2012 IEEE SYMPOSIUM ON COMPUTERS AND INFORMATICS

PROGRAM AND ABSTRACTS

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WELCOME MESSAGE

On behalf of the Organizing Committee of ISCI 2012 it gives me great pleasure in welcoming all delegates to Penang, Malaysia.

ISCI 2012 is held from 18 to 21 March 2012 at the Park Royal Hotel, Penang, Malaysia and is jointly sponsored by the IEEE Malaysia, the IEEE Malaysia Power Electronics (PEL)/Industrial Electronics (IE)/ Industrial Applications (IA) Joint Chapter.

The occasion creates a forum for scientists, engineers and practitioners on the varied disciplines and its associated applications. In line with IEEE's vision of Advancing Technology for Humanity beyond traditional boundaries; ISCI 2012 with the various tracks on Humanities, Engineering, Applied Sciences and Business applications has been introduced.

We are very glad to mention that the Proceedings of ISCI 2012 will be included in the IEEE Xplore database.

We have received 162 paper submissions for the ISCI 2012. Over 750 reviewers worldwide volunteered to evaluate papers for ISCI2012 which finally only 52 papers are to be presented with 2 parallel technical sessions and 1 tutorial session.

Appreciating international participation and the nature of Penang; a UNESCO World Heritage site, time is allocated for a local excursion trip. A dinner with cultural show is also included. Throughout these events, we hope to create an opportunity for old friends and colleagues to get together, and more importantly, to welcome new peers in diverse areas of expertise.

On behalf of the organizing committee we would like to take this opportunity to express our gratitude to all reviewers who have been working hard to finish reviews on time and hence ensured the success of this event. We would like to thank all authors, session chairpersons, reviewers and delegates for your great support and contribution to the event. Last but not least are the Organizing Committee, colleagues and friends who have been working behind-the-scenes; who deserve special mention. Without their unfailing cooperation, hard work and dedication, this event would simply not be possible.

I understand that many delegates are here in Malaysia for the first time. I would like to encourage you to explore the beautiful sights of Malaysia during your stay and do enjoy the conference.

MUSTAFAR KAMAL HAMZAH
Chair, IEEE Malaysia PEL/IE/IA Joint Chapter
General Chair, ISCI 2012

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TECHNICAL PROGRAM OVERVIEW

Time	JINTAN	LAWANG
Monday, March 19		
08:20 AM	R1: *Registration (8.20 am - 3.00 pm)*	
08:40 AM	A11: *Business, Management & Knowledgement Management*	B11: *AI & Software*
10:40 AM	MB1: *Morning Coffee/Tea Break*	
11:00 AM	A12: *Tutorial : Bioinformatics (Siti Azma Jusoh)*	B12: *AI & Software (cont)*
01:00 PM	L1: *Lunch (Tamarind Brasserie)*	
02:00 PM	A13: *Network & Communications Technology*	B13: *Science & Engineering Applications*
03:40 PM	AB1: *Afternoon Coffee/Tea Break*	
04:00 PM	A14: *Network & Communications Technology (cont)*	B14: *Science & Engineering Applications (cont)*
08:00 PM	GALA: *Gala Dinner (Golden Thai Seafood Restaurant)*	
Tuesday, March 20		
08:20 AM	R2: *Registration (8.20 am - 12.00 am)*	
09:00 AM	A21: *Signal & Image Processing*	B21: *Computer Applications & Software Engineering*
10:40 AM	MB2: *Morning Coffee/Tea Break*	
11:00 AM	A22: *Signal & Image Processing (cont)*	B22: *Computer Applications & Software Engineering (cont)*
01:00 PM	L2: *Lunch (Tamarind Brasserie)*	
02:00 PM	Trip: *Penang Excursion (Subject to Availability)*	

TECHNICAL PROGRAM / ABSTRACT

Tutorial 1

Tutorial 1

Structural Bioinformatics of Integral Membrane Protein

Time: 11:00 AM - 1:00 PM
Room: JINTAN

Presenter: Siti Azma Jusoh
Chair: Siong Hoe Lau (Multimedia University, Malaysia)

Abstract
Stably folded membrane proteins reside in a free energy minimum determined by the interaction among the protein, the lipid bilayer and water. The prediction of three-dimensional structure from sequence requires a detailed understanding of these interactions. The putative transmembrane domains (TM) of the envelope glycoproteins from the family Flaviviridae consist of a highly polar segment in between two hydrophobic stretches. In contrast, the sequence pattern that contains highly polar amino acid residues does not represent the membrane protein in the database of high resolution structures. However, in our work, we showed that the charged and polar amino acids may possibly exist in the hydrophobic core region as the nonpolar amino acids. Specifically, we report here that the TM domains of the envelope glycoprotein E2/E that contain a central Asp residue were severely kinked. On the other hand, the TM domains of the envelope glycoprotein E1/prM tended to tilt and remain helical during 200 ns MD simulations. For HCV, the TM domains of E1 and E2 were hypothesized to heterodimerize via an ion pair of Lys-Asp amino acids. We showed that the HCV:E1-E2 heterodimer formed by the charged residues located in the core region of the membrane lipid bilayer stabilized the helical conformation of E2 compared to E2 existing as a single-pass TM helix. We compared the effect of other types of ion pair interactions using computationally engineered peptides and similar results were obtained as for the TM domain of the E1-E2 from HCV. We found that an Asp amino acid had the strongest kink-inducing effect on the helix when it was located in the middle of a single-pass TM helix. This work not only showed the significant existence of the polar amino acids in the hydrophobic region of lipid bilayer but also provides new insight into the interaction of the integral membrane proteins with water and lipid environment. Siti Azma Jusoh, Faculty of Pharmacy, Universiti Teknologi MARA, 42300 Bandar Puncak Alam, Malaysia & Volkhard Helms, Lehrstuhl für Computational Biology, Center for Bioinformatics, Universität des Saarlandes, 66041 Saarbrücken, Germany.

A11

Business, Management & Knowledgement Management

Time: 8:40 AM - 10:40 AM
Room: JINTAN

Chair: Bong Chih How (Universiti Malaysia Sarawak, Malaysia), Siong Hoe Lau (Multimedia University, Malaysia)

8:40 Key.net: A System and Method for Accessing Offline Lock System by the Internet-made Key Using Barcode Technology
Farhang Padidaran M. (Universiti Kebangsaan Malaysia, Malaysia); Mohamed bin Daud (Universiti Putra Malaysia, Malaysia); Ir. Riza Sulaiman (UKM, Malaysia)

Regarding to Key.net, Clients can apply for their desired room key, which is available for a specific duration using an online booking system. The key can be printed at home without using any special peripheral equipment. The issued key is recognizable by offline and the standalone lock system. Barcode as a code carrier has been chosen, according to its advantages, such as reduced cost of key production, ease of generating, and it's highly resistant. The Verifier Machines can be located at each entry point are standalone devices, and are not connected in any way neither between them nor to any central database, server or portal. The Key.net is generally designed for places where some people make use of it of a particular time and location like remote lodgings/hotels, vacation homes, clubs, some departments of factories, parking entrances and so on. Clients can create their own access code from anywhere at any time using the online portal. Thanks to proposed encryption / decryption scheme, Key.net gives a reliable solution to design a method and system for generating access codes and authenticating the key or ticket/coupon with offering a safe and fast way. The major contributions of Key.net are user convenience in making desired key, cost reduction in producing the barricaded-key and to empower remote and disconnected lock systems for using the Internet- made keys.

9:00 Understanding the User Acceptance of Gesture-based Human-Computer Interactions
Siong Hoe Lau (Multimedia University, Malaysia); Tze Hui Liew (Multimedia University, Malaysia)

This study empirically evaluates how user perceptions and attitudes influence behavioral intention use of multi-touch gestures on a large multi-touch screen by using Technology Acceptance Model (TAM). In the study the researchers presented 20 novice users with an introduction and hands-on of multi-touch gestures on window, object and image manipulations. Following the hand-on session, data on user perceptions and attitudes about multi-touch gestures were gathered. The hierarchical multiple regression analyses were employed to test the hypothesized study model. The analysis results showed that both the user perceptions and attitudes have significant positive effects on user behavioral intention to use multi-touch gestures on computer applications. Suggestions for future research and conclusions for both researchers and practitioners are offered.

9:20 Stock Prediction Using Multiple Time Series of Stock Prices and News Articles
Daigo Kato (Yokohama National University, Japan); Tomoharu Nagao (Yokohama National University, Japan)

In the stock market, stock prices of multiple companies interact with each other. For instance, a stock price movement of a company triggers that of another one. Therefore, investors are interested in inter-relationship of multiple companies whose stock prices interact with each other. In recent years, a number of studies are conducted to predict stock price movements in the area of artificial intelligence. Most of them focus on stock prediction but not on explaining the reason why they succeed in stock prediction. In this study, we propose a method to find out a rule that predicts the stock price movement of a target company. We use rate of change of multiple companies' stock prices and a newspaper article about a company in the rule. We explain the reason why the rule succeeds in its prediction by analyzing inter-relationship of these companies and the target company by the use of newspaper articles and stock prices related to Companies Co-occurrence Map. This method is applied to the first section of the Tokyo Stock Exchange and encouraging results are obtained.

