Malaysia); Ahmed Mohamed Ahmed Haidar (Universiti Malaysia Sarawak, Malaysia); Abdul Rahman Kram (University Malaysia Sarawak, Malaysia)

Soft errors are a serious concern in state holders as it can cause temporarily malfunction of the circuit. C-element is one of the state holders that is used widely in asynchronous circuit. In this paper, our investigation will focus on the vulnerability of two types of C-element towards soft errors. We proposed the equations for the rate of error due to neutron spectrum energy that can cause failure in the state holder. We have conducted analysis on two different C-elements at different nodes by using UMC90 nm technology and 180nm technology. Based on the vulnerability data, we developed a method for assessing vulnerability on different implementation of C-elements. From the data, we concluded that SIL is more resistant towards soft errors.

17:00 *Noise Level Estimation for Digital Images Using Local Statistics and Its Applications to Noise Removal*

Asem Khmag (Zawia Uni & Faculty of Engineering, Libya); Syed Abdul Rahman Al-Haddad and Noraziahtulhidayu Kamarudin (Universiti Putra Malaysia, Malaysia); Sami Ghoul (Zawia University, Libya)

In this paper, an automatic estimation of additive white Gaussian noise technique is proposed. This technique is built according to the local statistics of Gaussian noise. In the field of digital signal processing, estimation of the noise is considered as pivotal process that many signal processing tasks relies on. The main aim of this paper is to design a patch-based estimation technique in order to estimate the noise level in natural images and use it in blind image removal technique. The estimation processes is utilized selected patches which is most contaminated sub-pixels in the tested images sing principal component analysis (PCA). The performance of the suggested noise level estimation technique is shown its superior to state of the art noise estimation and noise removal algorithms, the proposed algorithm produces the best performance in most cases compared with the investigated techniques in terms of PSNR, IQI and the visual perception.

17:15 *Multiple Human Body Postures Detection Using Kinect*

Rosdiyana Samad, Law Wen Yan, Mahfuzah Mustafa and Nor Rul Hasma Abdullah (Universiti Malaysia Pahang, Malaysia); Dwi Pebrianti (FKEE, University Malaysia Pahang, Malaysia)

This paper presents a method to detect multiple human body postures using Kinect sensor. In this study, a combination of shape features and body joint points are used as input features. The Kinect sensor which used infrared camera to produce a depth image is suitable to be used in an environment that has varying lighting conditions. The method for human detection is done by processing the depth image and joint data (skeleton) which able to overcome several problems such as cluttered background, various articulated poses, and change in color and illumination. Then, the body joint coordinates found on the object are used to calculate the body proportion ratio. In the experiment, the average body proportions from three body parts are obtained to verify the suitability of golden

ratio usage in this work. Finally, the measured body proportion is compared with Golden Ratio to determine whether the found object is a real human body or not. This method is tested for various scenarios, where true positive human detection is high for various postures. This method able to detect a human body in low lighting and dark room. The average body proportions obtained from the experiment show that the value is close to the golden ratio value.

CME 1

Control and Mechatronic Engineering 1 (continue)

Room 3

16:00 Modular Approach to Implement Model Predictive Control on Three Phase Voltage Source Inverter

Muhammad Abbas Abbasi (Universiti Teknologi Malaysia); Abdul Rashid Bin Husain and Hasan Alqaraghuli (Universiti Teknologi Malaysia, Malaysia)

A modular abstraction is presented to implement model predictive control (MPC) on a three phase two level voltage source inverter to control its output current. Traditional ways of coded implementation do not provide insights into the complex nature of MPC; hence a more intuitive, logical and flexible approach for hardware implementation is conceptualized in the form of signal flow graphs (SFGs) for estimation, prediction and optimization. Simulation results show good performance of the approach and easier code generation for real time implementation. RL load is assumed for the inverter and the importance of choosing load inductance and sampling time ratio is emphasized for better control performance.

16:15 Positive Interval Observer-based State Feedback Controller for Uncertain General Anaesthesia System

Jing Jing Chang (Universiti Tunku Abdul Rahman, Malaysia); Syafiie Syafiie (Syiah Kuala University, Indonesia)

The drug delivery process of general anaesthesia in the human body is most commonly described by the Pharmacokinetic/Pharmacodynamic (PK/PD) model. Since the PK model is a positive linear system, the design of the controller can be treated as a positive stabilization problem. In this paper, a state feedback controller with positive interval observer was designed using a linear programming approach by taking into account the inter-individual variability among patient in the PK model. The designed controller was assessed by simulation on a pool of patients. Result shows that the design of a fix controller for the whole population is difficult due to the conflict between performance and robustness.

16:30 Neural Network Model Development with Soft Computing Techniques for Membrane Filtration Process

Zakariah Yusuf, Norhaliza Abdul Wahab and Shafishuhaza Sahlan (Universiti Teknologi Malaysia, Malaysia)

Membrane technology has become more attractive particularly in solid-liquid separation process. Membrane bioreactor (MBR) has found to be a reliable technology to replace the conventional activated sludge (CAS) process for water and wastewater treatment by adopting membrane filtration technology and bioreactor. However, numerous drawbacks arise when using membrane which includes high maintenance cost and fouling problem. In order to reduce fouling, hence the operational

cost of MBR, an optimal plant operation is desirable. To realize this, a reliable MBR filtration prediction that can measure and predict the filtration of the dynamic performance, especially the effect of fouling to the filtration and cleaning operations, is required. With the development of an efficient prediction tool, suitable action can be taken to find the optimum setting of the filtration process, hence improving the overall operation. In this paper, submerged membrane filtration model development using recurrent neural network (RNN) train using a genetic algorithm (GA), inertia weight particle swarm optimization (IW-PSO) and gravitational search algorithm (GSA) is presented. These optimization algorithms are compared in terms of its accuracy and convergent speed in updating the weights and biases of the RNN for optimal filtration model. The evaluation of the models is measured using three performance evaluations, which are mean square error (MSE), mean absolute deviation (MAD) and coefficient of determination (R^2). From the results obtained, all methods yield a satisfactory result for the model, with the best results given by IW-PSO.

16:45 News Reliability Evaluation Using Latent Semantic Analysis

Xiaoning Guo, De Zhern Tan, Wooi King Soo, Yi-Fei Tan and Hai Shuan Lam (Multimedia University, Malaysia)

The rapid rise and widespread of 'Fake News' has severe implications in the society today. Much efforts have been directed towards the development of methods to verify news reliability on the Internet in recent years. In this paper, an automated news reliability evaluation system was proposed. The system utilizes term several NLP techniques such as Term Frequency-Inverse Document Frequency (TF-IDF), Phrase Detection and Cosine Similarity in tandem with Latent Semantic Analysis (LSA). A collection of 9203 labelled articles from both reliable and unreliable sources were collected. This dataset was then applied random test-train split to create the training dataset and testing dataset. The final results obtained shows 81.87% for precision and 86.95% for recall with the accuracy being 73.33%.

17:00 Asymptotic Features of Hessian Matrix in Receding Horizon Model Predictive Control with Medium Sized Prediction Frames

Muhammad Bilal Shahid Shahid (The Islamia University of Bahawalpur, Pakistan)

In this paper, Receding Horizon Model Predictive Control (RH-MPC) having a quadratic objective function is studied through the Singular Value Decomposition (SVD) and Singular Vectors of its Hessian Matrix. Contrary to the previous work, non-equal and medium sized control and prediction horizons are considered and it is shown that the Singular Values converge to the open loop magnitude response of the system and singular vectors contain the phase information. Earlier results focused on classical formulation of Generalized Predictive Control (GPC), whereas, current work proves the applicability to modern formulation. Although, method can easily be extended to MIMO systems, only SISO system examples are presented

17:15 A Survey on Cleaning Dirty Data Using Machine Learning Paradigm for Big Data Analytics

Jesmeen M. z. h., Md. Jakir Hossen, Md. Shohel Sayeed, Chin-Kuan Ho, Chy. Mohammed Tawsif Khan, E m h Arif and Md. Armanur Rahman (Multimedia University, Malaysia)

Recently Big Data has become one of the important new factors in the business field. This needs to have strategies to manage large volumes of structured, unstructured and semi-structured data. It's challenging to analyze such large scale of data to extract data meaning and handling uncertain outcomes. Almost all big data sets are dirty, i.e. the set may contain inaccuracies, missing data, miscoding and other issues that influence the strength of big data analytics. One of the biggest

challenges in big data analytics is to discover and repair dirty data; failure to do this can lead to inaccurate analytics and unpredictable conclusions. Data cleaning is an essential part of managing and analyzing data. In this survey paper, data quality troubles which may occur in big data processing to understand clearly why an organization requires data cleaning are examined, followed by data quality criteria (dimensions used to indicate data quality). Then, cleaning tools available in market are summarized. Also challenges faced in cleaning big data due to nature of data are discussed. Machine learning algorithms can be used to analyze data and make predictions and finally clean data automatically.

EPE 1

Electric Power Engineering 1 (continue)

Room 4

16:00 *The Resistance Comparison Method Using Integral Controller for Photovoltaic Emulator*

Razman Ayop and Chee Wei Tan (Universiti Teknologi Malaysia, Malaysia)

A Photovoltaic (PV) emulator is a device that produces a similar output as the PV module and it is useful for testing the PV generation system. This paper present a new and simple control strategy for the PV emulator using the combination of the Resistance Comparison Method with the Integral Controller. The closed-loop buck converter system with the current-mode controlled and the single diode model are used for the PV emulator. The results obtained from the proposed PV emulator are compared with the conventional PV emulator using the Direct Referencing Method as the control strategy. The proposed PV emulator produces a more accurate output, 74 % faster transient response, and a lower output voltage ripple compared to the conventional PV emulator.

16:15 *Impact of Different Time of Use Electricity Pricing Structure on Residential Consumer*

Nurazrina Mohd Azman, Md Pauzi Abdullah and Siti Maherah Hussin, SMH (Universiti Teknologi Malaysia, Malaysia); Mohammad Yusri Hassan (University of Technology Malaysia(UTM), Malaysia); Dalila Mat Said (Universiti Teknologi Malaysia, Malaysia); Norzanah Rosmin (University of Technology Malaysia, Malaysia); Faridah Hussin (University Technology of Malaysia, Malaysia)

Load profile for residential users is different from commercial users where peak load occurs outside of work hours compared to working hours. Consequently, the Time of Use-based electricity price must be different not only in terms of price, but also in terms of time block structure. This paper examines the impacts of different TOU structures on TOU prices and load profiles of residential consumer. Four TOU structures are tested on real load profile for a selected residential consumer area in Malaysia. Two elasticity factors are used for each structure to represent two different groups of users, a group that responds highly to price changes and a group that does not. The TOU price set for each structure is determined optimally subject to the following constraints; price difference between TOU and fixed price per hour should be minimized and the amount of difference between price increase and price drop should be equal. From the analysis, the TOU structure with 12 time blocks provides better price signals and peak load reduction.

16:30 Microcontroller-Based Control and Data Acquisition System for a Grid-Connected Renewable Energy System

Kevin Dugay, Jomille Angelo Bancud and Adam Luisaga (Malayan Colleges Laguna, Philippines)

There has been a significant increase in the exploitation of renewable energy systems. To be able to efficiently utilize grid - connected renewable energy sources, there must be a reliable control and monitoring system. In building a control and monitoring system for this system, a power analyzer connected to a microcontroller was used. The microcontroller was linked to touchscreen display where a graphical user interface (GUI) was programmed to able to display and log the data recovered.. Relays were used to reconfigure the system by shifting the load's source of energy between the grid and renewable energy system. The energy generated by the renewable energy system may be delivered to the load or be fed to the grid as needed. This operation will be done through either an external device or through a computer which was built to manually operate the control system and view the status of the system as determined by parameters such as cost and energy consumption. This system provided residential buildings with their own renewable energy system with a simple yet reliable control and monitoring system. The system was able to accumulate accurate and real time data. It also provided a continuous supply and switching application simultaneously

16:45 A Field Survey on the Peak Energy Demand for Typical Terrace House in Malaysia

Sheikh Ahmad Zaki Shaikh Salim (Universiti Teknologi Malaysia, Malaysia); Mohd Zubaidi Ismail (Malaysia-Japan International Institute of Technology (MJIT), Malaysia); Fitri Yakub (Universiti Teknologi Malaysia & Malaysia-Japan International Institute of Technology, Malaysia); Nelidya Md. Yusoff (Universiti Teknologi Malaysia, Malaysia); Aya Hagishima (Kyushu University, Japan); Naja Aqilah Hisham (Universiti Teknologi Malaysia, Malaysia)

It is very important to study the time-use data of home energy consumption of appliances for developing an accurate model of domestic energy demand. In this paper, we discussed the statistical nature of total energy consumption pattern in a typical terrace house in Malaysia. The field measure was conducted for eight months from September 2016 to April 2017. The data was recorded with high resolution energy monitoring devices of a one minute interval. Measured data were compared with resolutions of 1 minute, 30 minutes and 60 minutes. Monthly electric consumption was analyzed in order to investigate the pattern and peak demand at particular period of time. Results indicate that the period where the power demand is in high state is in the early morning and night time with an average value of electrical consumption of 0.5 kWh to 0.7 kWh. In the mid-day, power demand remain constant with average hourly power ranging from 0.4 kWh to 0.5 kWh while at night the power fluctuates ranging from 0.5 kWh to 0.9 kWh and the latter average power will slowly decrease in the early morning. Weekend and night time recorded huge amount of energy consumption compared to weekdays and day time. The amount of energy consumed depends on time-of-use, power characteristics of particular appliances as well occupancy period. These findings might be beneficial for identifying demand respond opportunity of potential home energy consumption.

17:00 Initial Development of an Electrical Power Generator by Using Thermoelectric Generator, Focal Lens and Underground Heat Dissipation System

Syed Zainal Abidin Syed Kamarul Bahrin and Sabarina Jaafar (Universiti Tenaga Nasional, Malaysia)

Electrical energy is important in various developments to ensure global stability. However, most electrical energy sources are non-renewable and these sources are expected to be depleted in the near future. In order to solve this problem, research on renewable energy sources are intensified and

thermoelectric generator (TEG) is one of the potential solutions. TEG can generate electricity if there is a temperature difference between the hot end and cold end of its plate and it is widely used in various applications, ranging from high temperature of a steam generator until to the lowest temperature of a human body. The initial development of this work focuses on the electrical power generator design by using focal lens to focus sunlight, a form of renewable energy, on the TEG hot end and also underground heat dissipation system on the cold end to create temperature difference. The initial results showed that the amount of power produced by the system is quite small but reasonable due to the type of TEGs used. However, the heat dissipation system showed a promising development due to its non-dependency on external energy to expel heat from the cold side.

17:15 Optimization of PV Systems Using Data Mining and Regression Learner MPPT Techniques

Adedayo Farayola, Ali Hasan and Ahmed Ali (University of Johannesburg, South Africa)

Supervised machine learning techniques such as artificial neural network (ANN) and ANFIS are powerful tool used to track the maximum power point in PV systems. However, these offline methods still require large and accurate training data sets for successful maximum power point tracking (MPPT). This paper presents an innovative use of rational quadratic gaussian process regression (RQGPR) technique to generate the large and very accurate training data for MPPT task. To confirm the effectiveness of the RQGPR technique, combination of ANN and RQGPR as ANN-RQGPR technique results were compared with conventional ANN technique results, and that of combined ANN and linear support vector machine regression as ANN-LSVM technique results under different weather conditions. Results show that ANN-RQGPR technique produced the overall best result and with an improved performance.

17:30 Performance of a Small-sized Savonius Blade with Wind Concentrator

Norzanah Rosmin and Dygku. Asmanissa Awg. Osman (University of Technology Malaysia, Malaysia); Aede H Musta'amal, Siti Maherah Hussin, SMH and Md Pauzi Abdullah (Universiti Teknologi Malaysia, Malaysia); Faridah Hussin (University Technology of Malaysia, Malaysia); Mohammad Yusri Hassan (University of Technology Malaysia(UTM), Malaysia); Hasimah Abdul Rahman (Centre of Electrical Energy Systems & Universiti Teknologi Malaysia, Malaysia)

This paper presents the performance of a fabricated small-sized Savonius wind turbine with two blades. The design of Savonius vertical axis wind turbine (VAWT) was based on Malaysia wind speed condition. Meanwhile, the design of wind concentrator was based on the dimensions and the constant airflow of an air compressor. From the experimental testing in a laboratory, it was found that the proposed Savonius turbine has best performance when tested using wind concentrator. To conclude, airflow from air compressor can be increased when the proposed wind concentrator is used and hence increasing the proposed VAWT performance in terms of its angular speed (ω), tip speed ratio (TSR) and the generated electrical power (PE).