9:40 Stock Market Prediction Based on Interrelated Time Series Data
Ryota Kato (Yokohama National University, Japan); Tomoharu Nagao (Yokohama National University, Japan)

In this paper, we propose a stock market prediction method based on interrelated time series data. Though there are a lot of stock market prediction models, there are few models which predict a stock by considering other time series data. Moreover it is difficult to discover which data is interrelated with a predicted stock. Therefore we focus on extracting interrelationships between the predicted stock and various time series data, such as other stocks, world stock market indices, foreign exchanges and oil price.We test our method for predicting the daily up and down changes in the closing value by using discovered interrelationships, and experimental result shows that our method can predict stock directions well, especially in the manufacturing industry.

10:00 A Large Scale Knowledge Integration Leading to Human Decision Making
Bong Chih How (Universiti Malaysia Sarawak, Malaysia); Kai R Larsen (University of Colorado, USA); James Martin (University of Colorado, USA)

For the first time natural language processing approaches are applied on a large scale to psychometric methods. Psychometric methods have been applied in hundreds of thousands of published studies. This study examines automated approach to discovering behavioral knowledge that are encoded as constructs in social and behavioral science disciplines. To date, constructs relationships are ordinarily revealed through laborious psychometric methods, but this study has shown that it is possible to extract these relationships through automated computational approaches. By building on text similarity measure from prior literature, we are able to predict construct relationships through construct name, definition and items. The predicted relationships were woven into an interlock system to demonstrate construct interplays, even though they have not been studied. The construct interlock could be seen as a theory map to understand human decision-making. We visualizing network of construct on a very well studied information system construct: perceived usefulness. The encouraging results showed that the proposed measures could dramatically expedite theory development, at the same time also expedite progression of human science.

B11

Artificial Intelligence & Software

Time: 8:40 AM - 10:40 AM
Room: LAWANG

Chair: Lim Eng Aik (Universiti Malaysia Perlis, Malaysia), Chee Ling Thong (UCSI University, Malaysia)

8:40 Knowledge Discovery Based on Importance of Features
Hiroshi Sugimura (Kanagawa Institute of Technology, Japan); Kazunori Matsumoto (Kanagawa Institute of Technology, Japan)

This paper proposes a system which datamines time series classification knowledge leading by a discovery of feature patterns. In the case of classification, prediction accuracy is an important point, and to build a human understandable model is another essential issue. To satisfy these requests, our system runs in two stages. In the first stage, the system discovers important feature patterns which are useful for identifying data. For this purpose, we propose a feature importance measure which is called FI. The second stage builds a decision tree that determines class membership based on the feature patterns. We explain how these two stages are harmonized in the entire process.

9:00 Stereo Matching Based on Disparity Propagation Using Cellular Evolutionary Neural Networks
Tomohiro Nagata (Yokohama National University, Japan); Tomoharu Nagao (Yokohama National University, Japan)

In this paper, we propose a novel stereo matching algorithm based on disparity propagation using cellular evolutionary neural networks (CEN). Most of previous works have drawbacks and advantages in accuracy, running time and scene types of image; however, our advantage is obtaining not exceedingly-high but satisfactory accuracy for various scenes with low computational cost. Our algorithm calculates initial disparities with a simple local method, and then propagates those disparities using CEN. The direction of propagation is controlled by a reliability map, which is created by checking left-right consistency of the initial disparity maps. We test our algorithm with the Middlebury stereo dataset, and experimental results show that our algorithm is able to produce more accurate disparities than common local and global methods for many types of scenes within just two seconds.

9:20 Image Filtering with Multilayered Cellularly Connected Evolutionary Neural Networks
Junji Otsuka (Yokohama National University, Japan); Tomoharu Nagao (Yokohama National University, Japan)

This paper presents a study of automatic construction of image filters with a novel multilayered cellular network. Each layer of the proposed network is Cellular RFCN (CRFCN), the neural network model for automatic construction of image filters we previously proposed. CRFCN consists of a regular array of evolutionary neural networks called Real Valued Flexibly Connected Neural Network (RFCN). In the previous work, single-layer CRFCN showed its good performance of image filtering. However in complex image processing, it is often effective to decompose the processing into a sequence of partial processing to achieve the target task. Hence, to enable the model to split up a complex task into partial tasks, we propose multilayered CRFCN: series-connected single-layer CRFCNs. The key ideas of multilayered CRFCN are (1) setting each layer to the original input image to prevent from lacking important information through multilayered processing, and (2) construction of the layers one by one efficiently. We apply multilayered CRFCN to three different image filtering of region extraction in comparison with comparative methods, and show its performance.

9:40 Refined Cellular Automata Model for Tawaf Simulation
Lim Eng Aik (Universiti Malaysia Perlis, Malaysia)

In this paper, a cellular automata (CA) model is extended to simulate the circular movements of Muslim pilgrims performing the Tawaf ritual within the Masjid Al-Haram facility in Makkah. There is scant literature on the implementation of CA in modeling circular motions. Moreover, most of the published studies do not take into account the pedestrian's ability to select the exit route in their models. To resolve these issues, we have developed a multi-floor cellular automata model incorporated with a probabilistic neural network for determining pedestrians' decision-making ability. The speed-density relationship of pedestrian movement is obtained by simulation, and their relationships are investigated. In addition, the effect of pedestrian density on speed during Tawaf is also studied. For validation, the results obtained from the proposed model are compared with published data. The results of simulations showed that the proposed model is capable in reproducing the similar movement behavior of Tawaf.

10:00 Review in Sign Language Recognition Systems
Mohammed Ebrahim Alahdal (Universiti Teknologi MARA UiTM, Faculty of Electrical Engineering & UiTM, Malaysia); Nooritawati Md Tahir (Universiti Teknologi MARA, Malaysia)

Automatic sign recognition system (ASR) is a highly desired system due to its ability to overcome the bearer between deaf and hearing people. At present, a robust ASR is still unavailable in real world due to numerous obstacles. Additionally, as we know, Sign language recognition has emerged as one of the most important research areas in the field of human computer interaction (HCI). Hence in this paper overview of main researches based on sign language recognition system along with classifying developed system by sign capturing method and recognition techniques are discussed. The strength and disadvantages that contributed for the system to function perfectly or otherwise will be highlighted by invoking major problem that associated with the developed system. Next, a novel method for designing automatic sign language system based on combination of EMG sensor with data glove is proposed. This method is based on electromyography signal for allocation of word boundaries for stream of words in continuous recognition. Overview of the new system for continuous sign recognition based on artificial neural network is elaborated too. The proposed system is expected to resolve word allocation and epenthesis problems which contributing in enhancing the recognition capability for continuous sing recognition system.

B12 — Artificial Intelligence & Software (cont)

Time: 11:00 AM - 1:00 PM
Room: LAWANG

Chair: Lim Eng Aik (Universiti Malaysia Perlis, Malaysia), Chee Ling Thong (UCSI University, Malaysia)

11:00 A PageRank Based Detection Technique for Phishing Web Sites
Naga Venkata Sunil Alamuri (Indian Institute of Technology Roorkee, India)

Phishing is an attempt to acquire one's information without user's knowledge by tricking him by making similar kind of website or sending emails to user which looks like legitimate site or email. Phishing is a social cyber threat attack, which is causing severe loss of economy to the user, due to phishing attacks online transaction users are declining. This paper aims to design and implement a new technique to detect phishing web sites using Google's PageRank. Google gives a PageRank value to each site in the web. This work uses the PageRank value and other features to classify phishing sites from normal sites. We have collected a dataset of 100 phishing sites and 100 legitimate sites for our use. By using this Google PageRank technique 98% of the sites are correctly classified, showing only 0.02 false positive rate and 0.02 false negative rate.

11:20 Soa4derts: a Service-oriented Uml Profile for Distributed Embedded Real-time Systems
Muhammad Aziz (Universiti Teknologi Malaysia, Malaysia); Radziah Mohamad (Universiti Teknologi Malaysia, Malaysia); Dayang N. A. Jawawi (Universiti Teknologi Malaysia, Malaysia)

In order to reduce the development complexities of Distributed Embedded Real-Time Systems (DERTS), new software engineering methods and techniques are always adapted. The use of Service Orientated Computing (SOC) and the Unified Modeling Language (UML) for DERTS development is part of this trend. There exists a number of UML profiles for embedded, real-time and SOC separately. However, a holistic UML profile combining the embedded, real-time and Service-Oriented concepts is still missing. This paper presents a UML profile for Service-Oriented DERTS development by

defining the stereotypes, along with the associated meta-model and constraints. The utility of the proposed profile is demonstrated by its application in the design of an autonomous mobile robot. The presented profile can also be used for modeling of a distributed environment where different devices are used such as a smart home or an industrial floor.

11:40 An Empirical Assessment of the Use of Different Communication Modes for Requirement Elicitation and Negotiation: Using Students as a Subject
Rodina Ahmad (Universiti Malaya, Malaysia); Amjed Tahir (University of Malaya, Malaysia); Zarinah Mohd Kasirun (Universiti Malaya, Malaysia)

Requirements engineering is considered the most communication-intensive activity among all other software engineering activities. Requirements' elicitation and negotiation are communication-rich stages that require intensive contact between different stakeholders (i.e., clients and engineers). For this reason, the need to identify the appropriate task/technology fits, to support the communication between different stakeholders, plays a key role in an efficient software products' development. This work reports an empirical study that assesses the use of three different communication modes, namely: Text-Based Communication, Face-to-Face, and Rich Media, in order to support the different tasks of requirements elicitation and negotiation, by using students as the study subjects. We conducted an experimental study of six groups of students, who were developing a requirements document, over a period of eight weeks. Each communication mode was used by two different groups. We evaluated the three communication modes in terms of the participants' satisfaction with performance, comfort with the communication mode, and the perceived engagement level, using post questionnaires. The main finding of this study is that the face-to-face communication mode was the most preferred method during both the elicitation and negotiation stages, in comparison to the text-based and rich media modes.

12:00 Educators' Perception Towards Automation of Curriculum Design Process for Institution of Higher Learning in Malaysia
Chee Ling Thong (Malaysia, Malaysia); Yusmadi Yah Jusoh (Universiti Putra Malaysia, Malaysia); Rusli Abdullah (Universiti Putra Malaysia, Malaysia); Nor Hayati Alwi (Universiti Putra Malaysia, Malaysia)

Curriculum design is an important phase in curriculum development process. Curriculum design precedes its submission to national regulatory body for approval. Curriculum design process plays an important role in helping educators to produce curriculum that is incompliance with the program standards and guidelines set by national regulatory body. The traditional approach requires much cumbersome manual iteration, making the process longer and error-prone. It is believed that automating the design process by utilizing advanced IT/ICT technologies helps to increase effectiveness and efficiency. Hence, a preliminary study is conducted to determine the perception of needs relative to automation of curriculum design process and current obstacles or issues during the design process. Five experienced educators from both private and public Instituitions of Higher Learning in Malaysia who are involved in curriculum design are interviewed. The design process may vary from one university to another, as well as from one faculty to another. The purpose of this study serves as a preliminary study, which will further contribute to a future detailed study in this area. This study creates an awareness of the extent of needs for design process automation supported by IT/ICT. These needs may be reflected in the planning of future research.

12:20 Sequence-Based Interaction Testing Implementation Using Bees Algorithm
Mohd Hazli Mohamed Zabil (Universiti Tenaga Nasional, Malaysia); Kamal Zuhairi Zamli (Universiti Sains Malaysia, Malaysia); Rozmie Razif Othman (Universiti Malaysia Perlis, Malaysia)

T-way strategies is used to generate test data to detect faults due to interaction. In the literature, there are many t-way strategies developed by researchers for the past 10 years. However, most of the strategies assumed sequence-less parameter interaction. In the real world, there are many systems that consider the sequence of the input parameter in order to produce correct output. These interactions of the sequence of inputs need to be tested to avoid fault due to sequence interaction. In this paper we present a sequence-based interaction testing strategy (termed as sequence covering array) using Bees Algorithm. We discuss the implementation, present and compare the results with existing sequence covering array algorithm.

A13

Network & Communications Technology

Time: 2:00 PM - 3:40 PM
Room: JINTAN

Chair: Tarig Mohamed Ahmed (University of Khartoum, Sudan), Usman Ashraf (Air University, Pakistan)

2:00 Generate Sub-Agent Mechanism to Protect Mobile Agent Privacy
Tarig Mohamed Ahmed (University of Khartoum, Sudan)

In recent years, the mobile agent system has taken a wide area of researchers' attention. They conducted intensive researches in the security areas to reach an ideal mobile agent model. The security area still needs more efforts to protect the mobile agent system. The protection of the mobile agent is one of these issues. In this paper a new mechanism called Generated Sub-Agent Mechanism (GSAM) to protect mobile agent against malicious Hosts has been proposed. The main idea behind GSMA is to generate a sub-mobile agent from the mobile agent in case the mobile agent will visit an untrusted host. The sub-mobile agent visits the untrusted host instead of the mobile agent. After the sub-mobile agent completes its work, it returns to the original mobile agent location and the mobile agent continues its journey. By this way, the untrusted host could not reach the content of the mobile agent. It couldn't attack the mobile agent behavior. The paper describes all GSMA components. GSMA cost analysis has been done. The analysis result mentions that the increasing of the untrusted host number reduces the time cost and GSMA has not affect the mobile agent system performance.

2:20 Reduced Complexity Scheme for MIMO Receiver with Combined ZF-OSIC and ML Detection
Maung Sann Maw (Chindwin, Myanmar); Hajime Suzuki (CSIRO, Australia); Iwao Sasase (Keio University, Japan)

Wireless system capacity can be increased enormously by using multiple antennas at transmitter and receiver sides in the system. Among them, maximum likelihood (ML) receiver is an optimal receiver, but it is difficult to implement due to high complexity arising from exhaustive searches over all candidate vector symbols. On the other hand, zero forcing ordered successive interference cancellation (ZF-OSIC) receiver can reduce the complexity greatly although its performance is less than ML receiver. Performance of ZF-OSIC receiver is seriously affected by the lower SNR layers. Therefore, in our proposed detection scheme, we will choose the optimal number of transmit antennas in the high SNR transmit layers, to be detected by the ZF-OSIC scheme and the remaining transmit antennas in the low SNR transmit layers will be detected by ML scheme to give the better BER performance for the spatial multiplexing MIMO system. Simulated results show that the proposed scheme gives better system performances than those of the conventional ZF-OSIC scheme not only in complexity but also in BER condition.

2:40 Persist: Mitigating Route Breakages in Wireless Mesh Networks
Usman Ashraf (Air University, Pakistan)

Although static mesh networks lack mobility, yet research shows that route breakages are quite frequent for reactive protocols in 802.11-based static mesh networks. In 802.11, a link is considered broken if a fixed number of consecutive transmission attempts fail at link-layer. However, transmissions failures can be temporary and may occur due a number of reasons including collisions on the channel or a burst of channel errors, leading to false link (and hence route) breakages which degrade performance. Our proposed scheme "Persist" reduces route breakages in reactive routing protocols in 802.11 based wireless mesh networks by considering the long-term loss-ratio of the links and taking a coherent decision on link breakage by dynamically adjusting the MAC retry limit. A strength of the Persist mechanism is that is extremely simple to implement and can be integrated in existing on-demand routing protocols and provides significant improvements in routing stability and throughput.

3:00 Towards Utilizing Flow Label IPv6 in Implicit Source Routing for Dynamic Source Routing (DSR) in Wireless Ad Hoc Network
Wai Yee Tai (Universiti Malaysia Sarawak, Malaysia); Chong Eng Tan (Universiti Malaysia Sarawak, Malaysia); Sei Ping Lau (Universiti Malaysia Sarawak, Malaysia)

As Internet Protocol version 4 (IPv4) is becoming obsolete, Internet Protocol version 6 (IPv6) is introduced to alleviate the depletion of IP addresses, much needed functionality in security and so much more. Quality of Service (QoS) has been one of the aspects taken into consideration for improving network performance such as Packet Delivery Fraction (PDF), average End-to-end Delay and throughput. However, in IPv4 network transmission, QoS is not given much attention as all transmission is managed with their "best-of-effort" services. Hence, in wireless ad hoc networks where unpredictable changes in topologies often disrupt on-going transmission will affect network performances under "best-of-effort" basis. Therefore, in this paper we show how IPv6 can play its part in improving wireless ad hoc networks QoS performance with Dynamic Source Routing (DSR) routing protocol as DSR is one of the prominent on-demand routing protocols in the ad hoc networks.

3:20 Real-Time Adaptive Packet Compression Scheme for High Latency Network
Ling Sun Tan (Universiti Malaysia Sarawak, Malaysia); Chong Eng Tan (Universiti Malaysia Sarawak, Malaysia); Sei Ping Lau (Universiti Malaysia Sarawak, Malaysia)

In recent years, due to its cost-effectiveness and ease of deployment, high latency network such as VSAT satellite network has been widely used to interconnect with people especially those in the rural areas. Since the VSAT satellite channels are widely used for real-time interactive multimedia applications that require relatively high bandwidth, this have led to greater demand for network bandwidth and improved transmission efficiency for such network. Unfortunately, VSAT satellite network provides limited network bandwidth and introduces high network latency issues. Satellite transmission bandwidth is usually shared among multiple concurrent users in a contention basis for economic reasons. Thus, bandwidth available for each application can be very much limited. This leads to network congestion and results in substantial delay in packet delivery for real-time applications. These issues have created negative impacts on the Quality-of-Service (QoS) of VSAT satellite networks as well as user experiences. To further improve the network bandwidth utilization and avoid spending extra cost to increase network bandwidth, the adoption of compression technique is essential. This paper proposes a real-time adaptive packet compression scheme especially for high latency network. This scheme eliminates redundancies in the network packet to reduce the packet size and improve the bandwidth utilization. Simulation results demonstrate that the proposed scheme is effective in network bandwidth saving.