Wednesday, December 6

Wednesday, December 6, 08:00 - 09:00

Registration 2

Room: Anjung Razak UTMKL

Wednesday, December 6, 09:00 - 10:40

CE 2

Communication Engineering 2

Room 1

09:00 Development of Reconfigurable Antenna for Advanced Tracking Technology

Norsuzlin Bt Mohd Sahar (SEGi University & Faculty of Engineering & The Built Environment, Malaysia); Mohammad Tariqul Islam (University Kebangsaan Malaysia, Malaysia); Md. Rokunuzzaman (Rajshahi University of Engineering and Technology, Bangladesh); Norbahiah Misran (Universiti Kebangsaan Malaysia, Malaysia)

This paper focuses on the design and fabrication of reconfigurable multiband antenna for RFID and GPS as advance tracking technology for various applications that achieve a physically compact, planar profile and sufficient bandwidth. The antenna can be reconfigured as single band at 1.2275 GHz for GPS applications when the switches are OFF state and dual-band frequencies at 0.915 GHz and 2.4 GHz required in RFID applications when the switches are ON state. The performance of the antenna involves changing the switches to ON or OFF mode by controlling RF switches. RF MEMs RMSW101, Single Pole Single Throw (SPST) switches have been chosen due to the satisfactory RF properties includes low insertion loss, good impedance matching and high isolation. The gain for single and dual band is greater than 2dBi. The design methodology and antenna measurement results are both presented and discussed in this letter.

09:15 A MIMO H-shape Dielectric Resonator Antenna for 4G Applications

Siti Salihah (Wireless Communication Center (WCC), UTM Skudai, Malaysia); Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Muhamad Hafiz (Wireless Communication Center (WCC), UTM Skudai, Malaysia); Raghuraman Selvaraju (Universiti Teknologi Malaysia & WCC, Malaysia)

In this article, a Multiple-Input-Multiple-Output (MIMO) H-shape Dielectric Resonator Antenna (DRA) is designed and simulated at 2.6 GHz for 4G applications. The proposed structure consists of H-shape DRA ($\epsilon_r=10$) which is mounted on FR4 substrate ($\epsilon_r=4.6$), and feed by two different feeding mechanisms. First, microstrip with slot coupling as Port 1. Second, coaxial probe as Port 2. The electrical properties of the proposed MIMO H-shape DRA in term of return loss, bandwidth and gain are completely obtained by using CST Microwave Studio Suite Software. The simulated results demonstrated a return loss more than 20 dB, an impedance bandwidth of 26 % (2.2 - 2.9 GHz), and gain of 6.11 dBi at Port 1. Then, a return loss more than 20 dB, an impedance bandwidth of 13 % (2.2 - 2.7 GHz), and gain of 6.63 dBi at Port 2. Both ports indicated impedance bandwidth more than 10 %, return loss lower than 20 dB, and gain more than 10 dBi at 2.6 GHz. The simulated electrical properties of the proposed design show a good potential for LTE applications.

09:30 Design of Dual Band Stacked RDRA for 5G Applications

Aminu Bugaje (Wireless Communication Center (WCC), UTM Skudai, Nigeria); Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Muhamad Hafiz (Wireless Communication Center (WCC), UTM Skudai, Malaysia); Raghuraman Selvaraju (Universiti Teknologi Malaysia & WCC, Malaysia)

This paper focuses on the investigation and discussion of three different designs of stacked Rectangular Dielectric Resonator Antenna (RDRA) at dual bands of 25 GHz and 32 GHz for 5G applications. First, basic stacked RDRA. Second, basic stacked RDRA with a single notch. Third, basic stacked RDRA with double notches. All the proposed structure consists of two stacked DRA of dielectric permittivity of 10 which mounted on a Duriod dielectric substrate of dielectric permittivity of 2.2 and feed by Microstrip aperture slot feeding technique (MSA) for 50 Ω characteristic impedance. Authentication of all the proposed designs comparison is completed using CST simulation software by observing the performance of reflection coefficient, bandwidth, and gain. All the proposed RDRA are demonstrated simulated reflection coefficient lower than 20 dB for both bands and simulated gain more than 6 dBi. Meanwhile, for simulated bandwidth, only the proposed basic stacked RDRA with single and double notches are demonstrated simulated bandwidth more than 1 GHz, which fulfill the requirement for 5G applications.

09:45 Improved Vivaldi Antenna with Radiation Pattern Control Features for Wireless Communications

Delphine Abijuru (Universiti Teknologi Malaysia(UTM), Malaysia); Mohamad Rijal Hamid (Universiti Teknologi Malaysia, Malaysia); Nyangwarimam Ali (Faculty of Electrical Engineering, University of Technology Malaysia, Malaysia)

In a rich scattering environment, unwanted beam occurs in different directions other than the desired beam, which could potentially affect the performance of the antenna. Vivaldi antenna has been considered a mitigation to the scattering effect of an antenna. However, the current performance of Vivaldi antenna suffers from effect of multipath, interfering signals and radiation pattern control. This paper therefore proposes an improved Vivaldi antenna which combine triple radiating slot to enable radiation pattern control Depending on the radiating element, the proposed antenna can achieve 3 eminent main beam angular position. The proposed antenna can primarily enable beams to cover at an approximate of -90° to 90° with an almost equal gain at the three different focal while holding the taper slot length equality, thus minimizing the interference in converse to the traditional rectangular microstrip antenna beam which covers -45° to 45° . This is accomplished by controlling the position of the radiating element (taper slot) through the redirecting of the signals towards the intended directions and through the asymmetric arrangement of ideal switches (on and off) to steer the beam in 3 desired directions. To test the effectiveness of the proposed design, CST microwaves simulations were carried out on a Vivaldi antenna on a FR4 substrate with a dielectric constant of 4.3 and a thickness of 1.6mm fed by microstrip line. The operating frequency lies between 900 MHz and 2.5GHz. The results showed that the antenna reduced the undesired radiations in another direction other than the main beam and yielded a higher gain in the desired directions which overcame the effect of multipath or interfering signals. This proposed design can be very useful for wireless communications where multipath fading problems are encountered.

10:00 Mutual Coupling Reduction Between Asymmetric Reflectarray Resonant Elements

Muhammad Hashim Dahri (University Technology Malaysia & Pakistan Engineering Council, Malaysia); Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Muhammad Inam Abbasi (Universiti Teknologi Malaysia (UTM), Malaysia); Muhammad Ramlee Kamarudin (Cranfield University, United Kingdom (Great Britain))

A physically asymmetric reflectarray element has been proposed for wide band operations. The dual resonant response has been introduced by tilting one side of the square path element. The numerical results have been analyzed in the frequency band between 24 GHz to 28 GHz where a reflection phase range of more than 600° has been achieved. The proposed asymmetric element can produce mutual coupling with adjacent elements on a reflectarray. This effect has been monitored by placing the elements in mirror configuration on the surface of reflectarray. The single unit cell element results have been compared with conventional 4 element unit cell and proposed mirroring element configuration. The proposed mirroring element technique can be used to design a broadband reflectarray for high gain applications.

10:15 Diagnosis of Faulty Elements in Array Antenna Using Nature Inspired Cuckoo Search Algorithm

Shafqat Ullah Khan (Department of Electrical Engineering, International Islamic University, H-10, Islamabad, Pakistan); Mohamad Kamal A. Rahim (Universiti Teknologi Malaysia, Malaysia); Ijaz Qureshi (Air University Islamabad, Pakistan); Atif Khalil (International Islamic University Islamabad, Pakistan)

Detection and correction of faulty elements in a linear array have great importance in radar, sonar, mobile communications and satellite. Due to single element failure, the whole radiation pattern damage in terms of side lobes level and nulls. Once we have detect the position of defective element, then correction method is applied to achieve the desired pattern. In this work, we introduce a nature inspired meta-heuristic cuckoo search algorithm to diagnose the position of defective elements in a linear array. The nature inspired cuckoo search algorithm is new to the optimization family and is used first time for fault detection in an array antenna. Cuckoo search algorithm is a global search optimization technique. The cost function is used as a fitness function which defines an error between the degraded far field power pattern and the estimated one. The proposed technique is used effectively for the diagnosis of complete, as well as, for partial faulty elements position. Different simulation results are evaluated for 40 elements Taylor pattern to validate and check the performance of the proposed technique

ECE 2

Electronic and Computer Engineering 2

Room 2

09:00 Real-Time Stereo-Vision Human Tracking in Unconstrained Environment

Bunseng Chan (Curtin University, Malaysia); King Hann Lim (Curtin University, Sarawak, Malaysia); Lenin Gopal (Curtin University Malaysia, Malaysia); Alpha Agape (Monash University, Malaysia)

Stereo-vision is an emerging research for automation and robotic field due to the advancement of imaging sensors and information technology. However, real-time human detection and tracking in the unconstrained environment were led to the difficulty of features extraction. In this paper, we proposed an approach of mixture Gaussian and median filter to reduce the shadow and sudden change of the illumination issue. We used the sequential thinning and thickening method to construct

the skeleton model. In the experimental result, normalize filter has been applied and compare with the proposed approach. Based on the results, the skeleton model produced do not affected by the illumination and shadow. The output results of the proposed approach merged with the skeleton and showed up to 85% of the matching in the real-time video. The proposed real-time stereo-vision human tracking using the mixture filter and mathematical morphology could improve the performance of the detection in the unconstrained environment.

09:15 *Embedded Automated Vision for Double Parking Identification System*

Norasyikin Fadilah, See Yoon Soon and Hadzfizah Radi (Universiti Malaysia Pahang, Malaysia)

The aim of this work is to assist the city administration issue which involve the traffic flow disruption in an urban area. One of the causes of traffic flow disruption is double parking; thus, in this work, an automated double parking identification and alert system was developed using embedded vision system and internet of things. A camera was utilized to acquire the image of a parking area, and the image was processed using Beaglebone Black processor. A computer vision algorithm was developed to process the image using background subtraction, region of interest identification, and color analysis. When a double parked vehicle is detected, the data was sent into the cloud automatically to alert the city administrator for further action. The developed system achieved 91% accuracy in detecting the traffic violation of double parking.

09:30 *Comprehensive Pineapple Segmentation Techniques with Intelligent Convolutional Neural Network*

Fatimah Sham Ismail, Muhammad Azmi Ahmed Nawawi and Hazlina Selamat (Universiti Teknologi Malaysia, Malaysia)

This paper develops an intelligent segmentation technique for pineapple fruit using Convolutional Neural Network. The Cascade Object Detector (COD) is used to detect location of the pineapple in the image by returning the bounding box around the detecting pineapple. Then, the Hue value is used to remove the ground and sky. Further removal of background from the image are applied by Adaptive Red and Blue Chromatic Map (ARB) and Normalized Difference Index (NDI) at the same time. In this case, the ARB and NDI method are still produced misclassified error and the edge is not smooth. Template Matching Method (TMM) is applied as image enhancement so that misclassified error is removed and the edge become smooth. Lastly, intelligent Convolutional Neural Network (CNN) is implemented as decision making to select the best segmentation image between ARB and NDI. The results obtained show that the proposed intelligent method successfully verify the fruit from the background with high accuracy segmentation process compare to the conventional method.

09:45 *K-NN Classification of Brain Dominance*

Khairul Amrizal Abu Nawas, Mahfuzah Mustafa and Rosdiyana Samad (Universiti Malaysia Pahang, Malaysia); Dwi Pebrianti (FKEE, University Malaysia Pahang, Malaysia); Nor Rul Hasma Abdullah (Universiti Malaysia Pahang, Malaysia)

The brain dominance is referred to right brain and left brain. The brain dominance can be observed with an Electroencephalogram (EEG) signal to identify different types of electrical pattern in the brain and will form the foundation of one's personality. The objective of this project is to analyze brain dominance by using Wavelet analysis. The Wavelet analysis is done in 2-D Gabor Wavelet and the result of 2-D Gabor Wavelet is validated with an establish brain dominance questionnaire. Twenty one samples from University Malaysia Pahang (UMP) student are required to answer the establish brain dominance questionnaire has been collected in this experiment. Then, brainwave signal will record

using Emotiv device. The threshold value is used to remove the artifact and noise from data collected to acquire a smoother signal. Next, the Band-pass filter is applied to the signal to extract the sub-band frequency components from Delta, Theta, Alpha, and Beta. After that, it will extract the energy of the signal from image feature extraction process. Next the features were classified by using K-Nearest Neighbor (K-NN) in two ratios which 70:30 and 80:20 that are training set and testing set (training: testing). The ratio of 70:30 gave the highest percentage of 83% accuracy while a ratio of 80:20 gave 100% accuracy. The result shows that 2-D Gabor Wavelet was able to classify brain dominance with accuracy 83% to 100%.

10:00 *Reduced-Reference Video Quality Metric Using Spatio-Temporal Activity Information*

Farah Abdul Rahman (International Islamic University Malaysia, Malaysia); Ahmad Ibrahim (International Islamic University of Malaysia, Malaysia); Dimitris Agrafiotis (University of Bristol, United Kingdom (Great Britain))

Monitoring and maintaining acceptable Quality of Experience is of great importance to video service providers. Perceived visual quality of transmitted video via wireless networks can be degraded by transmission errors. This paper presents a reduced-reference video quality metric of very low complexity and overhead that makes use of frame based spatial (SI) and temporal (TI) activity levels to monitor the effect of channel errors on video transmitted over error prone networks. The performance of the metric is evaluated relative to that of a number of full and reduced reference metrics. The proposed metric outperforms some of the most popular full reference metrics whilst requiring very little overhead.

10:15 *A Blind Multiple Watermarks Based on Human Visual Characteristic*

Ferda Ernawan (Universiti Malaysia Pahang, Malaysia)

Digital watermarking is an alternative solution to prevent unauthorized duplication, distribution and breach of ownership right. This paper proposes a hybrid watermarking scheme with discrete cosine transform and singular value decomposition. The embedding of multiple watermarks use a block-based scheme based on Human Visual System (HVS) characteristics. A threshold is used to determine the watermark values by modifying first column of the orthogonal U matrix obtained from SVD decomposition. The tradeoff between normalize cross-correlation and imperceptibility of watermarked image from quantization steps was used to achieve an optimal threshold value. The experimental results show that the proposed multiple watermarks scheme exhibit robustness against image processing attacks. The proposed scheme demonstrates that the watermark recovery from chrominance blue was resistant against different types of attacks.

CME 2

Control and Mechatronic Engineering 2

Room 3

09:00 *Tree Physiology Optimization in Constrained Optimization Problem*

Abdul Hanif Abdul Halim (Universiti Teknologi PETRONAS, Malaysia); Idris Ismail (Universiti Teknologi Petronas, Malaysia)

Metaheuristic algorithms are proven to be more effective on finding global optimum in numerous problems including the constrained optimization area. The algorithms have the ability to overcome many shortcomings in traditional algorithms. Despite of good performance, some metaheuristic algorithms have limitations that may deteriorate by certain degree of difficulties especially in real-world application. Most of the real-world problems consist of constrained problem that significantly important in modern engineering design and must be considered in order to perform any optimization task. Therefore, it is necessary to compare the performance of the algorithm by different level of difficulties in constrained region. This paper introduces Tree Physiology Optimization (TPO) algorithm for solving constrained optimization problem and compares the performance with other existing metaheuristic algorithms. The constrained problems that included for the comparison are three engineering design and nonlinear mathematic problem. The difficulties of each proposed problem are the function complexity, number of constraints, and dimension of variables. The performance measure of each algorithm is the statistical results on finding the global optimum and the convergence towards global optimum

09:15 *Conceptual Framework of Modelling for Malaysian Household Electrical Energy Consumption Using Artificial Neural Network Based on Techno-Socio Economic Approach*

Boni Sena, Sheikh Ahmad Zaki Shaikh Salim and Nelidya Md. Yusoff (Universiti Teknologi Malaysia, Malaysia); Fitri Yakub (Universiti Teknologi Malaysia & Malaysia-Japan International Institute of Technology, Malaysia); Mohammad Kholid Ridwan (Universitas Gadjah Mada, Indonesia)

The residential sector is one of the contributors for the increase in the world energy consumption and CO₂ emission due to the increasing population, economic development, and improved living standard. Developing a reliable model of electrical energy consumption based on techno-socio economic factors is challenging since many assumptions need to be considered. Over the past decade, bottom-up approaches such as Multi-linear Regression, Artificial Neural Network, and Conditional Demand Analysis were used for developing mathematical models to investigate interrelated characteristics among techno-socio economic factors. However, the existing models mostly are focused on countries that have different socio-economic level and cultures from the developing countries of the Association of Southeast Asian Nations. Similar studies in that tropical region are very scarce and only limited for linear modelling under the conditions of techno-socio economic factors. In this study, we propose Artificial Neural Network for developing a model of electrical energy consumption based on techno-socio economic factors for a tropical region, Malaysia. In order to develop the model, quantitative measurement and qualitative assessment are required. The quantitative measurement is based on the monitoring of total electrical energy consumption with a one-minute interval for approximately 50 residential houses. In contrast, the qualitative assessment utilizes a questionnaire survey to assess household characteristics based on techno-socio economic parameters for approximately 500 residential houses. The aim of this paper is a conceptual framework of the estimation model for

household electrical energy consumption with the consideration of techno-socio economic factors using Artificial Neural Network.

09:30 A Survey of Machine Learning Techniques for Self-Tuning Hadoop Performance

Md. Armanur Rahman and Md. Jakir Hossen (Multimedia University, Malaysia); Venkateshaiah C (Assoc Prof, Malaysia); Chin-Kuan Ho (Multimedia University, Malaysia); Aziza Sultana (Dhaka International University, Bangladesh); Jesmeen M. z. h. and Ferdous Hossain (Multimedia University, Malaysia)

The Apache hadoop framework is an open source implementation of MapReduce for processing and storing big data. However, to get best performance from this is a big challenge because of its large number configuration parameters. In this paper, the concept of critical issues of hadoop system, big data and machine learning have been highlighted and an analysis of some machine learning techniques applied so far, for improving the hadoop performance is presented. Then, a promising machine learning technique using deep learning algorithm is proposed for hadoop system performance improvement.

09:45 Sensor Fusion Algorithm by Complementary Filter for Attitude Estimation of Quadrotor UAV with Low-Cost IMU

Aminurrashid Noordin (Universiti Teknikal Malaysia Melaka, Malaysia); Mohd Ariffanan Mohd Basri and Zaharuddin Mohamed (Universiti Teknologi Malaysia, Malaysia)

This paper proposes a sensor fusion algorithm by complementary filter technique for attitude estimation of quadrotor UAV using low-cost MEMS IMU. Angular rate from gyroscope tend to drift over a time while accelerometer data is commonly effected with environmental noise. Therefore, high frequency gyroscope signal and low frequency accelerometer signal is fused using complementary filter algorithm. The complementary filter scaling factor $K1=0.98$ and $K2=0.02$ are used to merge both gyro and accelerometer. The results show that the smooth roll, pitch and yaw attitude angle can be obtained from the low cost IMU by using proposed sensor fusion algorithm.

10:00 Metamodel-Based Optimization of a PID Controller Parameters for a Coupled-Tank System

Marwan Nafea (Universiti Teknologi Malaysia (UTM), Malaysia); Abdul Rasyid Mohammad Ali (Universiti Teknologi Malaysia, Malaysia); Mohamed Sultan Mohamed Ali (Universiti Teknologi Malaysia & UTM, Malaysia)

Industries such as petrochemical industries, paper manufacturing, waste management, and others are the vital industries where liquid level and flow control are essential. Liquids are processed by chemicals or mixing treatment in several tanks, while the levels of liquids in all tanks and the flow between these tanks are regulated in the presence of nonlinearity and inexact model description of the plant. This paper investigates the usage of the radial basis function neural network metamodel to find a good approximation to the optimum controller parameters in controlling the liquid level in the second tank of a coupled-tank plant through variable manipulation of a water pump in the first tank. System modeling involves developing a mathematical model by applying the fundamental physical laws of science and engineering. Comparisons were made between the optimized controllers using the metamodeling technique and the original large space design. In this system, a nonlinear dynamic model with time-varying parameters are observed and steps are taken to derive each of the corresponding linearized perturbation models from the nonlinear model.

10:15 Rheological Model for Drilling Mud Using Support Vector Regression

Tamiru Alemu and Amy Nur Syafiqah (Universiti Teknologi PETRONAS, Malaysia); Mebrahitom Asmelash Gebremariam (University Malaysia Pahang Malaysia, Malaysia)

Mud rheology plays a vital role in drilling operations. This paper examines past rheological models of drilling fluid at high-temperature and high-pressure conditions and then develops a new model using Support Vector Machine Regression approach. The new model was established using experimental data from literature. Accuracy of the model is later assessed using R² goodness of fit. It was found that the SVM model is indeed reliable for a temperature in the ranges of 149 to 260 °C and pressures in the ranges of 10,000 to 30,000 psia. Further analysis of the model showed that past model from Alderman et al. and Allouche et al. are inferior to the SVM model. The new model is applicable in the design of drilling process optimization tool and diagnostics system.

EPE 2

Electrical Power Engineering 2

Room 4

09:00 Automatic Sequential Reactive Power Compensation for Single Phase Loads Using Fuzzy Logic and Minimized Switching Devices

Shashikumar Krishnan (Cyberjaya & Multimedia University, Malaysia); Venkateshaiah C (Assoc Prof, Malaysia); Kok Swee Sim (Multimedia University, Malaysia)

The current rapid growth in IoT technology facilitates the effortless implementation of bidirectional remote monitoring and control system implementation in homes and buildings. We have modeled an actual non-intrusive PnP sequential SVC prototype hardware and wireless FLC automation software design on a real single phase home appliances system as load modeling. In addition, we have also designed a novel Unidirectional MOSFET Switched Capacitor model (UniMosSC) which enables us to reduce the hardware cost and increase the life span of SVC due it uses minimum switching devices. The system we have designed is able to correct the power factor at the root of the problem at each appliance. Due to complexity of appliance clustering and overlapping clusters, we implemented fuzziness in the system for more reliability in computations. The system could be used in homes or buildings resulting in electricity bill reduction, saving dollars and cents

09:15 An Hour Ahead Electricity Price Forecasting with Least Square Support Vector Machine and Bacterial Foraging Optimization Algorithm

Intan Azmira (Universiti Teknikal Malaysia Melaka, Malaysia); Izham Z. Abidin (Universiti Tenaga Nasional & UNITEN, Malaysia); Yap Keem Siah and Aidil Azwin Zainul Abidin (Universiti Tenaga Nasional, Malaysia); Titik Khawa Abdul Rahman (King Abdulaziz University, Saudi Arabia); Nurliyana Baharin (University of Technical Malaysia Malacca (UTeM), Malaysia); Mohd Hafiz Jali (Universiti Teknikal Malaysia Melaka, Malaysia)

Predicting electricity price has now become an important task in power system operation and planning. An hour-ahead prediction offers the market members with the pre-dispatch prices for the next hour. It is useful for an effective bidding strategy where the quantity of bids can be revised or changed prior to the dispatch hour. However, only a few studies have been conducted in the field of hour-ahead forecasting. This is due to most of the power markets apply two-settlement market structure (day-ahead and real time) or standard market design rather than single-settlement system (real time). Therefore, a multistage optimization for hybrid Least Square Support Vector Machine

(LSSVM) and Bacterial Foraging Optimization Algorithm (BFOA) was developed in this study to provide an accurate electricity price forecast with optimized LSSVM parameters and input features. So far, no literature has been found on multistage feature and parameter selections using the methods of LSSVM-BFOA for hour-ahead price prediction. The model was examined on the Ontario power market. A huge number of features were selected by five stages of optimization to avoid from missing any important features. The developed LSSVM-BFOA shows higher forecast accuracy with lower complexity than most of the existing models.

09:30 Nonlinear Observer Based PI Sliding Surface of Adaptive Sliding Mode Control for Boost Converter in PV System

Ramadhani Kurniawan Subroto, Lunde Ardhenta and Eka Maulana (Brawijaya University, Indonesia)

In photovoltaic system, solar energy cannot directly be utilized to the grid. It is because of the fluctuation of the generated output voltage from solar array. The generated output voltage depends on environmental condition, such as the availability of solar irradiance and temperature. Any changes from those variables will affect the generated output voltage. Boost converter is an interface device that connect solar array to dc grid. However, the dynamics of boost converter is nonlinear and non-minimum phase, thus it needs sophisticated control method that can force the output voltage follow the desired reference voltage. In addition, to reduce the number of sensors and cost investment, nonlinear observer technique is constructed. Therefore, the aims of this paper is to design nonlinear observer based on adaptive sliding mode control with PI sliding surface to reduce steady state error and ensure the overall system becomes more stable. The stability of proposed system is investigated through analytical and simulation proof. As a result, the performance of proposed system is better than the previous research during tested in various conditions.

09:45 Thermal Effect of Wind Generation on Conventional Generator in a Microgrid

Azmi Hashim (University of Strathclyde & UniKL BMI, Malaysia); Kwok Lo (University of Strathclyde, United Kingdom (Great Britain))

In order to reduce CO₂ emissions, which is one of the key strategy in combatting global warming, development of wind energy technology as source of renewable energy has become more important globally. However, the variability of the wind speeds leads to the intermittent nature of wind power generation. The conventional generators in the system must be able to compensate this fluctuation to maintain system stability and meet the load demand in the grid. This in turn may increase the temperature of the conventional generators beyond what normally occurs without wind generation in the grid. The aim of the paper is to investigate the effect of thermal heating of the generators due to the variable output of wind generation in different time of the year in a microgrid. The simulations are done in 24 hours period in four different time of the years corresponding to different seasons of the year.

10:00 Introduction of Buy-Sell Energy Management for PV Microgrid Environment in Web-Based Platform

Lunde Ardhenta, Ramadhani Kurniawan Subroto and Eka Maulana (Brawijaya University, Indonesia)

The electricity power company only supply the electricity to the consumer, however, the coming technology should provide bi-directional method to electricity supply and demand. Renewable energies can be solution by creating systems that can improve the efficiency of electricity utilization and build a micro-scale generating system. Development of micro smart grid system is the effort to increase efficiency in electric consumption. In this system, people able to buy electricity and also sell

it. This device consist of monitoring system through web services, thus able to monitor information of current, voltage, power, and energy remotely. This device using Wi-Fi to connect with ethernet. This system using low voltage DC electric grid. Current direction controlled by difference of voltage between bus and node.

10:15 *High Photovoltaic System Penetration Level Evaluation on the European-based LV Residential Network*

Kyairul Azmi Baharin, Nur Aliah Isa and Chin Kim Gan (Universiti Teknikal Malaysia Melaka, Malaysia); Meysam Shamshiri (Universiti Teknikal Malaysia Melaka & UTeM, Malaysia)

PV penetration into the electric grid continues to increase over the past few years. Yet concern remains on the impact of increased PV penetration towards the grid. This project aims to investigate the effect of high PV penetration in a residential distribution network. The modeling is done using OpenDSS while the network model used is the IEEE European Low Voltage Test Feeder which consists of 55 loads representing a generic housing area. Each load point is then equipped with a 4 kW PV system—representing a typical size for a house installation. PV output variability is then introduced into the modeling using two sample days of actual irradiance variability obtained from UTeM Malaysia; one for clear day and another for a high variability day. Voltage unbalance, voltage rise and reverse power flow were analyzed. One significant finding of this project is that voltage rise exceeds the standard of 1.05 pu during noon, when voltage at the load side is higher than the transformer secondary side. Besides that, the high variability days significantly affect the mitigation measures required to manage reverse power flow.

Wednesday, December 6, 10:40 - 11:00

Morning Break

Room: Anjung Razak UTMKL

Wednesday, December 6, 11:00 - 12:40

CE 2

Communication Engineering 2 (continue)

Room 1

11:00 *Design and Specific Absorption Rate of 2.6 GHz Rectangular-Shaped Planar Inverted-F Antenna*

Nurul Inshirah Mohd Razali, Norhudah Seman and Nur Ilham Aliyaa Ishak (Universiti Teknologi Malaysia, Malaysia)

This article presents the investigation of specific absorption rate (SAR) of a rectangular-shaped planar inverted-F antenna (PIFA) at frequency of 2.6 GHz. Initially, the design antenna is presented with parametric study concerning the dimensions of antenna patch length, shorting plate, ground plane and substrate. The proposed PIFA antenna has -20.46 dB reflection coefficient and 2.383 dB gain. The PIFA's SAR is correlated with the antenna gain and excitation power. The analysis shows that higher gain contributes to a lower SAR value. While, the higher excitation power causes a higher SAR value. All the design and analysis are performed using the CST Microwave Studio.

11:15 *Specific Absorption Rate Assessment of Multiple Microstrip Patch Antenna Array*

Nur Ilham Aliyaa Ishak, Norhudah Seman and Noor Asmawati Samsuri (Universiti Teknologi Malaysia, Malaysia)

Interaction between electromagnetic field (EMF) radiated from multiple antennas and human body is crucial to be explored as multiple antennas are the essential implemented devices to achieve the requirements of the future evolved fifth generation (5G) technology. Thus, this article presents a significant study of the radiated EMF effect from a single and multiple antennas towards human through the assessment of specific absorption rate (SAR). The single antenna, 1 x 2, 1 x 3 and 1 x 4 arrays of microstrip patch antennas are designed to cover mobile operating frequencies of 0.8, 0.85, 0.9, 1.8, 2.1 and 2.6 GHz. Two types of human head phantoms are implemented in this study, which are specific anthropomorphic mannequin (SAM) and Voxel head model that placed close to single antenna or antenna array to investigate the penetration of EMF towards the human tissue. The single antenna or antenna array is placed with fixed distance of 10 mm from the phantom, which excited by maximum allowable power of 19 dBm in CST Microwave Studio 2016. The effect of the radiated EMF that quantified by SAR parameter, which depicts satisfying results against the established standard limits at averaged 1g and 10g mass of tissues for all designated frequencies that utilized for single and multiple-antennas.

11:30 *Bi-Directional Beams Waveguide Slotted Antenna at Millimeter Wave*

Muataz Watheq Almeshehe (Faculty of Electrical Engineeri, Universiti Teknologi Malaysia, Malaysia); Noor Asniza Murad and Mohamad Kamal A. Rahim (Universiti Teknologi Malaysia, Malaysia)

This paper is focused on designing a bi-directional beams wave-guide slotted antenna at millimeter wave spectrum. The design is implemented by using antenna slot theory on the wave-guide structure. Two models of wave-guide slotted antenna are introduced. The proposed two models design are simulated using CST microwave software. The simulation results show that both models operate at 30 GHz with reflection coefficient of -24.63 and -25.01 dB respectively. The two models achieved a fair higher gain at 20 dB with directional beam-width of 8.9 degree. The proposed bi-directional beams structure achieved a higher gain in dual directional beam at mm-wave frequency compared to directional one.

11:45 *Beam Steering Using the Active Element Pattern of Dipole Antenna Array*

Norun Abdul Malek and Othman Omran Khalifa (International Islamic University Malaysia, Malaysia); Zuhairiah Zainal Abidin (Universiti Tun Hussein Onn Malaysia, Malaysia); Sarah Yasmin Mohamad (International Islamic University Malaysia, Malaysia); Nur Aqilah ARahman (International Islamic University Malaysia & Universal Cellular Engineering, Malaysia)

The antenna array is a set of a combination of two or more antennas in order to achieve improved performance over a single antenna. This paper investigates the beam steering technique using the active element pattern of dipole antenna array. The radiation pattern of the array can be obtain by using the active element pattern method multiplies with the array factor. The active element pattern is crucial as the mutual coupling effect is considered, and it will lead to an accurate radiation pattern, especially in determining direction of arrival (DoA) of a signal. Conventional methods such as the pattern multiplication method ignores the coupling effect which is essential especially for closely spaced antenna arrays. The comparison between both techniques has been performed for better performance. It is observed that the active element pattern influenced the radiation pattern of antenna arrays, especially at the side lobe level. Then, the beam of the 3x3 dipole antenna array has

been steered to an angle of 60° using three techniques; Uniform, Chebyshev and Binomial distribution. All of these are accomplished using CST and Matlab software.