B13 Science & Engineering Applications

Time: 2:00 PM - 3:40 PM
Room: LAWANG

Chair: Gul Khan (University of Engineering and Technology Peshawar, Pakistan), Anongnart Srivihok (Kasetsart University, Thailand)

2:00 A Wavelet Packet Transform Approach for Locating Faults in Distribution System
Pratul Arvind (Instrumentation and Signal Processing Labratory, Department of Electrical Engineering & Indian Institute of Technology Roorkee, India); Rudra Prakash Maheshwari (Indian Institute of Technology Roorkee, India)

Accurate location of faults in a distribution system is a need of present scenario in order to provide uninterrupted supply to the customers. Research is under way to increase the accuracy of the fault in distribution system. It should also be kept in mind that transmission line fault location algorithms cannot be directly employed on distribution system because of the configuration of distribution system. In the present work, the authors have developed an algorithm for locating all ten types of faults by extracting the features of voltage signals by wavelet packet transform and subjecting it to artificial neural network. The voltage samples have been collected after extensive simulation of a sample distribution system over different fault resistances, inception angle in PSCAD and the results obtained are very promising. Also, the multiple estimation problems have been tackled..

2:20 Oil Whip Detection Using Stator Current Monitoring
Alok Kumar Verma (Indian Institute of Technology Patna & Naveen Goverment Polytechnic Campus, Patliputra Colony, IIT Patna, India); Somnath Sarangi (Indian Institute of Technology Patna, India); Mahesh Kolekar (Indian Institute of Technology Patna, India); Shreya Banerjee (National Institute of Technology Durgapur, India)

The oil whirl and oil whip phenomena have been well known since many decades. The performance of rotating machinery supported by fluid film bearings are limited by instability threshold known as oil whirl and oil whip. However, there exists confusion on the parameters that affects the stability of the system. In this study, authors investigate the onset of instability on a flexible rotor mounted on journal bearings. Shaft displacement and stator current samples during machine run up under loading condition are measured, analyzed and presented here. Some other vibration components associated with oil whip have been discussed in this paper. Result shows that misalignment is the parameter that is more responsible for the cause of instability.

2:40 Modeling of DC-DC Boost Converter for Solar System Applications
Nurul Husna Abd. Wahab (Universiti Malaysia Perlis, Malaysia); Siti Fatimah Siraj (Universiti Malaysia Perlis, Malaysia)

This paper presents a design and simulation of DC-DC boost converter that will be used for solar system. The operation principle of boost converter working in continuous conduction mode (CCM) has been introduced. The continuous part of the converter is modeled by differential equations and state space models, while the switching actions are recently more accurately modeled by state charts. Circuit model for open loop system may be conveniently implemented using the MATLAB's Simulink toolbox environment. It was also studied the changes of the parameter especially the variations of load thus the results obtained can be analyzed to ensure that the variations of load impacting on the stability of the

converter. This paper attempts to model the continuous part of the converters using state space averaging technique so that it can be proceed to design a hybrid control system to improve the converter's performance so that it can be adapted with solar system applications.

3:00 A Proposal of Small Linear Actuators for Small Entertainment Robots
Yasuaki Horima (Yokohama National University, Japan); Tomoharu Nagao (Yokohama National University, Japan)

This paper describes about a small linear actuator. In recent, there have appeared miniature direct current electric (DC) motors. Then, we propose a linear actuator consisting of a DC motor, a pair of spiral springs and cylinders. The principle of the actuator is simple. The DC motor rotates a spring directly. The rotated spring gears the other one and goes in or out of the spiral interspace. As a result, the actuator elongates and contracts. Our actuator is controlled by a ON- OFF signal and inversion of a current. We made the actuator experimentally and constructed a four-legged locomotion robot with proposed actuators as an application. In simulation, we obtained parameters for locomotion of the robot by using genetic algorithm. The robot realized walking by switching on or off the current and changing the polarity of the current.

3:20 Generation of Wind Power in Perlis, Northern Malaysia
Nurul Razliana Abd Razak (University Malaysia Perlis, Malaysia)

In recent years, wind energy is one of the fastest developing renewable energy sources technologies across the globe. wind energy conversion given a serious consideration in Malaysia since it is located in the equatorial region. Wind energy generation in Malaysia is very much depends on the availability of the wind sources that varies with specific location. This paper present analysis of wind speed by using Weilbull distribution function and describes the performance on the Horizontal axis Wind Turbine (HAWT). The wind speed data and output voltage from the wind turbine is recorded per hour for a 24 hour by using Davis Vantage Pro2 Weather station and Electrocoder. A few calculations has been done to get output power from the wind to shows potentialities of wind energy weather it can be develop in Perlis.

A14

Network & Communication Technology (cont)

Time: 4:00 PM - 6:00 PM
Room: JINTAN

Chair:Tarig Mohamed Ahmed (University of Khartoum, Sudan), Usman Ashraf (Air University, Pakistan)

4:00 IEEE 802.21 Based Vertical Handover in WiFi and WiMAX Networks
Mohd Dani Baba (Universiti Teknologi MARA, Malaysia); Ammar Bathich (UiTM, Malaysia)

Seamless handover between different access technologies is a great challenge as it needs to obey different performance of QoS and security constraints. Subscribers are becoming more demanding regarding roaming capabilities across different networking technologies such as WiFi, WiMAX, and CDMA as they claim service continuity with QoS requirement and good security features. In this paper, a QoS based vertical handover mechanism between WiMAX and WiFi networks is proposed by applying the Signal to Interference and Noise Ratio SINR. The Media Independent Handover MIH (IEEE 802.21) protocol is adopted to assist in the handover decisions by providing a suitable platform for vertical handovers. The performance of the proposed SINR based vertical handover algorithm and RSS based vertical handover algorithm have been evaluated in terms of the maximum downlink throughputs.

4:20 SPKT: Secure Port Knock-Tunneling, an Enhanced Port Security Authentication Mechanism
Mehran Pourvahab (International Pardis of Guilan University, Iran); Reza Ebrahimi Atani (University of Guilan, Iran); L Boroumand (University of Malaya, Malaysia)

In recent years, there has been an increasing interest in the authentication process due to the key role that it has in the network security. Port Knocking (PKn) is an authentication method in which data transmits through the closed ports. This method is prone to attacks when attackers sniff the network. This paper proposes a new method which is called "Secure Port Knock-Tunneling" to eliminate both DOS-Knocking and NAT-Knocking attacks. The possibility of implementation of this method is investigated on the Mikrotik devices.

4:40 Joint Beamforming and Power Control to Overcome Tradeoff Between Throughput-Sensing in Cognitive Radio Networks
Abdul Fattah (North South University, Bangladesh); Mohammad A Matin (Institut Teknologi Brunei, Brunei Darussalam); Iftihaj Hossain (North South University, Bangladesh)

Cognitive radio is introduced for efficient spectrum utilization by allowing unlicensed (secondary) users to access licensed frequency bands and to maintain a minimum interference to the licensed (primary) users. A sensing time has been allocated for sensing the licensed frequency bands before data transmission of secondary system and during the sensing time, data transmission is prohibited, which results in the sensing throughput tradeoff problem. To overcome this tradeoff, the authors present join beamforming and power control approach in this paper. The presented modified WLS algorithm minimizes the interference to the primary system as well as overcome the sensing throughput tradeoff problems in cognitive radio. The simulation result shows that the optimal transmit power of secondary user can improve the system throughput.

5:00 Integrated Approaches to Enhance TCP Performance Over 4G Wireless Networks
Ghassan A. Abed (Universiti Kebangsaan Malaysia, Malaysia); Mahamod Ismail (Universiti Kebangsaan Malaysia, Malaysia); Kasmiran Jumari Jumari (Universiti Kebangsaan Malaysia, Malaysia)

The Fourth Generation (4G) of cellular communication systems is a technology emerging from future wireless networks. In recent years, many researchers and scientists worldwide have been working on government and business funded projects, whose goal is an efficient wireless network, borne from all current technologies. By adapting new solutions for these enhanced telecommunications, superior quality, efficiency, and opportunities will be provided where wireless communications were otherwise unfeasible. Some researchers define 4G as a significant improvement of 3G, where current cellular network's issues will be solved and data transfer will play a more significant role. For others, 4G unifies cellular and wireless local area networks, and introduces new routing techniques, efficient solutions for sharing dedicated frequency bands, and an increased mobility and bandwidth capacity. One of the main solutions to improve the performance of new wireless communication systems is by improving TCP (Transmission Control Protocol) performance. This article investigates the possible practical solutions to enhancing the performance of TCP over 4G systems.

5:20 Design and Implementation of 16-QAM Transceiver Using Near-Maximum-Likelihood Detection for Software Defined Radio
Rehan Muzammil (Aligarh Muslim University, India); Mirza S. Beg (Aligarh Muslim University, India); Mohsin Jamali (The University of Toledo, USA)
High transmission bit rate in futuristic wireless channels gives rise to severe inter-symbol interference (ISI) and this makes the detection task very challenging. In such cases, Near-Maximum-Likelihood (NML) detection gives much better performance compared to traditionally used equalizers. This paper describes the implementation of a 16-QAM transceiver using NML detection on a model based development platform for Software Defined Radio (SDR) systems. The advantage of model based approach used in this work is that its design and implementation is less time consuming compared to the traditional method.