12:00 On-Body Transmission Single-Band Diamond Dipole Antenna with Waveguide Jacket

Muhammad Azfar Abdullah and Noor Asmawati Samsuri (Universiti Teknologi Malaysia, Malaysia)

This paper presents the investigation of on-body transmission single-band diamond dipole antenna with three different jacket. The jackets are known as normal jacket, grounding jacket and waveguide jacket. The on-body transmission is measured using two flexible single-band antennas attach to the jackets. A man with the height of 180cm and 75kg weight becomes as a model for the real measurement. The measurement is conducted in small space area by using portable network analyzer with flexible network cable. The measurement results show that the best performance for on-body transmission is with waveguide jacket. 10dB transmission improvement is archived when the antenna is put above the waveguide jacket compared to the normal jacket. It is found that the transmission of the antenna is also depends on the antenna orientation and much transmission losses occur when the antennas are put above the grounding jacket.

12:15 A Wideband mm-Wave Printed Dipole Antenna for 5G Applications

Dewan Atiqur Rahman, Sarah Yasmin Mohamad and Norun Abdul Malek (International Islamic University Malaysia, Malaysia); Dewan Arifur Rahman (East West University, Bangladesh); Siti Normi Zabri (Universiti Teknikal Malaysia Melaka, Malaysia)

In this paper, a wideband millimeter-wave (mm-Wave) printed dipole antenna is proposed to be used for fifth generation (5G) communications. The single element antenna exhibits a 36 GHz bandwidth with more than 85.71% fractional bandwidth (for $S_{11} < -10$ dB) which covers six of the 5G candidate frequencies; 24 GHz, 25 GHz, 28 GHz, 32 GHz, 38 GHz and 40 GHz. The antenna also exhibits an average gain of 5.3 dB with a compact size of 7.35×5.85 [mm]². The antenna is further designed to be an array with eight elements and manage to increase the gain of the antenna with an average of 12.6 dB, a fractional bandwidth of 81.48% and linearly-polarized radiation pattern.

ECE 2

Electronic and computer Engineering 2 (continue)

Room 2

11:00 Comparison of Palm Vein Pattern Visual Interpretation Using Laplacian Filter and Frangi-based Filter

Zarina Mohd Noh (Universiti Putra Malaysia & Universiti Teknikal Malaysia Melaka, Malaysia); Abd Rahman Bin Ramli and Marsyita Hanafi (Universiti Putra Malaysia, Malaysia); M Iqbal Saripan (UPM, Malaysia); Ridza Ramlee (Universiti Teknikal Malaysia Melaka & UTem, Malaysia)

Detection of palm vein pattern through image processing techniques is an open problem as performance of each technique is closely related to the sample image gathered for the processing. The detected palm vein pattern is useful for further analysis in biometrics application and medical purpose. This paper aims to investigate the application of Laplacian filter and Frangi-based filter in detecting vein pattern contained in a near infrared illuminated palm image. Both filtering techniques are applied independently to two palm image databases to compare their performance in translating vein pattern in the image visually. Through empirical study, it is observed that Laplacian filter can translate the vein pattern in the image effectively. But pre-processings involved before the application

of Laplacian filter need to be performed to accurately translate the vein pattern. The implementation of Frangi-based filter, while simplifying the detection process without the need of extra pre-processing, resulted in only certain vein pattern detected. Using pixel-by-pixel objective assessment, the rate for Laplacian filter in detecting vein pattern are generally more than 85% compared to Frangi-based filter; where it ranges from 60% to 100%.

11:15 Fuzzy Logic Based Edge Detection Method for Image Processing

Farah Abdul Rahman and Othman Omran Khalifa (International Islamic University Malaysia, Malaysia); Abdulrahman Alawad (International Islamic University, Malaysia); Norun Abdul Malek (International Islamic University Malaysia, Malaysia)

Edge detection is the first step in image recognition systems in a digital image processing. An edge may be the result of changes in light, color, shade and texture, and these changes can be used to resolve the depth, size orientation and surface properties of a digital image. One of the most challenging issues faced in edge detection is uncertain edge. This can lead to misconception image or vision as it based on faulty method. In this paper, a new fuzzy logic method is proposed and implemented. The objective of this method is to improve the edge detection task. The results are comparable to similar techniques in particular for medical images because it does not take the uncertain part into its account.

11:30 Reduced-Reference Video Quality Metric Using Spatial Information in Salient Regions

Farah Abdul Rahman and Othman Omran Khalifa (International Islamic University Malaysia, Malaysia); Dimitris Agrafiotis and Fan Zhang (University of Bristol, United Kingdom (Great Britain))

In multimedia transmission, it is important to rely on an objective quality metric which accurately represents the subjective quality of processed images and video sequences. Maintaining acceptable Quality of Experience in video transmission requires the ability to measure the quality of the video seen at the receiver end. Reduced-reference metrics make use of side-information that is transmitted to the receiver for estimating the quality of the received sequence with low complexity. This attribute enables real-time assessment and visual degradation detection caused by transmission errors as well as compression artifacts. A novel reduced-reference video quality known as the Spatial Information in Salient Regions Reduced Reference Metric is proposed. The approach proposed in this paper makes use of spatial and temporal activity to estimate the distortion of the received sequence after concealment, as well as another metric that relies on local edge information. The statistical elements analysed in this work are based on extracted edges and their luminance distributions. Results highlight that the proposed edge dissimilarity measure has a good correlation with DMOS scores from the LIVE Video Database. The proposed metric shows improvements over the metrics that work individually, although more work has to be done to refine the method.

11:45 An Improved Image Steganography Algorithm Based on PVD

Norun Abdul Malek, Othman Omran Khalifa, Sharif Shah Newaj Bhuiyan and Farah Abdul Rahman (International Islamic University Malaysia, Malaysia)

In this paper, a modification of PVD (Pixel value differencing) algorithm is used for Image Steganography in spatial domain. It is normalizing secret data value by encoding method to make the new pixel edge difference less among three neighbors (horizontal, vertical and diagonal) and embedding data only to less intensity pixel difference areas or regions. The proposed algorithm shows a good improvement for both color and gray-scale images compared to other algorithms. Color images performance are better than gray images. However, in this work the focus is mainly on gray images.

The strength of this scheme is that any random hidden/secret data do not make any shuttle differences to Steg-image compared to original image. The bit plane slicing is used to analyze the maximum payload that has been embedded into the cover image securely. The simulation results show that the proposed algorithm is performing better and showing great consistent results for PSNR, MSE values of any images, also against Steg-analysis attack.

12:00 A Robust Vision-based Multiple Moving Object Detection and Tracking from Video Sequences

Othman Omran Khalifa, Norun Abdul Malek, Kazi Istiaque Ahmed and Farah Abdul Rahman (International Islamic University Malaysia, Malaysia)

Detection of Moving Objects and Tracking is one of the most concerned issue and is being vastly used at home, business and modern applications. It is used to identify and track of an entity in a significant way. This paper illustrates the way to detect multiple objects using background subtraction methods and extract each object features by using Speed-Up Robust Feature algorithm and track the features through k-Nearest Neighbor processing from different surveillance videos sequentially. In the detection of object of each frame, pixel difference is calculated with respect to the reference background frame for the detection of an object which is only suitable for any ideal static condition with the consideration of lights from the environment. Thus, this method will detect the complete object and the extracted feature will be carried out for the tracking of the object in the multiple videos by one by one video. It is expected that this proposed method can commendably abolish the impact of the changing of lights.

12:15 Content-Based Image Retrieval System for an Image Gallery Search Application

Zaid Omar (Universiti Teknologi Malaysia & Imperial College London, IJN-UTM Cardiovascular Engineering Centre, Malaysia); Nicole Tham Lei May and Syahmi Syahiran Ahmad Ridzuan (Universiti Teknologi Malaysia, Malaysia)

vision techniques for searching and managing large image collections more efficiently. With the growth of large digital image collections triggered by rapid advances in electronic storage capacity and computing power, there is a growing need for devices and computer systems to support efficient browsing, searching, and retrieval for image collections. Hence, the aim of this project is to develop a content-based image retrieval system that can be implemented in an image gallery desktop application to allow efficient browsing through three different search modes: retrieval by image query, retrieval by facial recognition, and retrieval by text or tags. In this project, the MPEG-7-like Powered Localized Color and Edge Directivity Descriptor is used to extract the feature vectors of the image database and the facial recognition system is built around the Eigenfaces concept. A graphical user interface with the basic functionality of an image gallery application is also developed to implement the three search modes. Results show that the application is able to retrieve and display images in a collection as thumbnail previews with high retrieval accuracy and medium relevance and the computational requirements for subsequent searches were significantly reduced through the incorporation of text-based image retrieval as one of the search modes. All in all, this study introduces a simple and convenient way of offline image searches on desktop computers and provides a stepping stone to future content-based image retrieval systems built for similar purposes.

CME 2

Control and Mechatronic Engineering 2 (continue)

Room 3

11:00 A Solution to Partial Observability in Extended Kalman Filter Mobile Robot Navigation

Hamzah Ahmad (University Malaysia Pahang, Malaysia); Mohd Syakirin Ramli and Nur Aqilah Othman (Universiti Malaysia Pahang, Malaysia)

Partial observability in EKF based mobile robot navigation is investigated in this paper to find a solution that can prevent erroneous estimation. By only considering certain landmarks in an environment, the computational cost in mobile robot can be reduced but with an increase of uncertainties to the system. This is known as suboptimal condition of the system. Fuzzy Logic technique is proposed to ensure that the estimation achieved desired performance even though some of the landmarks were excluded for references. The Fuzzy Logic is applied to the measurement innovation of Kalman Filter to correct the positions of both mobile robot and any observed landmarks during observations. The simulation results shown that the proposed method is capable to secure reliable estimation results even a number of landmarks being excluded from Kalman Filter update process in both Gaussian and non-Gaussian noise conditions.

11:15 Brushless DC Motor Speed Controller for Electric Motorbike

Muhamad Syakir Adli Sulaiman and Noor Hazrin Hany Mohamad Hanif (International Islamic University Malaysia, Malaysia); Siti Fauziah Toha (Assistant Prof, Malaysia)

This paper presents a control scheme for speed control system in brushless dc (BLDC) motor. Many types of speed controller has been discussed in this paper by referring to the research paper from previous studies. The BLDC motor has some advantages compared to other motors. The brushless type of this motor make it more popular in industrial fields nowadays. In this paper, PID controller is being introduced as the main controller to maintain the speed of the motor at its optimum state. The mathematical model for this motor has been derived. The transfer function also had been produced based on the parameters given. The controller is designed to track variations of speed references and stabilizes the output speed during load variations. The effectiveness of this method is being verified by doing the simulation in MATLAB/SIMULINK software. The result shows that the proposed controller can be used to maintain the speed of the motor at its optimum speed.

11:30 Dual Axes Solar Tracker

Ahmad Ibrahim (International Islamic University of Malaysia, Malaysia); Farah Abdul Rahman (International Islamic University Malaysia, Malaysia); Muazzin Rohaizat (International Islamic University of Malaysia, Malaysia)

Photovoltaic (PV) is one of the most important sources of renewable energy in the world. Its current efficiency could be increased up to 60% by using dual axes solar tracker which maximise PV exposure to sun. The most important component in dual axes solar tracker is sensing location of the sun. Four light dependent resistors (LDR) are used as the sensors, connected to potentiometers to increase their accuracy. Arduino UNO is used as the controller to control the stepper motor and the dc motor. Two experiments had been carried out and the tolerance of the LDR has been found to be 0.05V and the calibration of the four LDRs to have the error of 0.03V. Both experiments proved the capability of LDR for dual axes solar tracker and potentiometer to increase their accuracy.

11:45 Development of Automatic Mixing Process for Fertigation System in Rock Melon Cultivation

Muhammad Khairie Idham Abd Rahman and Salinda Buyamin (Universiti Teknologi Malaysia, Malaysia); Mohamad Shukri Zainal Abidin (University of Technology Malaysia, Malaysia); Musa Mohd Mokji (Universiti Teknologi Malaysia, Malaysia)

This work proposed an automatic mixing system of nutrient solution for rock melon fertigation according to the required electrical conductivity (EC) level. Compared to the manual practice, this automatic system will ensure continuous supply of mixed nutrient solution without the need to daily check and mix new nutrient. Thus, this easy to use and low cost automatic system will reduce the burden of the farmers. This system uses an EC sensor to automatically check the concentration level of the mixed nutrient solution. Other than that, the system only consists of electronic pumps for mixing process and an Arduino board as the controller. The controller will monitor the EC level and run the mixing process when the EC level is below the required level. By calibrating the EC sensors, the test shows that the automatic mixing system is able to accurately keep the mixed nutrient solution concentration in a 400 L mixing reservoir at several required levels.

12:00 Path Tracking for Autonomous Vehicle for Severe Maneuvre

Zulkarnain Ali Leman (Universiti Teknologi Malaysia, Malaysia & Universitas Sriwijaya, Indonesia); Hairi Zamzuri and Hatta Ariff (Malaysia-Japan Institute of Technology, Universiti Teknologi Malaysia, Malaysia); Umar Zakir Abdul Hamid (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia)

Autonomous vehicle consists self-learning process consists recognizing environment, real time localization, path planning and motion tracking control. Path tracking is an important aspect on autonomous vehicle. The main purpose path tracking is the autonomous vehicle have an ability to follow the predefined path with zero steady state error. The non-linearity of the vehicle dynamic cause some difficulties in path tracking problems. This paper proposes a path tracking control for autonomous vehicle. The controller consists of a relationship between lateral error, longitudinal velocity, the heading error and the reference yaw rate. In addition, the yaw rate controller developed based on the vehicle and tyre model. The effectiveness of the proposed controller is demonstrated by a simulation.

EPE 2

Electrical Power Engineering 2 (continue)

Room 4

11:00 Preliminary Study of a New Topology of Permanent Magnet Flux Switching Motor for Electric Buses

Mohd Fairoz Omar (Universiti Tun Hussien Onn Malaysia, Malaysia); Md Zarafi Ahmad (Universiti Tun Hussein Onn Malaysia & UTHM, Malaysia); Erwan Sulaiman (Universiti Tun Hussein Onn Malaysia, Malaysia); Hassan Soomro (UTHM, Malaysia); Jaudah Abd Rani (Universiti Tun Hussein Onn Malaysia, Malaysia)

Electric buses (EBs) as public transit have been introduced in modern countries recently is an alternative to reduce climate change and environmental impacts of fossil fuels. One example of the successfully developed motor for EBs is interior permanent magnet synchronous motor (IPMSM) with merits heat dissipating, high torque per frame size and reliability influence by an absence of brushes. However, the three-phase armature windings are wound in the form of distributed windings, results

in much copper loss, high coil end length and reduced the efficiency. The embedded rectangular magnets inside the rotor make rotor less robust, increased rotor weight and reduced the torque and power density. The present IPMSM has a complex structure which is relatively difficult to manufacture and tough in optimization process. The 7.0 kg volume of PM used in IPMSM is very high, which increases the cost of the machine. Therefore, a new topology of permanent magnet flux switching motor using wedge-shaped PM and single stator structure with the advantages of simple stator design, robust rotor structure, high of torque and power, and high efficiency is proposed. The design, flux linkage, back-emf, cogging torque, average torque, speed, and power of this new topology are investigated by JMAG-Designer version 14.1 via a 2D-FEA. The initial design of proposed motor produces torque and power of 905.9 Nm and 57.75 kW, respectively.

11:15 Uncertain Dc-dc Zeta Converter Control in Convex Polytope Model Based on LMI Approach

Hafez Sarkawi (Kyoto University, Japan and Universiti Teknikal Malaysia Melaka, Malaysia); Yoshito Ohta (Kyoto University, Japan)

A dc-dc zeta converter is a switch mode dc-dc converter that can either step-up or step-down dc input voltage. In order to regulate the dc output voltage, a control subsystem needs to be deployed for the dc-dc zeta converter. This paper presents the dc-dc zeta converter control. Unlike conventional dc-dc zeta converter control which produces a controller based on the nominal value model, we propose a convex polytope model of the dc-dc zeta converter which takes into account parameter uncertainty. A linear matrix inequality (LMI) is formulated based on the linear quadratic regulator (LQR) problem to find the state-feedback controller for the convex polytope model. Simulation results are presented to compare the control performance between the conventional LQR and the proposed LMI based controller on the dc-dc zeta converter. Furthermore, the reduction technique of the convex polytope is proposed and its effect is investigated.

11:30 Cogging Torque Reduction Technique on E-Core Hybrid Flux Switching Motor by Notching and Pole Pairing

Jaudah Abd Rani and Erwan Sulaiman (Universiti Tun Hussein Onn Malaysia, Malaysia); Md Zarafi Ahmad (Universiti Tun Hussein Onn Malaysia & UTHM, Malaysia); Mohd Fairoz Omar (Universiti Tun Hussein Onn Malaysia, Malaysia); Hassan Soomro (UTHM, Malaysia); Rajesh Kumar (University of Tun Hussein Onn Malaysia & University of Tun Hussein Onn Malaysia, Malaysia)

In the past, 4S-10P E-Core Hybrid Flux Switching Motor (HFSM) had been studied. However, the motor suffers high cogging torque but it has high performance in terms of high power and high torque at high speed. Therefore, this paper is proposing the cogging torque reduction techniques to minimize the cogging torque. The high cogging torque gave an undesirable effect during low operating speed of the motor. In order to tackle the issue, the cogging torque mechanism in equation is laid out as a form of reference. Then the reduction techniques employed on the designs and analyzed with Finite Element analysis (FEA) in JMAG. The results show the cogging torque of the optimized design is 44.45% of the motor torque. Besides, the techniques employed to identify which techniques gave the most cogging torque reduction and analyzed the geometrical difference using the cogging torque mechanism. Finally, the analysis is discussed based on the modified geometrics.

11:45 Multi-Objective Evolutionary Programming for Static VAR Compensator Installation (SVC) in Power System Considering Contingencies (N-m)

Nor Rul Hasma Abdullah (Universiti Malaysia Pahang, Malaysia); Mahaletchumi Maha (Universiti Malaysia Pahang, Malaysia); Rosdiyana Samad and Mahfuzah Mustafa (Universiti Malaysia Pahang, Malaysia); Dwi Pebrianti (FKEE, University Malaysia Pahang, Malaysia)

Static VAR Compensators (SVCs) is a Flexible Alternating Current Transmission System (FACTS) device that can control the power flow in transmission lines by injecting capacitive or inductive current components at the midpoint of interconnection line or in load areas. This device is capable of minimizing the overall system losses and concurrently improves the voltage stability. A line index namely SVSI becomes indicator for the placement of SVC and the parameters of SVCs are tuned by using the multi-objective evolutionary programming technique, effectively able to control the power. The algorithm was tested on IEEE-30 Bus Reliability Test System (RTS). Comparative studies were conducted based on the performance of SVC in terms of their location and sizing for installations in power system.

12:00 Development of Compact Pulse Generator with Adjustable Waveshaped for Pulse Electric Field Treatment Technology

Nur Faiza (Universiti Teknologi Malaysia, Malaysia); M. Afendi M. Piah (Universiti Teknologi Malaysia & Institute of High Voltage and High Current, Malaysia)

The pulse generator which has been implemented in the pulse electric field (PEF) nonthermal method for food processing is worth to be highlighted and improved. It is parallel with the advancement in semiconductor technology, which offer robust and accurate devices. This research is an effort to produce a low cost, compact and reliable pulse generator as well as equipped with a PWM method for a wide selection of frequency and duty cycle. The result shows that the simulation process has proven the theoretical concept to be right and yield the desired outcome based on the calculated values. Then, the actual PCB of pulse generator was fabricated to observe and record its practical results to make comparison with the simulated version. Concerning the frequency and its duty cycle, both parameters can be altered without affecting each other. It means by changing the frequency, duty cycle remains the same and vice versa. Thus, this proposed pulse generator achieves its objective and fit to be implemented in PEF treatment technology and replace the conventional pulse forming network

Wednesday, December 6, 12:40 - 14:00

Lunch

Room: Anjung Razak UTMKL

Wednesday, December 6, 14:00 - 15:40

CE 3

Communication Engineering 3

Room 1

14:00 Compact Meander Line Telemetry Antenna for Implantable Pacemaker Applications

Noor Hafizah Sulaiman, Noor Asmawati Samsuri and Mohamad Kamal A. Rahim (Universiti Teknologi Malaysia, Malaysia); Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia); Muhammad Inam Abbasi (Universiti Teknologi Malaysia (UTM), Malaysia)

The demand for health technology is increasing rapidly especially in telemetry applications. These applications generally use implanted antennas to be utilized for data transfer from patients to another reader device. This procedure can make the health care more efficient, since it provides fast diagnosis and treatment to the patient. This work presents a design of telemetry antenna to be used in Pacemaker application in Medical Implant Communication Services (MICS) (401-406MHz). By introducing Compact Meander Line Telemetry Antenna (CMLTA), the overall dimension 37mm x 27mm. The proposed antenna offers advantages of easy fabrications, low cost and light weight with a simulated bandwidth of 6.17%.

14:15 Dielectric Resonator Reflectarray Antenna Unit Cells for 5G Applications

Nur Fazreen Sallehuddin (University Teknologi Malaysia, Malaysia); Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Muhammad Ramlee Kamarudin (Cranfield University, United Kingdom (Great Britain)); Muhammad Hashim Dahri (University Technology Malaysia & Pakistan Engineering Council, Malaysia); Siti Umairah Tajol Anuar (Universiti Teknologi Malaysia, Malaysia)

This paper presents an investigation for the performance comparison of three different unit cell configurations operating at 26 GHz for 5G applications. The unit cells are cross shape dielectric resonator, cross microstrip patch and cross hybrid dielectric resonator. Verification of the comparison has been done by simulations using commercial Computer Simulation Technology Microwave Studio (CST MWS). The simulated results for reflection phase, slope variation, reflection loss and 10% bandwidth was analyzed and compared. The results indicate that the optimum configuration to be deployed for the reflectarray's unit element in order to fulfill the 5G requirements of a wide bandwidth is the cross hybrid DRA. This configuration is a combination of cross DRA with cross microstrip patch as the parasitic element in order to tune the phase and provide a wide phase range with smooth variation slope. Cross hybrid DRA provided a wide phase range of 520° with 0.77 dB loss and 10% bandwidth of 160 MHz.

14:30 Structural Health Monitoring Sensor Based on a Flexible Microstrip Patch Antenna

Saidatul Norlyana Azemi (Lecturer, UniMAP, Malaysia); Hamse Abdillahi Haji Omer (UniMAP, Malaysia); Azremi Abdullah Al-Hadi (University Malaysia Perlis, Malaysia); Ping Jack Soh (Universiti Malaysia Perlis (UNIMAP) & Katholieke Universiteit Leuven, Malaysia); Faizal Jamlos (Universiti Malaysia Perlis, Malaysia); Latifah Munirah Kamarudin (University Malaysia Perlis, Malaysia)

A microstrip patch antenna strain sensor operating at dual frequencies 1.8GHz and 2.4GHz have been designed based on the relation between the resonant frequency and the strain applied to it. Felt substrate with a height of 3mm and dielectric constant of 1.44 and shield conductor are used for the design of this antenna. Testing results show that the resonant frequency of the microstrip patch antenna is 1.78 GHz and 2.4 GHz, which agrees with the simulation. The resonant frequency of the microstrip patch antenna increases linearly with the increase of the applied strain. This microstrip patch antenna strain sensor can be integrated with other components easily and have a great potential applications in structural health monitoring systems.

14:45 Dual Band to Wideband Pentagon-shaped Patch Antenna with Frequency Reconfigurability Using EBGs

Raimi Dewan and Mohamad Rijal Hamid (Universiti Teknologi Malaysia, Malaysia); Mohd Fairus Mohd Yusof (Faculty of Electrical Engineering, Universiti Teknologi Malaysia, Malaysia); Huda A. Majid (Universiti Tun Hussein Onn Malaysia, Malaysia); Bashir Esmail (UTHM, Malaysia)

A dual band to wideband reconfigurable pentagon-shaped antenna with EBG unit cell is proposed. A minimal number of nine EBG unit cell is deployed to realize frequency reconfigurable mechanism. By varying the state of the EBG the antenna capable to change its dual band operation to wideband alternately. There are three case that were analysed which are the EBG incorporated antenna with ideal and active EBG. The third case is the fabricated EBG incorporated antenna with ideal EBG. The dual band operation is at 1.8 GHz and 5.2 GHz while the wide band from 1.6 GHz to 2.37 GHz (770 MHz). The proposed reconfigurable antenna is suitable for to implemented for LTE (1.6 GHz), Wi-Fi (5.2 GHz), WiMAX (2.3 GHz) and cognitive radio application.

15:00 The Improvement of First Iteration Log Periodic Fractal Koch Antenna with Slot Implementation

Nur Syahirah Mohd Yaziz, Mohamad Kamal A. Rahim and Raimi Dewan (Universiti Teknologi Malaysia, Malaysia); Farid Zubir (Universiti Teknologi Malaysia & Faculty of Electrical Engineering, Malaysia)

In this paper, a slotted is introduced at each of the radiating elements on the 1st iteration log periodic fractal Koch antenna (LPFKA). The antenna is designed to testify the appropriate performance at UHF Digital television which operates from 4.0 GHz to 1.0 GHz. The dimension of the conventional 0th iteration LPKFA is successfully reduced by 17% with the implementation of slotted. The results show a good agreement with a stable radiation pattern across the operating bandwidth, stable gain more than 5 dBi and reflection coefficient of below -10 dB over the desired frequency range.

ECE 3

Electronic and Computer Engineering 3

Room 2

14:00 Back-to-Back Schottky Diode from Vacuum Filtered and Chemically Reduced Graphene Oxide

Shaharin Fadzli Bin Abd Rahman and Siti Nadiah Che Azmi (Universiti Teknologi Malaysia, Malaysia);
Abd Manaf Hasyim (MJIIT, Universiti Teknologi Malaysia, Malaysia)

This paper presents fabrication of reduced graphene oxide (rGO)-silicon (Si) back-to-back Schottky diode (BBSD) through graphene oxide (GO) film formation by vacuum filtration and chemical reduction of the film via ascorbic acid. In order to understand and assess the viability of these processes, process condition and parameter was varied and analyzed. The resulted in GO film thickness could be controlled by changing GO dispersion volume and concentration. Filtration of 200 ml of 0.4 ppm GO dispersion produced film with thickness of 70 nm. As for reduction process, long duration was required to produce higher reduction degree. It was found that reduction process after transfer process shows better result. The minimum sheet resistance of the reduced GO film was 3.58 MΩ/sq. Based on the above result, the BBSD device was fabricated and its current-voltage characteristics was characterized. The formed Schottky junction between rGO and Si was found to be around 0.6 to 0.7. The presented results confirmed the viability of fabricating rGO-based device using a simple method and without requirement of sophisticated equipments

14:15 Development of Accurate BSIM4 Noise Parameters for CMOS 0.13 Micrometer Transistors in Below 3-GHz LNA Application

Norlaili Mohd Noh (Universiti Sains Malaysia, Malaysia); Asmaa Aqilah (Universiti Sains, Malaysia);
Shukri Korakkottil Kunhi Mohd (Collaborative Microelectronic Design Excellence Centre (CEDEC),
Malaysia); Mohd Tafir Mustaffa, Arjuna Marzuki, Asrulnizam Abd Manaf and Mohamed Fauzi Packeer
Mohamed (Universiti Sains Malaysia, Malaysia)

Accurate transistor thermal noise model is crucial in IC design as it allows accurate selection of transistors for specific frequency application. The accuracy of the model is represented by the similarity between the simulated and the measured noise parameters (NPs). This work was based on a problem faced by a foundry concerning the dissimilarities between the measured and simulated NPs, especially NFmin for frequencies below 3 GHz. Hence, this work looks into the BSIM4 charge-based (TNOIMOD 0) and holistic (TNOIMOD 1) thermal noise models of a 0.13-μm CMOS device to determine the most accurate settings between them. As such, both the simulated and measured data for the transistors were retrieved from four NPs; NFmin, RN, |Γopt| and Γopt°. The findings exhibit optimum parameters for the TNOIMOD 1 at TNOIA=1.5, TNOIB=3.5, RNOIB=0.5164 and RNOIA = 1.477 for best NFmin and Γopt°, and RNOIA = 0.577 for best |Γopt| and Rn. Meanwhile, as for the TNOIMOD 0, the proposed setting is NTNOI=5 (above 4 GHz), NTNOI=10 (below 3 GHz), and either 5 or 10 for 3 to 4 GHz. On top of that, the noise figure (NF) performance of a low-noise amplifier (LNA) was chosen to verify the transistor's new NP settings. As a result, it was found that for application below 3 GHz, the TNOIMOD 0 at NTNOI=10 supersede the accuracy of the TNOIMOD 1.

14:30 Analysis the Effect of Control Factors Optimization on the Threshold Voltage of 18 nm PMOS Using L27 Taguchi Method

Norani Atan (Universiti Tenaga Nasional, Malaysia); Burhanuddin Yeop Majlis (UKM, Malaysia); Ibrahim Ahmad and Kok Hen Chong (Universiti Tenaga Nasional, Malaysia)

This research paper is about the investigation of Halo Implantation, Halo Implantation Energy, Halo Tilt, Compensation Implantation and Source/Drain Implantation. They are types of control factors that used in achievement of the threshold voltage value. To support the successfully of the threshold voltage (V_{TH}) producing, Taguchi method by using L27 orthogonal array was used to optimize the control factors variation. This analysis has involved with 2 main factors which are break down into five control factors and two noise factors. The five control factors were varied with three levels of each and the two noise factors were varied with two levels of each in 27 experiments. In Taguchi method, the statistics data of 18 nm PMOS transistor are from the signal noise ratio (SNR) with nominal-the best (NTB) and the analysis of variance (ANOVA) are executed to minimize the variance of threshold voltage. This experiment implanted by using Virtual Wafer Fabrication SILVACO software which is to design and fabricate the transistor device. Experimental results revealed that the optimization method is achieved to perform the threshold voltage value with least variance and the percent, which is only 2.16%. The threshold voltage value from the experiment shows -0.308517 volts while the target value that is -0.302 volts from value of International Technology Roadmap of semiconductor, ITRS 2012. The threshold voltage value for 18 nm PMOS transistor is well within the range of $-0.302 \pm 12.7\%$ volts that is recommendation by the International Roadmap for Semiconductor prediction 2012.

14:45 A Low Quiescent Current Fast Settling Capacitor-Less Low Drop Out Regulator Employing Multiple Loops

Suresh Alapati (National Institute of Technology Warangal, India); Patri Sreeharirao (National Institute of Technology, Warangal, India)

This paper presents a fast transient and low noise capacitor-less LDO using multiple loops. The proposed LDO exploits adaptive biasing, bulk modulation and a fast reacting control loop for achieving high performance striking reasonable tradeoffs among quiescent current, transient response and stability. The proposed LDO offers a load regulation of 0.095 μ V/mA while consuming quiescent current of 16 μ A. It exhibits a load transient of 134.23mV with a settling time of 240.8ns against 0 to 100mA load variation with 40pF output capacitor. It exhibits an integrated noise of 31.027 pV²/Hz at 10 Hz for a maximum load current of 100mA. The proposed LDO is designed using 0.18- μ m 1P6 CMOS process.

15:00 Development of Fall Risk Detector for Elderly

Noraini Zakaria, Muhammad Asaari and Nur Amalina Rashid (Universiti Teknologi Malaysia, Malaysia)

In Malaysia, falls has become the most common injuries for elderly [1]. Therefore, a wearable fall detector device is created to decrease the risk of serious injury among elderly. The device consists of an accelerometer (ADXL345) as a sensor, an Arduino Nano as a microcontroller, and a Global System for Mobile Communications (GSM) as a notifier. A group of 15 young people participated in performing several sets of different falls and ADL (daily life activities) to determine the ability of the device. The result shows a good functioning performance by 92.6% sensitivity to detect fall and 89.3% specificity in discriminate fall from daily life activity.