B14 Science & Engineering Applications (cont)

Time: 4:00 PM - 6:00 PM
Room: LAWANG

Chair: Gul Khan (University of Engineering and Technology Peshawar, Pakistan), Anongnart Srivihok (Kasetsart University, Thailand)

4:00 Experimental Investigation of Photovoltaic Modules Cooling System
Farhana Zainuddin (University Malaysia Perlis, Malaysia)

The electrical efficiency of photovoltaic (PV) cell depends on its operating temperature during absorption of solar radiation. It is well known that the power and efficiency of PV module usually falls at the rate of ~0.5%/°C and ~0.05%/°C respectively as increase of ambient temperature. A solar system was designed, fabricated and experimentally investigated in this work. To actively cool the PV panel, a DC brushless fan with inlet/outlet manifold designed for uniform airflow distribution was attached at the back of the PV panel. Experiments were performed with and without active cooling. In this study, the open-circuit voltage of PV module, Voc and every change of temperature on PV panel were measured and recorded using Midi Logger GL220. The characteristic of solar irradiance is recorded per minutes for a month using Davis Vantage Pro2 Weather Station. In the end, method to attach DC brushless fan to the backside of PV module is discussed. This work shows the comparison between a PV module with and without DC brushless fan.

4:20 Applications of PSO Technique to Optimal Location and Sizing of Static Var Compensator
Siti Amely Jumaat (University Teknologi MARA & University Tun Hussein Onn Malaysia, Malaysia); Ismail Musirin (Universiti Teknologi Mara, Shah Alam, Malaysia); Muhammad Othman (Universiti Teknologi MARA, Malaysia); Hazlie Mokhlis (Electrical Engineering Department, Malaysia)

This paper describes optimal location and sizing of static var compensator (SVC) based on Particle Swarm Optimization for minimization of transmission losses considering cost function. For this study, static var compensator (SVC) is chosen as the compensation device. Validation through the implementation on the IEEE 30-bus system indicated that PSO is feasible to achieve the task. The simulation results are compared with those obtained from Artificial Immune System (AIS) technique in the attempt to highlight its merit.

4:40 Building FExpert: System for Searching Experts in Research University Using K-Means Algorithms
Anongnart Srivihok (Kasetsart University, Thailand)

In a research university is difficult to find an expert since there are many faculties and staff who might work in multidisciplinary areas. Researchers working in the same project might not be from the same departments. It is the objective of this study to develop a prototype of expert finding system (FExpert) for a research university. Data were undertaken from three sources: (1) researcher personal profile, (2) graduate school profile and (3) research project profiles. The data were preprocessed and clustered according to keywords of each expert by using K-Means algorithm. The proposed system can be used to find experts according to the cluster of their research, and to find experts by keywords. The statistical analysis summarizes records of researchers by their works and by unit areas. This study can be further implied for an expert finding system of a large organization which might be a part of Knowledge Management.

5:00 Exploiting Developmental Plasticity in Cartesian Genetic Programming
Fahad Ullah (University of Engineering and Technology Peshawar, Pakistan); Gul Khan (University of Engineering and Technology Peshawar, Pakistan); Sahibzada Ali Mahmud (University of Engineering and Technology, Peshawar, Pakistan)

In this paper, the effect of developmental plasticity is investigated in Cartesian Genetic Programming (CGP); an evolutionary algorithm that uses a directed graph to represent its genetic architecture. Developmental Plasticity is the adaptability of an organism to a change in its surrounding environment. A Developmental Output is used to computationally develop a phenotype that has already been passed through a genetic evolution. To manifest the idea of developmental plasticity in the form of digital circuits, binary multiplexing functions are used in the CGP implementation. Two experiments—prime number test and image recognition test—are conducted so that to analyze the effect of Developmental Plasticity in CGP. As evident from the simulation results, the plasticity based CGP demonstrates better performance against conventional CGP in terms of its adaptability and learning in general.

A21

Signal & Image Processing

Time: 9:00 AM - 10:40 AM
Room: JINTAN

Chair: Fitri Arnia (Syiah Kuala University, Indonesia), Rostam Affendi Hamzah (Universiti Teknikal Malaysia Melaka, Malaysia)

9:00 A Robust Face Recognition Method Using Edge-Based Features
Reza Moradi Rad (University of Guilan, Iran); Abdolrahman Attar (University of Guilan, Iran); Reza Ebrahimi Atani (University of Guilan, Iran)

Face recognition, as one of the most interesting and successful applications of image understanding and machine vision, has grown a lot of attention during the past years. Basically human faces are very similar in structure with minor differences from person to person. In this paper a new robust face recognition method is proposed which exploit edge-based features of faces. The performance of this method is independent from the scenario of face recognition. Difficult scenarios of face recognition are including pose variation, illumination conditions, scale variability, images taken years apart, glasses, mustaches, beards, and low quality image.

9:20 A Novel Initialization Approach for Solving Permutation Ambiguity of Frequency Domain Blind Source Separation
Morteza Daneshkar (IUST, Iran); Reza Ebrahimi Atani (University of Guilan, Iran)

Due to the importance of speech signals in the recent years, many techniques have been proposed to solve the permutation ambiguity of blind source separation in frequency domain. Our goal in this paper is to present a new method based on initialization and navigation resources to solve the permutation ambiguity in blind source separation in the frequency domain. In this work, first the separation matrices are obtained from each frequency subband, into a diagonal matrix. After sorting the eigenvalues, the matrix will initialize to the next frequency subband as an initial value. Simulation results show that our separation method has better separation quality and has higher speed of convergence.

9:40 A Pixel to Pixel Correspondence and Region of Interest in Stereo Vision Application
Rostam Affendi Hamzah (Universiti Teknikal Malaysia Melaka, Malaysia)

This paper presents an analysis of stereo images for an application of stereo vision application. The correspondence process is to determine the difference of intensities of pixel between stereo images while the region of interest ROI works as a reference area to the stereo vision application. This region is a reference view of the stereo camera and stereo vision baseline is based on horizontal configuration. The block matching technique is briefly described with the performance of its output. The disparity mapping is generated by the algorithm with the reference to the left image coordinate. The algorithm uses Sum of Absolute Differences (SAD) which is developed using Matlab software. The rectification and block matching processes are also briefly described in this paper.

10:00 A Novel Approach of Skew Estimation and Correction in Persian Manuscript Text Using Radon Transform
Hadi Yousefi Ramandi (Islamic Azad University Qazvin Branch, Iran); Karim Faez (Amirkabir University of Technology, Iran); Mohammad Hadi Ardekani (University of Technical & Vocational, Shahid Babaee Technical Faculty of Qazvin, Iran)

Skew angle estimation is an important component of optical character recognition (OCR) systems. In this paper, a new optimizing method is introduced that is called "Finding the Skew with Radon (FSR)" in order to estimate the skew of the handwritten text. The above mentioned method has three stages. First of all, input text image is converted into a binary form and then the words and sub-words are became dilated. Then, the pattern angle is attained by using Radon transform. Finally, the inversion or non-inversion of the result image from the previous stage is recognized by extraction of horizontal histogram of that image and statistical analysis. To demonstrate the FSR method's outcomes, this proposed method is simulated for a complex of various Persian handwritten images, and then it is observed that its results in comparison with last methods are significantly optimized.

10:20 Iris Recognition Method Based on Ordinal Measure of Discrete Cosine Transform Coefficients
Fitri Arnia (Syiah Kuala University, Indonesia); Khairul Munadi (Syiah Kuala University, Indonesia); Masaaki Fujiyoshi (Tokyo Metropolitan University, Japan); Hitoshi Kiya (Tokyo Metropolitan University, Japan)

A recognition system based on irides has become important in the last decades due to its reliability and comfort. This paper proposed a method for iris recognition based on ordinal measure of Discrete Cosine Transform (DCT) coefficients. Ordinal measure was obtained by ordered the absolute value of AC coefficients of normalized iris image of both database and query image ascendantly. Distance between those image was measured by Minkowsky distance metrics. Five simulation sets, each with different of AC coefficient used, namely all, 63, 48, 32 and 16 coefficients were conducted, to find out recognition rate of the proposed method and the best trade-off between compression ratio and recognition rate. It turned out that 50% of querying task resulted in averaged recognition rate more than 60%, Moreover, the best trade-off between compression ratio and recognition rate was achieved when as many as 48 coefficients were used.

B21

Computer Applications & Software Engineering

Time: 9:00 AM - 10:40 AM
Room: LAWANG

Chair: Reza Ebrahimi Atani (University of Guilan, Iran), Mahesh Chandra Govil (Principal, Govt. Women Engineering College, Ajmer INDIA & Malaviya National Institute of Technology, Jaipur INDIA, India

9:00 CIARP: Crypto Instruction-Aware RISC Processor
Nima Karimpour Darav (Islamic Azad University, Lahijan Branch, Iran); Reza Ebrahimi Atani (University of Guilan, Iran); Erfan Aghaei (University of Guilan, Iran); Ahmad Tahmasivand (University of Guilan, Iran); Mahsa Rahmani (University of Guilan, Iran); Mina Moazam (University of Guilan, Iran)

Security is one of the most important features of industrial products. Cryptographic algorithms are mainly used for this purpose to obtain confidentiality and integrity of data in industry. One of the main concerns of researchers in the design cryptographic algorithms is efficiency in either software implementation or hardware implementation. However, the efficiency of some well-known algorithms is highly questionable. The main goal of this paper is to present a novel processor architecture called CIARP (stands for Crypto Instruction-Aware RISC Processor) being feasible for high speed implementation of low throughput cryptographic algorithms. CIARP has been designed based on a proposed instruction set named Crypto Specific Instruction Set (CSIS), that can speed up encryption and decryption processes of data.