CE 4

Communication Engineering 4

Room 3

14:00 0.5 GHz - 1.5 GHz Bandwidth GaN HEMT RF Power Amplifier Design

Ilamaran Shiva Ghandi Isma and Zubaida Yusoff (Multimedia University, Malaysia); Jahariah Sampe (Universiti Kebangsaan Malaysia (UKM) & Institute of Microengineering and Nanoelectronics (IMEN), Malaysia)

With the current development in wireless communication technology, the need for a wide bandwidth in RF power amplifier (RF PA)'s is an essential. In this paper, the design and simulation of 10W GaN wideband RF PA will be presented. The Source - Pull and Load - Pull technique was used to design the input and output matching network of the power amplifier. The operating frequency of the power amplifier was set to be 1.5 GHz and the drain efficiency of 36 % was achieved at output power of 40 dBm. Moreover, the power added efficiency was found to be 28.21%.

14:15 Novel Metamaterial Structures with Low Loss at Millimeter Wave Frequency Range

Bashar Esmail (UTHM, Malaysia); Huda A. Majid (Universiti Tun Hussein Onn Malaysia, Malaysia); Samsul Haimi Dahlan (Universiti Tun Hussien Onn Malaysia, Malaysia); Zuhairiah Zainal Abidin (Universiti Tun Hussein Onn Malaysia, Malaysia); Mohamad Kamal A Rahim and Raimi Dewan (Universiti Teknologi Malaysia, Malaysia)

Two novel millimeter-wave (MMW) metamaterials (MTMs) unit cells operate at 28 GHz for a future fifth generation (5G) mobile network applications had been designed, presented and numerically investigated. Two MTM structures are proposed; namely the double E-shaped resonator (DER) and T-U shaped resonator (TUSR). The DER and TUSR are consists of a double E and combined T-U shaped, each printed on front side of the substrate layer respectively. DER achieves a bandwidth of 0.5 GHz and a return loss of -34 dB, whereas TUSR features a bandwidth of 0.3 GHz and a return loss of -18 dB. The conventional split range resonator (SRR) was optimized to operate at similar frequency for comparison purpose. The simulation results revealed that the proposed DER and TUSR unit cells achieves the lowest loss as opposed to literature with -0.09 dB (0.99 in linear scale) and -0.23 dB (0.97 in linear scale) respectively. Moreover, a well-known algorithm was used to extract the constitutive parameters and the double negative nature of the two novel MTM structures is proven.

14:30 A Cross Slot Coupling to Enhance Bandwidth of Dual-Layer SIW Structure

Muhamad Hafiz (Wireless Communication Center (WCC), UTM Skudai); Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Raghuraman Selvaraju (Universiti Teknologi Malaysia & WCC, Malaysia)

In this paper, design characteristics of cross slot coupling have been explored and realized in a proposed dual-layer SIW prototype for bandwidth enhancement at 10.0 GHz. The assembled prototype consists of two SMA-microstrip input/output interface with low-loss microstrip-taper via transition and two manually stacked SIW structures electrically connected via a small cross slot coupling design. The proposed dual-layer SIW structure is designed using CST software and fabricated using conventional Printed Circuit Board (PCB) manufacturing process on Rogers 4003 C with $\epsilon_r = 3.38$ and $h = 0.813$ mm. The close agreement between simulated and measured results is observed within a frequency range studied of 9.2 GHz to 11.2 GHz with 19.0 % bandwidth performance. The used of cross slot coupling design in the assembled dual-layer SIW structure indicated 9.0 % bandwidth

enhancement compared to the conventional multilayer design with rectangular slot coupling. The assembled dual-layer SIW structure with cross slot coupling design shows potential in several RF applications such as radar and satellite communication.

14:45 A Compact Band Pass Filter Using a T-shaped Loaded Open-ended Stub Resonator

Nyangwarimam Ali (Faculty of Electrical Engineering, University of Technology Malaysia, Malaysia); Mohamad Rijal Hamid, Mohamad Kamal A Rahim and Noor Asniza Murad (Universiti Teknologi Malaysia, Malaysia)

This paper proposes a compact bandpass filter using a loaded open-ended T-shaped stub. The open-ended T-shaped stub is loaded with vertical resonators placed across. The key advantage of using vertical resonators in the design is the simplicity and low insertion loss it provides. The structure used is an open-ended stub attached on one end to the transmission line ($\lambda/2$) to form a T-shaped resonator ($\lambda/4$) having vertical resonators placed across. The vertical resonator position alters the position at which the transmission zero occurs. A pair of the T-shaped resonator is placed on parallel sides of the feed line. The proposed filter is designed with the aid of Computer Simulation Technology Microwave Studio Software. The proposed concept is verified by designing filters with four different vertical resonator positions. The filter possesses a good rejection and low insertion loss of $< 2\text{dB}$ with Chebyshev response. This filter is suited for modern-day communication applications since it shows good rejection of out of band signals.

15:00 Band-pass Filter with Harmonics Suppression Capability

Izni Husna Idris, Mohamad Rijal Hamid, Kamilia Kamardin and Mohamad Kamal A. Rahim (Universiti Teknologi Malaysia, Malaysia); Farid Zubir (Universiti Teknologi Malaysia & Faculty of Electrical Engineering, Malaysia)

This paper presents, a Band-pass Filter (BPF) with a very wide suppressions band. The filter design is based on a modified U-shaped slot. Two pair of U-shaped slots are used to ensure that the filter can suppress the unwanted frequencies up to 4th harmonics. The passband range start from 1.3 to 3.3 GHz and the stopband range from 3.3 up to 9 GHz. The filter performances are verified through simulated and measured results.

CE 5

Communication Engineering 5

Room 4

14:00 Q-switched Erbium Doped Fiber Laser Incorporating Antimony (III) Telluride in Polyvinyl Alcohol as Saturable Absorber

Ezzatul Irradah, Muhammad Ashraf Zolkopli and Muhammad Quisar Lokman (MJIIT, Universiti Teknologi Malaysia, Malaysia); Sulaiman Wadi Harun (Uni Malaya, Malaysia); Fauzan Ahmad (MJIIT, Universiti Teknologi Malaysia, Malaysia); Hafizal Yahaya (Universiti Teknologi Malaysia, Malaysia)

In this paper, we demonstrates a Q-switched erbium doped fiber laser (EDFL) incorporating Antimony (III) Telluride (Sb_2Te_3) in polyvinyl alcohol (PVA) as passive saturable absorber. The saturable absorber were fabricated by dissolving Sb_2Te_3 powder into PVA solution and dry in the ambient temperature for 48 hours. Then, 1 mm² Sb_2Te_3 -PVA film based saturable absorber were sandwiched in between FC/PC ferrule for Q-switched laser generation. The stable and self-started Q-switched laser operates at center wavelength 1560 nm with 3 dB bandwidth of 0.23 nm. The laser operates at pump power of

29.3 mW until 84.9 mW with repetition rate of 20.99 kHz to 89.29 kHz and pulse width of 13.95 μ s to 5.10 μ s. At maximum pump power, the laser able to achieve pulse energy of 62.72 nJ and high signal to noise ratio of 71.4 dB.

14:15 Maximally Spatial-Disjoint Lightpaths in Optical Networks

Muhammad Waqar Ashraf (UTM, Malaysia); Sevia Mahdaliza Idrus (Faculty Of Electrical Engineering & Universiti Teknologi Malaysia, Malaysia); Farabi Iqbal (Universiti Teknologi Malaysia, Malaysia)

Lightpaths enable end-to-end all-optical transmission between network nodes. For survivable routing, traffic are often carried on a primary lightpath, and rerouted to another disjointed backup lightpath in case of the failure of the primary lightpath. Though both lightpaths can be physically disjointed, they can still fail simultaneously if a disaster affects them simultaneously on the physical plane. Hence, we propose a routing algorithm for provisioning a pair of link-disjoint lightpaths between two network nodes such that the minimum spatial distance between them (while disregarding safe regions) is maximized. Through means of simulation, we show that our algorithm can provide higher survivability against spatial-based simultaneous link failures (due to the maximized spatial distance).

14:30 Performance Improvement for Hybrid L-band Remote Erbium Doped Fiber Amplifier/Raman Using Phase Modulator

Nelidya Md. Yusoff (Universiti Teknologi Malaysia, Malaysia); Abdul Hadi Sulaiman (Universiti Tenaga Nasional, Malaysia); Sumiaty Ambran (Universiti Teknologi Malaysia & Malaysia-Japan International Institute of Technology, Malaysia); Azura Hamzah (Universiti Teknologi Malaysia, Malaysia); Mohd Adzir Mahdi (Universiti Putra Malaysia, Malaysia)

We have demonstrated the performance improvement of L-band hybrid R-EDFA by introducing a phase modulator to suppress the SBS effect in the transmission. The transmission gain has improved by 12.65 dB while the noise figure has reduced by 47.1 dB when 0 dBm signal power is generated at 1590.05 nm wavelength. Furthermore, the optical signal-to-noise ratio has improved from 7.81 dB to 29.72 dB when the signal power is varied from -30 dBm to 0 dBm. By implementing a phase modulator to the input signal somehow able to produce better performance regarding gain, noise figure and OSNR, especially at the higher signal power as the gain, has been transferred to the Stokes signal and the amplified signal.

14:45 Multiwavelength Fiber Laser Based on Bidirectional Lyot Filter in Conjunction with Intensity Dependent Loss Mechanism

Abdul Hadi Sulaiman (Universiti Tenaga Nasional, Malaysia); Nelidya Md. Yusoff (Universiti Teknologi Malaysia, Malaysia); Noran Azizan Cholan (Universiti Tun Hussein Onn Malaysia, Malaysia); Mohd Adzir Mahdi (Universiti Putra Malaysia, Malaysia)

We experimentally demonstrate a multiwavelength fiber laser (MWFL) based on bidirectional Lyot filter. A semiconductor optical amplifier (SOA) is used as the gain medium, while its combination with polarization controllers (PCs) and polarization beam splitter (PBS) induces intensity dependent loss (IDL) mechanism. The IDL mechanism acts as an intensity equalizer to flatten the multiwavelength spectrum, which can be obtained at a certain polarization state. Using different ratio of optical splitter affected to multiwavelength flatness degradation. As we removed a polarizer in the setup, the extinction ratio (ER) is decreased. Ultimately, with two segments of polarization maintaining fiber (PMF), two channel spacings can be achieved due to splicing shift of 0° and 90°.

15:00 Scattering Regimes for Underwater Optical Wireless Communications Using Monte Carlo Simulation

Faezah Jasman (First City University College, Malaysia); Zaiton Abdul Mutalip (Universiti Teknikal Malaysia Melaka & Centre for Telecommunication Research & Innovation (CeTRI), Malaysia); Zahir Ahmad (Coventry, United Kingdom (Great Britain)); Zeina Rihawi (University of Warwick, United Kingdom (Great Britain))

Optical wireless communications has shown tremendous potential for underwater applications as it can provide higher bandwidth and better security compared to acoustic technologies. In this paper, an investigation on scattering regimes for underwater links using Monte Carlo simulation has been presented. While the focus of this paper is on diffuse links, the simulation results of collimated links is also provided for comparison purpose. Three types of water namely clear, coastal and turbid water are being used in the simulation. It is shown that the effect of scattering on the path loss cannot be accurately modeled by the existing channel model; ie. Beers-Lambert (BL) law. It has been shown that the distance at which the unscattered light drops to zero can be used to estimate the transition point for the scattering regimes in case of diffuse links. The transition point for diffuse links in coastal water and turbid water can be estimated to be around 22 m and 4 m respectively. Further analysis on the scattering order probability at different scattering regimes illustrates how scattering is affected by beam size, water turbidity and distance. From the frequency response plot, it is estimated that the bandwidth of several order of GHz can be achieved when the links are operating in the minimal scattering region and will reduce to several hundreds of MHz when the link is operating in multiple scattering region.

15:15 Interference Temperature Measurements and Spectrum Occupancy Evaluation in the Context of Cognitive Radio

Eberechukwu Paulson and Dauda Umar Suleiman (Universiti Teknologi Malaysia, Malaysia); Alias Mohd (UTM, Malaysia); Kamaludin Mohamad Yusof and Rozeha A. Rashid (Universiti Teknologi Malaysia, Malaysia)

This paper presents a refined radio spectrum measurement platform specifically designed for spectrum occupancy surveys in the context of Cognitive radio. Cognitive radio permits the opportunistic usage of licensed bands by unlicensed users without causing harmful interference to the licensed user. In this work, a study based on the measurement of the 800 MHz to 2.4 GHz frequency band at two different locations inside Universiti Teknologi Malaysia (UTM), Johor Bahru campus, Malaysia is presented. Two Tektronix RSA306B spectrum analyzer are set up to conduct simultaneous measurements at different locations for a 24 hours period. The analysis conducted in this work is based on the real spectrum data acquired from environment in the experimental set up. Busy and idle channels were identified. The channels subject to adjacent-channel interference were also identified, and the impact of the detection threshold used to detect channel activities was also discussed. The consistency of the observed channel occupation over a range of thresholds and a sudden drop has good characteristics in determining an appropriate threshold needed in order to avoid interference.

ECE 4

Electronic and Computer Engineering 4

Room 5

14:00 Reducing Total Power Consumption and Total Area Techniques for Network-on-Chip Through Disable Cores and Routers Based on Clustering Method

Ng Yen Phing (University Malaysia Perlis, Malaysia); Mohd Nazri Mohd Warip (UNIMAP, Malaysia); Phaklen Ehkan (University Malaysia Perlis, Malaysia)

Network-on-Chip (NoC) is a promising solution to overcome the communication problem of System-on-Chip (SoC) architecture. The execution of topology, routing algorithm and switching technique is significant because it powerfully affects the overall performance of NoC. In the Network-on-Chip, the total power consumption increasing due to the large scale of network. In order to solve it, a clustering method and disable cores and routers based on clustering method is apply onto mesh based NoC architecture. In the proposed approach, the optimization of total area and total power consumption are the major concern. Experiment results show that the proposed method outperforms the existing work. The clustering-mesh based method reduced the total area by 22% to 40 % and total power consumption by 22% to 56% compare to mesh topology. In addition, the proposed method by disable cores and routers based on clustering-mesh based method has decrease the total area by 45% to 87% and total power consumption by 33% to 75% compare to mesh topology.

14:15 Bounded Probabilistic Neural Network with Circular Activation Function

Wee Teck Lim (Mr., Malaysia); King Hann Lim and Hendra Harno (Curtin University, Sarawak, Malaysia)

Gaussian-based Radial basis function (RBF) is a commonly used activation function in Probabilistic Neural Network (PNN). PNN receives input sequentially into the network and estimates the probability density function (PDF) of the likelihood between a new observed data and the trained samples. However, the exponential nature of RBF activation function contributes to a very small PDF value when the difference between two observations increases. The resultant PDF values can fall into near zero regions either due to the number of input dimensions or the value of the input intensity. By replacing the exponential shape activation function with a circular shape activation function, the PDF value can be guaranteed to fall in a bounded range. The proposed Bounded-PNN is tested using three dataset , a handwritten digit dataset from MNIST, a real-life underwater fish images from Fish4Knowledge dataset and a digitally created fish images dataset. The simulation results showed that the proposed method increases the PDF gap between positive and negative instances by 78.3% and detection accuracy by 30.7%.

14:30 Impact of Packet Inter-arrival Time Features for Online Peer (P2P) Classification

Bushra Ali (UTM, Malaysia); Mosab Hamdan (Universiti Teknologi Malaysia, Sudan); Stephen Joseph (Universiti Teknologi Malaysia & Faculty of Electical Engineering, Malaysia); Mohammed Sultan (Universiti Teknologi Malaysia, Sudan); Ismahani Ismail and Muhammad Nadzir Marsono (Universiti Teknologi Malaysia, Malaysia)

Identification of bandwidth-heavy Internet traffic is important for network administrators to throttle high-bandwidth application traffic. Flow features based classification have been previously proposed as promising method to identify Internet traffic based on packet statistical features. The selection of statistical features plays an important role for accurate and timely classification. In this work, we investigate the impact of packet inter-arrival time feature for online P2P classification in terms of

accuracy, Kappa statistic and time. Simulations were conducted using available traces from University of Brescia, University of Aalborg and University of Cambridge. Experimental results show that the inclusion of inter-arrival time (IRT) as an online feature increases simulation time and decreases classification accuracy and Kappa statistic.