9:20 Enhancing Security Features in RSA Cryptosystem
Abrar Ahmed (Iqra University Islamabad Campus, Sector H-9, Pakistan); Imran Shafi (Iqra University Islamabad Campus, Sector H-9, Pakistan); Ahsan Tanvir (Iqra University Islamabad Campus, Sector H-9, Pakistan); Muhammad Asshad (Iqra University Islamabad Campus, Sector H-9, Pakistan)

The public key cryptosystem RSA is considered to be the first algorithm for public key encryption and decryption method for saving data confidentially over the network. However, several successful attacks are developed to break this algorithm due to certain limitations assumed in its derivation. The algorithm's security is primarily based on the problem of factoring large number. If the process factorization is done then the whole algorithm can become breakable. This paper presents a methodology to change the original modulus (product of two prime numbers). The changed modulus value will be publicly announced which might be the fake value. Even if the hacker factorizes this new modulus value, he can't be searched out the original decryption key (d). Inability to find the original decryption key, the factorization is worthless. This scheme helps to overcome the weaknesses of factorization found in RSA.

9:40 A Dynamic Group Based Scheduling for Soft Real Time Systems
Zahereel Ishwar Abdul Khalib (University of Malaysia Perlis, Malaysia); R Badlishah Ahmad (Universiti Malaysia Perlis, Malaysia); Ong Bi Lynn Ong (Universiti Malaysia Perlis, Malaysia)

Hard real time system were often implemented with preemptive scheduling, which gives priority to the highest priority task. In this paper we present a new non-preemptive scheduling of jobs meant for soft real time application. Our ultimate aim is to increase the success rate of the evergreen Earliest Deadline First (EDF) algorithm during overload condition while maintaining the excellent performance it poses during normal load. Our approach, grouped jobs with near deadlines together using our novel algorithm and schedule the jobs within a group using another algorithm. We named the approach Group, Utilization and Deadline Tolerance EDF (gutEDF). We will present result comparing the success rate of gutEDF and EDF under different deadline tolerance values and success ratio improvement of gutEDF.

10:00 Modeling Crosscutting Applications in Untyped Aspect Calculus
Mahesh Chandra Govil (Malaviya National Institute of Technology, Jaipur, India); Dinesh Gopalani (Malaviya National Institute of Technology Jaipur, India)

The untyped aspect calculus provides direct support for aspects and other related constructs of aspect-oriented programming languages. The calculus uses object and aspect rather than function as its primitive constructs and define operations on these primitives directly. In this paper, we present how the untyped aspect calculus, a minimal language representing the essence of the class of aspect-oriented programming languages, can be used to model various crosscutting applications. The paper discusses some of the common crosscutting applications like caching and logging using the UML notations along with their modeling details in the aspect calculus.

10:20 Preliminary Study of Electromagnetic Energy Absorption in the Head Due to the Exposure of Radio Frequency At 900MHz
Mohd Hafizuddin Mat (Universiti Malaysia Perlis, Malaysia); Mohd Fareq Abd Malek (Universiti Malaysia Perlis, Malaysia); Muhammad Solihin Zulkefli (Universiti Malaysia Perlis, Malaysia); Suzanna Harun Ronald (Universiti Malaysia Perlis, Malaysia)

In this paper, the effects to Specific Absorption Rate (SAR) levels in human head proximity to metal-spectacle when using RF source investigated. The source is from a mobile communications enabled device (MCE) operating in GSM900. A homogenous SAM phantom head and hand model were used to understand the related mechanism with the representative sources of Planar Inverted F antenna (PIFA) at 900MHz. A PIFA inside mobile phone excited in front of the head-worn metallic spectacle. Previous studies have been conducted using dipole in the frontal face. However, human hand holding MCE in the frontal face has not been discussed. The Simulations showed high correlation between the metallic spectacles and powers absorbed in face. All simulations have been done using finite integration in time domain (FIT).

A22

Signal & Image Processing (cont)

Time: 11:00 AM - 1:00 PM
Room: JINTAN

Chair: Fitri Arnia (Syiah Kuala University, Indonesia), Rostam Affendi Hamzah (Universiti Teknikal Malaysia Melaka, Malaysia)

11:00 Motion Recognition Based on Face and Hand Activity Detection
Wenkai Xu (Tongmyong University, Busan, Korea); Suk-Hwan Lee (TongMyong University, Korea); Soo-Yol Ok (Tongmyong University, Korea); Eung-Joo Lee (Tongmyong University, Korea)

In this paper, we develop face and hand activity detection for motion recognition system. In initial stage, a skin color segmentation method for the color image with complex background is presented, which is a mixed skin color segmentation model in both HSI and YCbCr color space constructed. After skin color segmentation, improved face feature extraction method is proposed. Then the improved CAMSHIFT algorithm is used for hand tracking stage. Through computation, the key points of hand and face can be received. Then we establish coordinate system for motion recognition. Simulation results indicate our proposed algorithm has satisfying interactive function in real time and it can be applied in different illumination condition and complex background as well

11:20 A Joint Filtering Based SVD Technique for Image De-noising
Aris Marjuni (Multimedia University, Malaysia); Mohammad Faizal Ahmad Fauzi (Multimedia University, Malaysia); Swee-Huay Heng (Multimedia University, Malaysia); Rajasvaran Logeswaran (Multimedia University, Malaysia)

Image de-noising is an important part of image enhancement. This paper proposes an image de-noising technique on the singular value decomposition (SVD) using a combination of the signal-to-noise ratio (SNR) and median of noised image as a filtering function for singular values replacement. The signal noise is assumed to be an additive white Gaussian noise. Experimental results show that the proposed method is able to successfully enhance the visual quality of noisy images through this low complexity de-noising process.

11:40 Review of Energy Efficient Block-Matching Motion Estimation Algorithms for Wireless Video Sensor Networks
Seong Chee Cheong (University Malaysia Perlis, Malaysia); Asral Bahari Jambek (Universiti Malaysia Perlis, Malaysia); Razaidi Hussin (Universiti Utara Malaysia, Malaysia)

This paper presents review of several popular block-matching motion estimation algorithms from energy efficient viewpoint for wireless video sensor networks application. Full search motion estimation gives the best image quality but demands high computing power. Therefore only fast search algorithms are considerable to be deployed in wireless video sensor networks which operates at battery-constrained remote area. However, image quality of fast search algorithms also need to be counted in the comparison. In this paper, those block-matching algorithms are compared based on two criterion: 1) computing cost/energy consumption, 2) image quality. The purpose of this review is to select the most energy efficient algorithm while image quality can be retained in order to apply onto wireless video sensor networks video compression application.

12:00 Image Encryption Using Random Pixel Permutation by Chaotic Mapping
GA Sathishkumar (Sri Venkateswara College of Engineering, India); Srinivas Ramachandran (Sri Venkateswara College of Engineering, India); Boopathybagan K (Madras Institute of Technology, India)

This paper describes the result of our investigation on the utilization of pixel scrambling and random permutation to encrypt and securely transmit images. The objective of this proposed algorithm is to obtain a high speed computation process and high security. Among other techniques such as pixels shuffling methods, frequency transform method and diffusion methods, our permutation technique provides simple and quick processes. This is achieved by simple chaotic maps. This feature is especially very useful for satellite transmission of image where the image can be very big. We have tested the algorithm using gray-scale still images. The scheme shows a good statistical analysis, key sensitivity tests, provide good randomness.

B22

Computer Applications & Software Engineering (cont)

Time: 11:00 AM - 1:00 PM
Room: LAWANG

Chair: Reza Ebrahimi Atani (University of Guilan, Iran), Mahesh Chandra Govil (Principal, Govt. Women Engineering College, Ajmer INDIA & Malaviya National Institute of Technology, Jaipur INDIA, India)

11:00 Generation of Multiple Side Lobe Levels of Non Uniformly Excited Linear Array Antenna Using Iterative Fast Fourier Transform
Harikumar Pilli (National Institute of Technology, Durgapur, India); Anwesh Mukherjee (National Institute of Technology, Durgapur, India); Vishal Gupta (National Institute of Technology, Durgapur, India); Soham Mondal (National Institute of Technology, Durgapur, India); Saheli Sarkar (National Institute of Technology, Durgapur, India); Gautam Kumar Mahanti (National Institute of Technology, Durgapur, India)

This paper describes amplitude control method for the synthesis of broadside non-uniformly excited and uniformly spaced linear array antenna for generation of multiple side lobe levels using iterative Fast Fourier transform. Compared to other evolutionary methods this technique has higher computational speed. This is the major advantage of this technique i.e. it takes less computation time. This is because of the fact that the core calculations are based on direct and inverse fast Fourier transforms (FFT). An example has been presented with 30 isotropic antennas for producing two different side lobe levels of -50 dB and -30Db.