14:45 Recognition System for Classification of Human Body Parts

Nurul Fatiha Johan, Syahar Shukor and Nursabillilah Binti Mohd Ali (Universiti Teknikal Malaysia Melaka, Malaysia)

The use of computer vision in the surveillance system has provided huge advantages in the field of security and safety. Recognition of human body parts can be a challenging task due to the wide variability of human appearance in terms of clothing, lighting conditions and the occlusion especially in the crowded environment. Recognition of human body parts also play an important task when dealing with missing people. To cope with this problem, a technique has been introduced in this paper to recognize and classify the body parts using neural network system. The segmentation of body parts is extracted by using skin color detection but this process did not cover for this paper. Then the body features from detection process is used as an input to a neural network system (ANN) with feedforward backpropagation algorithm in order to classify the body parts into a specific class. Experimental results indicate that the ANN classification system is successful in identifying face, right hand and left hand by 90%, 73% and 74% respectively.

15:00 DEVELOPMENT OF REAL-TIME POSE ESTIMATION ALGORITHM FOR QURANIC ARABIC WORD

Luqman Naim Mohd Esa (International Islamic University of Malaysia, Malaysia); Malik Arman Morshidi (International Islamic University Malaysia, Malaysia); Syarah Munirah Mohd Zailani (International Islamic University of Malaysia, Malaysia)

The study carried out in this report proposes the best keypoint detection, description, and pose estimation algorithm combination for Quranic Arabic words. Oriented-FAST Rotated-BRIEF (ORB) and Accelerated-KAZE (AKAZE) are used as the keypoint detection and description algorithms while Random Sample Consensus (RANSAC) and Least Median Squares (LMEDS) are used to evaluate the homography for pose estimation algorithms. The algorithms are combined with each other to provide four different techniques to estimate the pose of Quranic Arabic words. The algorithms are tested on a limited dataset chosen from a phrase within the Quran. Performance of each algorithm is measured in real-time through inlier to keypoint ratio which determines pose accuracy.

Wednesday, December 6, 15:40 - 16:00

Afternoon Break

Room: Anjung Razak UTMKL

Wednesday, December 6, 16:00 - 17:40

CE 3

Communication Engineering 3 (continue)

Room 1

16:00 *Experimental Study on the Effect of Antenna Orientations to the Performance of OFDM-based System*

Jusnaini Muslimin, Ani Liza Asnawi, Ahmad Fadzil Ismail, Ahmad Jusoh, Norun Abdul Malek and Huda Adibah Mohd Ramli (International Islamic University Malaysia, Malaysia)

Software-defined radio (SDR) is an emerging and promising high re-configurable platform for rapid prototyping and real environment applications. It offers both flexibility and low cost to facilitate the development process of agile communication system, such as Orthogonal Frequency Division Multiplexing (OFDM). Other than modulation and transmission technique like OFDM, antenna orientations play a significant importance in wireless communication. The availability of SDR platform like USRP has enabled the empirical evaluation of antenna orientation to the system performance. In this study, the performance has been evaluated in terms of throughput and packet error rate (PER). The findings show the antenna orientation affect the system performance significantly.

16:15 *Meander Bowtie Antenna for Wearable Application*

Nazirah Othman (University Teknologi Malaysia, Malaysia); Noor Asmawati Samsuri, Mohamad Kamal A. Rahim and Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia)

This paper proposes a flexible compact bowtie antenna for medical application that operates at 2.45 GHz. The proposed antennas are miniaturized using meander technique. Both substrates and conducting material of the antenna are made of flexible material semi-transparent film as a substrate and shieldit fabric as a conducting material which suitable for wearable and on body application. The results in this research show that the total length of the antenna is significantly reduced up to 38%. However, the gain of the antenna is slightly decreased when the size of the antenna become smaller. The results of this research could provide guidance and has significant implication for future development of wearable electronics especially in medical monitoring application.

16:30 *Design of Miniaturized Multiband Patch Antenna Using Multiple-Circular Complementary Split Ring Resonator (MC-CSRR) for WLAN/WiMAX Applications*

Murtala Aminu-Baba (Universit Teknologi Malaysia, Malaysia); Mohamad Kamal A. Rahim (Universiti Teknologi Malaysia, Malaysia); Farid Zubir (Universiti Teknologi Malaysia & Faculty of Electrical Engineering, Malaysia); Mohd Fairus Mohd Yusof (Faculty of Electrical Engineering, Universiti Teknologi Malaysia, Malaysia)

A novel miniaturized multiband, single-feed microstrip patch antenna is presented in this letter for WLAN and WiMAX applications. Both size reduction and multiband are obtained by etching the Multiple Complementary Split Ring Resonators (MC-SRR) on the ground plane of the normal patch antenna. At first, the normal patch antenna produces a single band of 5.15GHz; 200 MHz (5.0500 ~ 5.2499). Subsequently, a Single Circular Split Ring Resonator (SC-SRR) is etched on the ground plane and produces a triple band of: 3.25GHz; 288 MHz (3.1085 ~ 3.3964), 4.5GHz; 101.3 MHz (4.4488 ~ 4.5501), & 5.22GHz; 220 MHz (5.1191 ~ 5.3400) and Double Single Circular Split Ring Resonator (DC-MCSRR) with: 2.99GHz; 60.7 MHz (2.9574 ~ 3.0181), 3.57GHz; 324.7 MHz (3.4065 ~ 3.7312), &

5.1413GHz; 115.4 MHz (5.0817 ~ 5.1971). The working bandwidths cover the desired frequency bands of WLAN 5.2GHz and WiMAX 3.3/3.5GHz. The proposed (MC-SRR) antenna can be employed to wireless communication systems due to its simplicity in design, compactness and miniaturization.

16:45 Switchable Wideband Metamaterial Absorber and AMC Reflector for X-band Applications and Operation

mohammed mustapha gajibo, Mohamad Kamal A. Rahim, Noor Asniza Murad and Osman Bin Ayop (Universiti Teknologi Malaysia, Malaysia); Huda A. Majid (Universiti Tun Hussein Onn Malaysia, Malaysia)

A single layered metamaterial structure with capabilities of switching from a wideband metamaterial absorber to an AMC reflector and vice versa is presented in this paper. A flame retardant 4 substrate with physical thickness of 1.60mm was used. The absorption rate, reflection rate, reflection phase and surface current distribution were studied and discussed. The operational incidental wave angles were varied from 0° to 65°. A peak reflection of about 90% was achieved at 11.20 GHz with a usable bandwidth (-90 to +90) of 3.01 GHz by the AMC reflector. The metamaterial absorber demonstrated a wideband performance (from 8.10 GHz to 14.30 GHz). It achieved 100% absorption at 11.20 GHz and not less than 65% absorption across the entire X-band frequencies except for incidental wave angles above 55°.

17:00 Frequency Reconfiguration Mechanism of a PIN Diode on a Reconfigurable Antenna for LTE and WLAN Applications

Shaharil Mohd Shah (Universiti Tun Hussein Onn Malaysia, Malaysia); Muhamad Fariz Mat Daud (UTHM, Malaysia); Zuhairiah Zainal Abidin (Universiti Tun Hussein Onn Malaysia, Malaysia); Shipun Anuar Hamzah (Universiti Tun Hussein Onn Malaysia & Faculty of Electrical and Electronic Engineering (FKEE), Malaysia); Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia); Farid Zubir (Universiti Teknologi Malaysia & Faculty of Electrical Engineering, Malaysia)

Microstrip patch antennas are increasingly gaining popularity for usage in portable wireless system applications due to their light weight, low profile structure, low cost of production and robust nature. The patch is generally made of a conducting material such as copper or gold and can take any possible shapes, but rectangular shapes are generally used to simplify analysis and performance prediction. Microstrip patch antenna radiates due to the fringing fields between the patch edge and ground plane. In this work, a frequency reconfigurable antenna with a BAR63-02V Positive-Intrinsic-Negative (PIN) diode is designed, simulated and fabricated. The antenna operates at 2.686 GHz for Long-Term Evolution (LTE2500) and 5.164 GHz for Wireless Local Area Network (WLAN) applications. In the OFF state, the antenna operates at 5.302 GHz, which is also suitable for WLAN application. The proposed antenna is fabricated on a FR-4 substrate with a relative dielectric constant, ϵ_r of 4.5, thickness, h of 1.6 mm and loss tangent, $\tan \delta$ of 0.019. The fabrication process is carried out at the Advanced Printed Circuit Board (PCB) Design Laboratory.

ECE 3

Electronic and computer Engineering 3 (continued)

Room 2

16:00 Artificial Neural Networks to Predict Coal-fired Boiler Fault Using Boiler Operational Parameters

Nong Nurnie Mohd. Nistah (Curtin University Malaysia, Malaysia); King Hann Lim (Curtin University, Sarawak, Malaysia); Lenin Gopal (Curtin University Malaysia, Malaysia); Firas B. Ismail Al-Naimi (Universiti Tenaga Nasional, Malaysia)

A boiler operational parameter fault prediction is still a significant issue in a thermal power plant. The most convenient and effective means to accurately predict this occurring fault is by implementing Artificial Neural Network (ANN) in the existing monitoring system. The complexity of the boiler mechanism makes it difficult and dangerous for the plant operators to monitor and identify any occurring fault in real time. In this paper, a boiler fault monitoring model based on the least misclassification rate (MCR) and mean squared error (MSE) simulation outcome using a specific set of initial weights are developed and key influential parameters analysis approach is carried out to identify its correlation with the performance of the boiler. In this process, ANN is used to improve the boiler fault monitoring model and the least MCR and MSE values are used to validate its prediction accuracy against actual fault value from a collected real plant data. With reference to the study and test results, both initial weights sets has been found to have a very fast computation time with only a slight difference in its MSE and MCR performance in the training stage. However, during the testing stage it shows that a selected randomized initial weight set has achieved a higher accuracy with the least MCR.

16:15 Algorithm to Convert Signal Interpreted Petri Net Models to Programmable Logic Controller Ladder Logic Diagram Models

Zulfakar Aspar, Mohamed Khalil-Hani and Nasir Shaikh-Husin (Universiti Teknologi Malaysia, Malaysia)

Signal Interpreted Petri Nets (SIPN) modeling has been proposed as an alternative to Ladder Logic Diagram (LLD) modeling for programming complex programmable logic controllers (PLCs) due to its high level of abstraction and functionalities. This paper proposes an algorithm to efficiently convert existing SIPN models to their LLD models equivalences. In order to automate and speed up the conversion process, matrix calculation approach is used. A complex SIPN model was used to show that existing conversion technique must be expanded in order to cater for a more complex SIPN models.

16:30 Smart Monitoring of a Water Quality Detector System

Sharatul Izah Samsudin, Sani Irwan Md Salim, Khairuddin Osman and Siti Fatimah Sulaiman (Universiti Teknikal Malaysia Melaka, Malaysia)

The importance to monitor the water quality level is undeniable due to significant impact to human health and ecosystem. The project aims to develop a wireless water quality monitoring system that aids in continuous measurements of water conditions based on pH and turbidity measurements. These two sensors are connected to microprocessor and transmitted to the database by using a Wi-Fi module as a bridge. The developed system was successfully detect both the pH and turbidity values hence updating in IoT platform. Based on the results obtained, the test water sample can be classified to class IIB which is suitable for water recreational used body contact. Overall, the developed system offers fast and easy monitoring of pH and turbidity levels with IoT application for continuous

maintenance of clean water. The work is just concern on the physical water parameters hence further extend to chemical parameter for verifying a better result in measuring the WQI value.

16:45 Instruction Set Extension of a Low-End Reconfigurable Microcontroller in Bit-Sorting Implementation

Sani Irwan Md Salim, Yewguan Soo and Sharatul Izah Samsudin (Universiti Teknikal Malaysia Melaka, Malaysia)

The microcontroller-based system is currently having a tremendous boost with the revelation of platforms such as the Internet of Things. Low-end families of microcontroller architecture are still in demand albeit less technologically advanced due to its better I/O better application and control. However, there is clearly a lack of computational capability of the low-end architecture that will affect the pre-processing stage of the received data. The purpose of this research is to combine the best feature of an 8-bit microcontroller architecture together with the computationally complex operations without incurring extra resources. The modules' integration is implemented using instruction set architecture (ISA) extension technique and is developed on the Field Programmable Gate Array (FPGA). Extensive simulations were performed with the and a comprehensive methodology is proposed. It was found that the ISA extension from 12-bit to 16-bit has produced a faster execution time with fewer resource utilization when implementing the bit-sorting algorithm. The overall development process used in this research is flexible enough for further investigation either by extending its module to more complex algorithms or evaluating other designs of its components.

17:00 Fine-Grained Overhead Characterisation of Cross-ISA DBTO for Multicore Processor

Joo On Ooi (Universiti Tunku Abdul Rahman, Malaysia)

The emergence of modern portable software, start to behaved hybrid short-long running combined applications, in which an active apps may invoked others to fulfill task requirements. Thus the implementation of Dynamic Translation and Optimisation (DBTO) into heterogeneous multicore system-on-chip (SoC) will require careful re-study, to ensure efficient usage of most available cores. In order to improve efficiency in supporting this ISA diversity of computing platforms, mix modes of statically and dynamically Binary Translation and Optimization system, or DBTO, need to utilize concurrent compilation techniques, to better service the combined applications processing. This research deep dived into finer-grained DBTO overhead analysis, to provide categorization and characterization of overhead sources in breakdown stages during concurrent instruction processing. A dual-engine of translation and optimization is constructed for finer management of start-up overheads. Helper functions, i.e. LL/SC are derived from atomic instructions, to create multiple helper thread supported by multiple host cores, for better instruction translation and optimization operation concurrently. Our experiment platform, evaluated through PARSEC-3.0 benchmark suite, shows performance improvement approaching 2.0x for apps based programs and 1.25x for kernel based programs, for x86 to X86-64 emulation. This technique possess great potential and serve as research based platform for future binary translation technique development, including adaptive method.

CE 4

Communication Engineering 4 (continued)

Room 3

16:00 Multilayer End Coupled Band Pass Filter Using LTCC Technology for Broadband Fixed Wireless Access

Zulkifli Ambak (TM Research & Development Sdn Bhd, Malaysia); Razali Ngah (Universiti Teknologi Malaysia, Malaysia); Ahmad Ismat Abdul Rahim (Telekom Research & Development Sdn Bhd, Malaysia); Hizamel M. Hizan (Telekom Malaysia (TM) Research & Development, Malaysia); Azmi Ibrahim (TM Research & Development Sdn. Bhd., Malaysia); Mohd Zulfadli Mohamed Yusoff (TM Research & Development Sdn Bhd, Malaysia)

This paper describes the design of Multilayer End Coupled Band Pass Filter (EC BPF) using Low Temperature Co-Fired Ceramic (LTCC) for broadband fixed wireless access at 40GHz frequency region. The multilayer end coupled band pass filter was designed and realized using LTCC Ferro A6S substrate. The dielectric constant of the LTCC Ferro A6S substrate was 5.8 and its loss tangent was 0.002 at 40GHz. The EC BPF was fabricated in the 8 layers LTCC Ferro A6S. Its measured insertion loss and return loss were 3.17dB and 18.53dB at center frequency of 42GHz respectively. The overall size of the fabricated filter was 10.5 mm x 2.5 mm x 0.77 mm.

16:15 Analysis of Time Diversity Gain for Satellite Communication Link Based on Ku-Band Rain Attenuation Data Measured in Malaysia

Md Rafiqul Islam (International Islamic University Malaysia, Malaysia); Ali Kadhim Lwas (IIUM, Malaysia); Mohamed Hadi Habaebi (International Islamic University Malaysia (IIUM), Malaysia)

This paper reports a study on mitigation of propagation impairments on Earth-space communication links. The study uses time diversity as a technique for mitigating rain propagation impairment in order to rectify rain fade. Rain attenuation time series along earth-to-satellite link were measured for two years period at 12.225 GHz in Malaysia. The time diversity technique was applied on measured rain fade to investigate the level of possible improvement in system. Time diversity gain from measured one-minute rain attenuation for two years period was estimated and significant improvement was observed with different delays of time. These findings will be utilized as a useful tool for link designers to apply time diversity as a rain fade mitigation technique in earth-satellite communications systems.