11:20 A Comprehensive Analysis and Performance Evaluation of Different Direction of Arrival Estimation Algorithms
Khan Reaz (North South University, Bangladesh); Ferdousul A.S.M. Haque (North South University, Bangladesh); Mohammad A Matin (Institut Teknologi Brunei, Brunei Darussalam)

The performance of the smart antennas greatly relies on the efficient estimation of direction of arrival. Therefore, the authors have addressed and analyzed high resolution subspace based algorithms to evaluate the performance for accurate estimation of direction- of- arrival (DOA) of signals impinging on uniform linear array (ULA). Simulation results showed that Matrix Pencil (MP) provides better performance in terms of root mean square error (RMSE) and probability of resolution although its performance is not as good as Root Music algorithm for closely spaced signals. Profound analysis of these algorithms can be used to determine the direction of arrival of the signals at ULA.

11:40 Optimized Power Allocation Approach in Relay-based Cognitive Radio Network
Maria Ahmed (North South University, Bangladesh); Nazia Ferdous (North South University, Bangladesh); Mohammad A Matin (Institut Teknologi Brunei, Brunei Darussalam)

In this paper, we address the issue of power allocation in a relay-based cognitive radio network. The power allocation approach analyzed here maximizes the system throughput while maintaining interference to a tolerable limit. We modify the approach to achieve a higher convergence rate. Later we further propose a near optimal power allocation approach that significantly lowers the computational complexity. A detailed analysis has been done before simulation. The simulated results validate the theoretical analysis

12:00 A Review on Optimization of Turbo Code Iteration with Channel Estimation in Ultra-Wideband Channel
Roslina Mohamad (University Teknologi Mara, Malaysia)

This paper describes a review on minimizing stopping turbo iteration methods with channel estimation in UWB channel. Most existing stopping criteria for turbo iteration will cause degradation to the system, computational complex. In this paper, sign-change-ratio (SCR) criterion are being proposed for stopping iteration while using Least Square (LS) estimation technique to estimate the channel parameter of turbo codes maximum iteration. It is believed that the propose combination method can minimizing stopping turbo iteration, it would be able avoid any unwanted condition like computation delay, wasted power consumption as the iteration stages keep increasing when it reach the maximum peak of the performances.

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A Joint Filtering based SVD Technique for Image De-noising

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***Abstract*—Image de-noising is an important part of image enhancement. This paper proposes an image de-noising technique on the singular value decomposition (SVD) using a combination of the signal-to-noise ratio (SNR) and median of noised image as a filtering function for singular values replacement. The signal noise is assumed to be an additive white Gaussian noise. Experimental results show that the proposed method is able to successfully enhance the visual quality of noisy images through this low complexity de-noising process.**

Keywords-component; image de-noising; singular value decomposition; signal-to-noise ratio; median; image enhancement

I. INTRODUCTION

The term 'noisy image' refers to image degradation caused by noise perturbation. Image de-noising is the process of reducing or removing the influence of noise from the noisy image and reproducing, as close as possible, the original 'clean' image.

Singular value decomposition (SVD) is a technique that has been widely applied in image de-noising. Yanmin *et al.* [1] proposed an adaptive de-noising by SVD using image patches. Their experiment achieved outstanding preservation of image details, and provided improvement on de-noised images at high noise levels. Sunil and Yadava [2] proposed noise removal by truncating the SVD matrices up to a few largest singular value components, and reconstructing the de-noised image by using the remaining singular vectors. Their procedure could effectively remove an additive noise from the sensor array based electronic nose data. Tanaphol *et al.* [3] proposed an adaptive image de-noising based on the non-local mean by employing the SVD and K-means clustering technique for robust block classification in noisy images, adjusting the local window adaptively to match the local property of a block, and applying a rotated block matching algorithm for better similarity matching. Their proposed technique is shown to be effective in de-noising highly noisy images. *Zhijia et al.* [4] proposed the minimum energy model for image de-noising by selecting the proper singular values that represent the signal, and discarding the ones that represent noise. Their experiment results show that their technique is effective and robust to the images with simple/regular pattern/structure. Wongsawat *et al.* [5] proposed the multichannel SVD-based image de-noising by employing the integer discrete cosine transform (IntDCT) to de-correlate the image into sixteen sub-bands and applying the SVD to each of the subbands. Their proposed technique could effectively filter the noisy images without assuming any statistics of the image.

In this work, we propose an alternative method to reduce the noise by using the SNR and median values of noised image as a filtering function based on SVD. In SVD, singular values have a dominant effect on the image quality [4]. By modifying those values using this filtering, the proposed method could be expected to be as close as possible to the original clean image.

This paper is organized as follows. Section II illustrates the SVD in brief as a background of this work. Section III presents the proposed image de-noising method, while the experimental results are described in Section IV. Finally, the conclusion is presented in Section V.

II. BACKGROUND

A. Singular Value Decomposition

The SVD is a numerical approach to obtain a linear algebraic solution by matrix factorization. A matrix can be decomposed into three matrices of the same size as the original matrix, which in turn, can be reconstructed into the original matrix.

Let, M be the $N \times N$ real matrix with rank $r \leqslant N$. The SVD of M is defined as [4, 5, 8]:

$$M = USV^T \tag{1}$$

where S is an $N \times N$ diagonal matrix with singular values $s_1 \geqslant s_2 \geqslant \cdots \geqslant s_N \geqslant 0$; U and V are $N \times N$ orthogonal matrices and called as the left and right singular vectors, respectively; and V^T is the conjugate transpose of V. Equation (1) can also be expressed in summation form of components matrices: u_i, s_i, and v_i^T [2].

$$M = \sum_{i=1}^{r} s_i u_i v_i^T \tag{2}$$

where $s_i = s_1 \geq s_2 \geq \ldots \geq s_N > 0$ are singular values of M; $u_i = [u_{1i}\ u_{2i}\ \ldots\ u_{Ni}]$ and $v_i = [v_{1i}\ v_{2i}\ \ldots\ v_{Ni}]$ are the left and right singular vectors with $i = 1, 2, \ldots, N$, respectively.

B. SVD on Image Processing

In digital image processing, an image $N \times N$ can be represented as a matrix of size $N \times N$. Fig. 1 illustrates the SVD application to decompose and reconstruct a gray level image of Lena. The Lena image I is decomposed into U, S, and V using the SVD transform. The three matrices: U, S, and V have the same size with I. The reconstructed image of I can be obtained by multiplying U, S, and V^T.

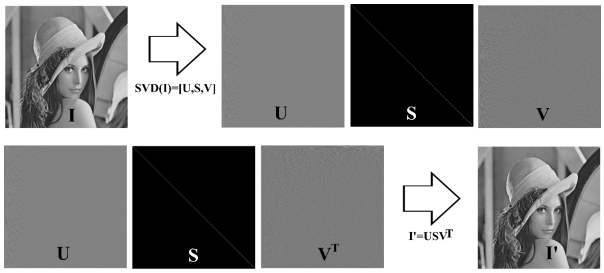

Figure 1. Image Decomposition and Reconstruction

The diagonal matrix S consists of the singular values s_i and it represents the energy of an image I [4]. It means that the image information is addressed by those singular values of S. The U and V control the spatial distribution of image energy, formulated by multiplying U and V^T as a component image. This concept is illustrated in Fig. 2.

(a) (b)

Figure 2. Image Spatial Distribution of $Lena_{512\times512}$ (a) Original Image, (b) UV^T Image

There are many SVD applications in image processing, such as image compression, registration, recognition, enhancement, and segmentation. The SVD transformation has some important advantages in image processing. First, the singular values of an image are stable without any great variance when the image has a small disturbance. Second, singular values contain algebraic image properties which are intrinsic and not visual [7].

III. The Proposed Image De-Noising Method

Suppose the original image I is distorted by a noise component X. The noisy image I' can be formulated as:

$$I' = I + X \tag{3}$$

where the noise variable X is a random noise and is assumed to be independent and identically distributed (*i.i.d.*) Gaussian distribution with zero mean and standard deviation σ. The main task of the image de-noising is to estimate the noiseless image, namely, I_d, from the noisy image I'.

In this work, the estimated image I_d will be achieved by modifying the singular values of I_d. Let Λ be a diagonal matrix which consists of the singular values s_i, and r be a rank of Λ. Noise reduction is performed by replacing the singular values s_i in Λ using the filtering function in (4). The change of singular values is obtained based on their certain position which is determined by the percentile values (P_k). The singular values are divided into four ranges with the limit of position values are P_5, P_{50}, and P_{75}. The most image information of an image is represented on the foreside of the singular matrix and its represent by P_5 to P_{50} of the first-half singular values. The next half range of singular values then separated proportionally. This separation is intended to prevent a significant loss of image information, especially on the first-half singular values.

$$f(s_i) = \begin{cases} s_i - \alpha \times med_\Lambda \times SNR_\Lambda^2, i < P_5 \\ s_i - \alpha \times med_\Lambda \times (1 - SNR_\Lambda^2), P_5 \leq i < P_{50} \\ s_i \times \alpha \times med_\Lambda \times SNR_\Lambda^2, P_{50} \leq i < P_{75} \\ s_i \times \alpha, i \geq P_{75} \end{cases} \tag{4}$$

where α is the de-noising coefficient, med_Λ is the median of Λ, P_k is the k-percent position (percentile) of the s_i, and $i = 1, 2, \ldots, r$. The SNR_Λ is a ratio of the mean and standard deviation of Λ, notated as [4,7]:

$$SNR_\Lambda = \mu_\Lambda / \sigma_\Lambda \tag{5}$$

where μ_Λ and σ_Λ are the mean and standard deviation of Λ, respectively.

To evaluate the proposed method performance, the mean square error (MSE) and peak signal to noise ratio (PSNR) are used in this work as performance measures. The MSE and PSNR are computed by (6) and (7), respectively.

$$MSE = \frac{1}{mn} \sum_{i=1}^{m} \sum_{i=1}^{n} [I(i,j) - I'(i,j)]^2 \tag{6}$$

$$PSNR = 10.\log_{10}\left(Max_I^2 / MSE\right) \tag{7}$$

where I and I' are the original and noiseless image, respectively; Max_I is the maximum possible pixel value of the image I; and m and n are the number of rows and columns of the image I, respectively.

IV. Experimental Results

The noise model in this experiment is assumed to be additive Gaussian with zero mean and standard deviation σ. For the first experiment, we used standard deviation σ=10 to generate a random noise and α=0.25 as a de-noising coefficient. The noisy and de-noised images of $Lena_{512\times512}$ are illustrated in Fig. 3a and Fig. 3b. Using those parameter values, the MSE is decreased by 87.5803, while the PSNR is increased by 9.0666dB. It means that the proposed method could improve the image visual quality by reducing the noise.

(a) (b)

Figure 3. Noisy and De-noised Image of $Lena_{512\times512}$. (a) Noisy Image (σ=10, PSNR=28.1319dB, MSE=99.9748), (b) De-noised Image (α=0.25, PSNR=37.1985dB, MSE=12.3945

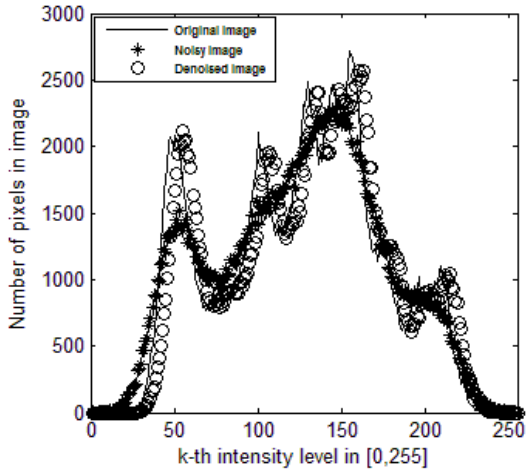

Fig. 4. Plot Histogram of $Lena_{512\times512}$

To evaluate the estimation model, Fig. 4 illustrates the histogram of the Lena image for standard deviation σ=10. The change on the singular values of the noisy image reduces the noise when the plot gets closer to that of the original image. Although the de-noised image is not a perfect estimation of the clean image, the pixel distribution of the de-noised image is significantly similar to the original image. The residual image which represents the differences between the original image and de-noised image is illustrated in Fig. 5.

The proposed method was then applied on test images with higher standard deviation of noise. The standard test images, such as Lena, Pepper and Goldhill were used in the performance evaluation. The noisy, de-noised, and histogram images of Pepper and Goldhill are illustrated in Fig. 6. The MSE and PSNR performances are presented in Table I. The standard deviations in this experiment are 10, 15, 20, and 25; with the fixed de-noised coefficient is 0.25. Experimental results show that using the higher standard deviation, the MSE increased and the PSNR decreased.

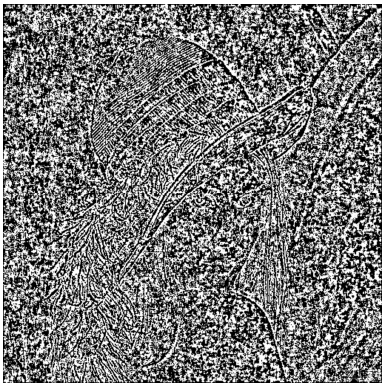

Fig. 5. Residual Image of $Lena_{512\times512}$

TABLE I. MSE And PSNR Performances in Different Images (α=0.25)

Images	σ	MSE		PSNR (dB)	
		Noisy	De-noised	Noisy	De-noised
Lena	10	99.9748	12.3945	28.1319	37.1985
	15	224.487	20.4109	24.6189	35.0322
	20	400.673	31.8340	22.1029	33.1019
	25	622.774	47.0392	20.1875	31.4062
Pepper	10	99.5635	11.3899	28.1498	37.5656
	15	225.004	19.2252	24.6089	35.2921
	20	400.553	30.2503	22.1042	33.3235
	25	626.672	45.0174	20.1604	31.5970
Goldhill	10	99.5635	22.0653	28.1498	34.6937
	15	224.864	30.6521	24.6116	33.2662
	20	400.766	42.4503	22.1019	31.8520
	25	622.286	57.3285	20.1909	30.5471

The performance of the proposed method is also evaluated for different values of the de-noising coefficient α. Table II shows that the change of the de-noising coefficient caused the small effect on the visual quality of performance both in MSE and PSNR. Similar results were observed.

TABLE II. MSE AND PSNR PERFORMANCES OF LENA IMAGE IN DIFFERENT DE-NOISING COEFFICIENT (σ =10)

α	σ	MSE		PSNR (dB)	
		Noisy	De-noised	Noisy	De-noised
0.00	10	99.6392	12.7462	28.1465	37.0770
0.25	10	99.6966	12.4724	28.1440	37.1713
0.50	10	99.9425	12.3982	28.1333	37.1972
0.75	10	99.7127	12.5061	28.1433	37.1596
1.00	10	100.1637	12.7450	28.1237	37.0774

In evaluation of the proposed method with the other benchmark methods, the results presented in Table III show that the proposed method performed better in almost all cases.

TABLE III. PSNR PERFORMANCES COMPARISON

Images	σ	MSVD [5]	ANL [3]	ASVD [1]	Proposed α=1
Lena	10	32.12	34.11	35.60	37.06
	20	28.56	31.98	32.97	33.64
	25	27.45	30.56	32.05	32.19
	30	26.67	30.04	31.13	30.88
	40	25.79	28.27	29.82	28.73
	50	24.38	27.29	28.94	26.79
Pepper	10	31.68	34.65	36.19	37.57
	20	28.48	31.59	32.84	33.98
	25	27.75	30.21	31.43	32.49
	30	26.12	29.79	30.98	31.16
	40	25.04	28.00	29.13	28.80
	50	24.19	27.12	28.43	26.95
Goldhill	10	30.83	31.67	32.84	34.69
	20	27.69	30.15	30.42	32.40
	25	27.04	29.12	29.60	31.28
	30	26.11	28.28	28.81	30.21
	40	25.53	27.98	28.42	28.26
	50	24.77	26.56	27.13	26.52

V. CONCLUSION

This paper proposed an image de-noising technique using singular value decomposition (SVD) by median and SNR as a filtering function. To obtain the clean signal, the filtering was applied to change the singular values. In this method, the low singular values were kept to prevent drastic changes to those values. Experimental work demonstrates that the proposed method has better performance in reducing most noise compared to the other methods. As a further work, the proposed method will be applied on the block-image.

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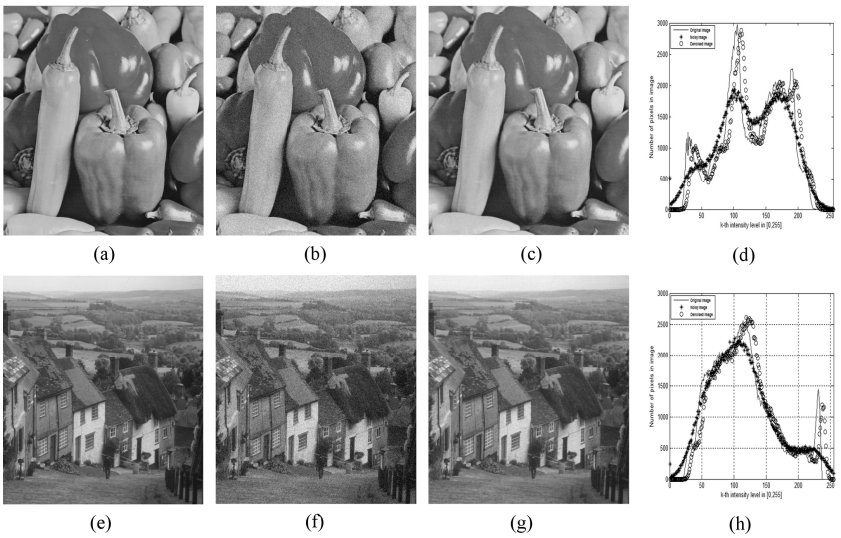

(a) (b) (c) (d)

(e) (f) (g) (h)

Fig. 6. (a)-(d) Original, Noisy, De-Noised, Histogram Image of $Pepper_{512\times512}$;(e)-(h) Original, Noisy, De-Noised, Histogram Image of $GoldHill_{512\times512}$