16:30 Performance Evaluation of Two Port and Four Port Measurement for Twisted Pair Cable

Azhari Asrokin (Telekom Research & Development Sdn Bhd, Malaysia)

A balance-unbalance (balun) transformer is commonly used to connect the balance 100 Ohm twisted pair cable to the unbalance 50 Ohm network analyzer ports, but due to the limitations of the core (i.e. ferrite) inside the balun, the balun can only effectively operates at a certain band of frequencies. This limitation can be eliminated by using a 4-port vector network analyzer (VNA) which is done by connecting the VNA's ports to each conductor end. The extracted S-parameters will then be transformed to a 2-port S-parameters in differential mode at both ports. To validate the measurement technique, S-parameter measurement by using the 4-Port Network Analyzer without any balun will be compared to the measurement which used the 2-Port Network Analyzer with the balun transformers. Two twisted pair cable distances are selected as reference which are 500, and 1000 meters with nominal copper diameter of 0.5mm. Based on the measurement results, the 4-ports measurement shows good correlation with the 2-ports measurement especially at 500m distance. This shows that

the 4-ports measurement setup is suitable to be used to measure twisted pair copper cable and possible to measure at a higher frequency band such as up to 500 MHz but at a shorter twisted pair cable distance.

16:45 Indoor Channel Capacity Measurement of 2 x 2 MIMO Polarization Diversity Antenna

Mohamed Nasrun Osman (Universiti Malaysia Perlis & Universiti Malaysia Perlis, Malaysia); Mohamad Kamal A. Rahim and Mohamad Rijal Hamid (Universiti Teknologi Malaysia, Malaysia); Mohd Fairus Mohd Yusof (Faculty of Electrical Engineering, Universiti Teknologi Malaysia, Malaysia); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka & Hang Tuah Jaya, Malaysia); Muzammil Jusoh (Universiti Malaysia Perlis & School of Computer and Communication Engineering, Malaysia); Muhammad Azfar Abdullah (Universiti Teknologi Malaysia, Malaysia)

This paper presents the channel capacity investigation and the polarization reconfigurable antenna analysis for MIMO system in an indoor scenario. A single and dual-port polarization reconfigurable antenna is used at the receiver end to study the effect of polarization diversity configurations towards the achievable performance of the channel capacity. The polarization reconfigurable antennas are developed through two techniques, which are slits perturbation for single-port and feeding network modification for dual-port. The benefits offered by the designed antennas are investigated when being used as a receiver in both line-of-sight (LOS) and non-line-of-sight (NLOS) scenarios. The results show the proposed antennas are suitable to be adopted and highly potential to improve the channel capacity of the MIMO systems.

17:00 Ultra Thin Flexible Octagonal Metamaterials Absorber

Hasnizom Hassan and Maisarah Abu (Universiti Teknikal Malaysia Melaka, Malaysia)

An ultra thin flexible octagonal metamaterial absorber on 0.13 mm fastFilm D27 material has been presented in this paper. CST microwave studio was used in designing and simulating the octagonal metamaterial absorber. The flexible octagonal metamaterial absorber was resonated at 10 GHz with highly perfect absorbance of 99.98%. However, Full Width Half Maximum (FWHM) of the absorbance was relatively small 135 MHz affected from the ultra thin substrate used. By using triangular lattice arrangement of the unit cell, the FWHM could be increased to 171 MHz. Besides that, combination of resonating frequencies technique also had increased the FWHM more than 74% increment from basic unit cell with one resonance frequency. The flexibility of the metamaterial absorber could increase the functionality of the metamaterial absorber to be used in any application especially in reducing radar cross section for stealth application.

17:15 Rain Rate Distributions for Microwave Link Design Based on Long Term Measurement in Malaysia

Md Rafiqul Islam (International Islamic University Malaysia, Malaysia); Md Moktarul Alam (International Islamic University, Malaysia); Ali Kadhim Lwas (IIUM, Malaysia)

Attenuation due to rain is an important constraint in microwave radio link design especially at frequencies above 10 GHz. It restricts the path length of radio communication systems and limits the use of higher frequencies for line-of-sight microwave links and satellite communications. In order to predict the attenuation due to rain accurately rainfall intensity is required with 1-minute integration time. Rainfall is a meteorological phenomenon with complex structure due to its variability in space, duration and occurrence frequency, particularly in tropical and equatorial regions. Since, the statistical distribution of rain attenuation is obtained from the rain rate distribution for the region considered, it should be noted that the accuracy of the rain rate measurement affects the accuracy of the

attenuation estimation. This paper presents rain intensity with 1-minute integration time measured for 6 years in Malaysia, its distribution, comparison with other prediction models and impact on high frequency propagation.

CE 5

Communication Engineering 5 (continued)

Room 4

16:00 Disparities in Induced Rain Attenuation Between Beacon and Broadband Satellite Links in Tropical Rain Zone

Abubakar Idrissa (Universiti Teknologi Malaysia, Nigeria & Nigerian Communications Satellite Ltd Abuja, Malaysia); Jafri Din (Universiti Teknologi Malaysia, Malaysia); Hong Yin Lam (Universiti Tun Hussein Onn Malaysia, Malaysia)

In Satellite Communication service industries, the trade-off between, availability of service, throughput and bandwidth determines the quality of service delivery between the satellite operators and their clients mostly the internet service providers (ISPs). These services are also dependent on the link performance under adverse atmospheric condition especially the rain induced attenuation. A study measurements was carried out on space to earth link using CW beacon carrier and broadband service signal on Nigerian Communications Satellite (Nigcomsat-1R) operating at 42.5oE GEO Orbit with a VSAT receiving terminals at latitude 7.4N, Longitude 9.04E and Altitude 334m, to evaluate rain effects and link performance on both signals of beacon and broadband under the same conditions of clear sky and rain (wet) events. The measurements revealed that, the induced rain attenuation on beacon carrier when compared to that of broadband signal for internet services over satellite presents a different response resulting in a significant variations of 13dB on Carrier to noise ratio (C/N) and above 10dB difference in their received signal level (Rx) in Ku-band frequency. These observations were equally compared with Crane global rain map and ITUR but realized that both models underestimated for Abuja, Nigeria signifying that under estimation in rain rate as input affects the link margin, thereby affecting the availability of satellite to earth link

16:15 Correlation Between Reflection Coefficient, Dielectric Properties and Brix Level of Malaysian Oranges at Microwave Frequencies

Rafidah Rosman (Universiti Teknologi MARA, Malaysia); Kok Yeow You and Mohamad Ngasri Dimon (Universiti Teknologi Malaysia, Malaysia)

This paper presents sweetness degree (°Brix) prediction of the Malaysian oranges using microwave technique. Experimental measurement using monopole sensor and reflectometer was done in order to correlate the relationship between measured reflection coefficient, S₁₁ of the orange and its sweetness level. Up to fifty orange samples were freshly plucked from local grower's farm and tested. The unique design of the monopole sensor's holder is made of nylon. The experiment test bed was set up based on the standard dimension of monopole sensor available in the market. The operating frequency is focusing on 2.2 GHz as it shows significant sensitivity for determining Malaysian local oranges sweetness level.

16:30 Long-Range Monitoring System with PDMS Material

Norsaidah Muhamad Nadzir (Universiti Teknologi Malaysia & Universiti Teknologi Malaysia, Malaysia); Mohamad Kamal A. Rahim (Universiti Teknologi Malaysia, Malaysia)

This paper describes the development of a long range monitoring system that integrates Cottonwood: UHF Long Distance RFID reader module with Raspberry Pi 3. When a UHF RFID tag is within the UHF RFID reader antenna's range, the unique ID of the tag will be transferred to the Raspberry Pi 3 to be processed. Then, the data will be sent over to the database wirelessly to be managed, stored, and displayed. The paper also describes the measurement done to determine the most suitable thickness of PDMS material so that it could be incorporated as a wearable transponder. After the result is calculated and tabulated, it can be concluded that the most suitable thickness of PDMS material for the transponder is 8 mm.

16:45 Data Exfiltration of Ultrasonic Signal in Computer Security System: A Review

Farah Hanim Abd Jabar, Janatul Mohammad, Ahmed Zain and Abu Bakar Hassan (Universiti Sains Islam Malaysia, Malaysia)

It is crucial for public users and service providers to stay abreast of the progress and trends on data exfiltration in computer security system. In cryptosystem, it is unnoticeable for computer and mobile users to realize that inaudible sound used to transmit signals carrying pervasive sensitive data was in the low frequency ultrasonic range. Acoustic attack on ultrasonic signal emanated by electronic devices have long been investigated among researchers. This paper is an exploration on the practicality of ultrasonic data exfiltration between computers in term of computer security system. It will discuss some work done by previous researchers in general, based on scientific, technological, and security perspectives. There will be inclusions of practical applications already in existence as well as future studies in related fields.

17:00 Significance of Speech Intelligibility Assessors in Medium Classroom Using Analytical Hierarchy Process

Mokhtar Harun (UTM, Malaysia); Khairunnisa Mohd Yusof, Mohamad Ngasri Dimon, Puspa Inayat Khalid and Siti Abdul Hamid (Universiti Teknologi Malaysia, Malaysia)

There are many speech intelligibility (SI) assessors to choose from in order to evaluate speech intelligibility in a particular room. When there are constraints on the resources - equipment, manpower and time - to conduct speech intelligibility tests, the most reliable or significant SI assessor for many different types of rooms is always sought for. The purpose of this study was to determine the most significant SI assessor in four medium classrooms. The SI assessors tested were reverberation time (RT60), Clarity (C50), Definition (D50), and Speech Transmission Index for Public Address System (STIPA). The data were acquired by means of sound recorder that recorded six Malay words spoken by a trained male speaker, in four medium classrooms that have volume ranging from 300 m³ to 620 m³. The recorded speech signals played in classrooms were analyzed by DIRAC software. It has been found that the data of four SI assessors have to be normalized before it can be analyzed by analytical hierarchy process (AHP). In conclusion, C50 has shown the most consistent prediction of speech intelligibility in the entire sampled classrooms. On the other hand, as the room gets larger, RT60 becomes significant for determining speech intelligibility in the sampled classrooms.

ECE 4

Electronic and computer Engineering 4 (continued)

Room 5

16:00 A Front Surface Optimization Study for Photovoltaic Application

Amirjan Nawabjan, Farabi Iqbal and Ahmad Shahidan Abdullah (Universiti Teknologi Malaysia, Malaysia)

In this paper, we presented a possible front surface optical enhancement of Si solar cell by optimizing the Antireflection (AR) and light trapping (LT) schemes. Conventional plasma enhanced chemical vapor deposition (PECVD) and in house hot wire chemical vapor deposition (HWCVD) tool was used to deposit Silicon Nitride (SiNX) layer and optimized at 668nm wavelength. This was followed by surface texturing of random pyramids to further enhance the broadband reflectance of the front surface. Broadband reflectance measurement using integrating sphere method showed achieved weighted average reflectance (WAR) value of as low as 1.8% and 1.5%, when 85nm SiNX was deposited on top of random pyramids structure using HWCVD and PECVD methods, respectively.

16:15 Solar Powered Charging Backpack

Jonas Taverne and Firdaus Muhammad-Sukki (Robert Gordon University, United Kingdom (Great Britain)); Ahmad Syahrir Ayub (University of Strathclyde, United Kingdom (Great Britain)); Nazmi Sellami (Robert Gordon University, United Kingdom (Great Britain)); Siti Hawa Abu-Bakar (Universiti Kuala Lumpur, Malaysia); Nurul Aini Bani (Universiti Teknologi Malaysia, Malaysia); Abdullahi Abubakar Mas'ud (Jubail Industrial City & Jubail Industrial College, Saudi Arabia)

This paper demonstrated a step by step process in designing a solar powered charging backpack that is capable of charging a mobile phone efficiently. A review of existing products on the market were looked and compared to ascertain the cost, size, and output capabilities. Next, the solar cell types and regulators were compared and their respective merits investigated. The charging system was then designed and tested before being integrated with the backpack.

16:30 EMBEDDED STUDENT ATTENDANCE SYSTEM USING FACE RECOGNITION

Rashidah Funke Olanrewaju and Ayesha Akter (International Islamic University Malaysia, Malaysia); Abdulkadir Ahmed (Kwara State University, Nigeria)

The world is becoming digitized, automated and electronically connected day by day. The attendance system of any school, college, university or any organization is very important. The manual system for attendance marking has become very monotonous and time consuming. It distracts students from being attentive in the class and there are some possibilities of proxy attendance as well. So we have decided to build a system which can handle all these issues. The system is based on Raspberry Pi board and face recognition algorithm. When the user presses the button, the camera captures the image of the students. Then using face recognition algorithm, it compares the captured image with the image saved in database. If the image is matched then the attendance of the student is marked. The system is ON for a certain period of time. When the time is over, the attendance sheet is sent to the administration of the system. This system is completely automated. We hope that this will bring easiness for the teachers and will be less time consuming

16:45 PV Smart Grid Monitoring System Based on Hybrid Telepot and Web Server

Eka Maulana, Lunde Ardhenta and Ramadhani Kurniawan Subroto (Brawijaya University, Indonesia)

Monitoring system in the smart grid is a key aspect that determines the reliability of transmission and communication systems in the power grid. Process in smart grid is monitored through Telegram social media and web service internet-based wirelessly. The aim of this research is to conduct monitoring in smart grid easier and ubiquitous remotely. The role of web service and telepot in the smart grid monitoring system are installed in Raspberry Pi 3 which responsible to receive and process data from sensor module on each nodes and saved in database. The MySQL database accommodates amounts of data containing information on the value of current, voltage, power and time stamp which deliver by sensor node. web programming is designed using PHP to generate connection to the database and node sensor status that runs continuously. Processed data are conducted in telepot and it is converted in to *.csv file type before sent to the telegram user. The information were also shown in web site as well as in telegram over graph display form that utilise the Highcharts library. Graphs that shows information on voltage, current, and power values can be accessed through a browser using IP address from the Raspberry Pi 3 server. When the users request information to the server, they only need certain command through Telegram social media or open the web browser to access the information from the smart grid system..

17:00 A New Method for Ball Tracking Based on A-B Linear Kalman and Extended Kalman Filters via Bubble Sort Algorithm

Hathiram Nenavath (National Institute of Technology Warangal, India); Ravikumar Jatoth (NIT Warangal, India); Ramesh naik Gugulothu (BEL Bangalore, India)

Object tracking is one of the challenging issues in computer vision and video processing, which has several potential applications. In this paper, initially a moving object is selected by frame differencing method and extracted the object by segment thresholding. Then bubble sort algorithm (BSA) arranges the regions (large to small) to make sure that there is at least one big region (object) in object detection process. To track the object, a motion model is constructed to set the system models of Alpha-Beta (α - β) filter, Linear Kalman filter (LKF) and Extended Kalman filter (EKF). Many experiments have been conducted on balls with different sizes in an image sequences and compared their tracking performance in normal light and bad light conditions. The parameters obtained are root mean square error (RMSE), absolute error (AE), object tracking error (OTE), Tracking detection rate (TDR), and peak signal-to-noise ratio (PSNR) and they are compared to find the algorithm that performs the best for two conditions.

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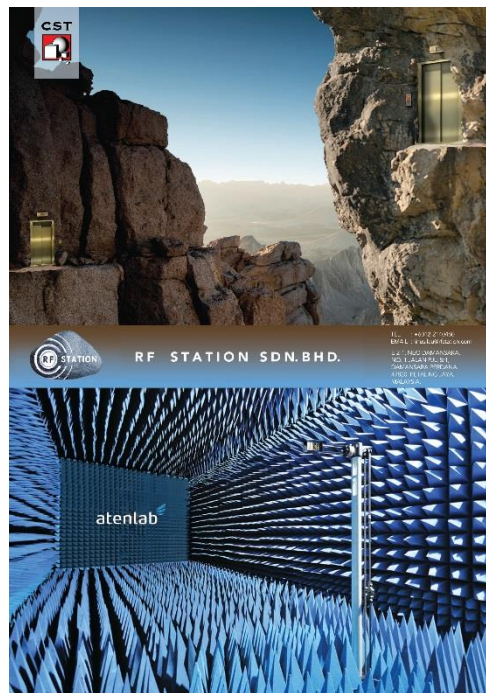
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