2015 6th International Conference on Information and Communication Technology for Embedded Systems (IC-ICTES)

March 22-24, 2015

Novotel Hua Hin Cha Am Beach Resort and Spa, THAILAND

ABSTRACT BOOK

The 2015 International Conference on Information and Communication Technology for Embedded Systems (IC-ICTES 2015)

Abstracts

March 22-24, 2015

Novotel Hua Hin Cha Am Beach Resort and Spa, THAILAND

Organized by

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National Electronics and Computer Technology Center, NSTDA
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CONFERENCE AT-A-GLANCE

Time	Conference Room A	Conference Room B
	March 22, 2015 (Sunday)	
10:00-12:00	Register (Welcoming Drink/Snack)	
1 hr.	Lunch	
13:00-14:00	Keynote Speech (Assoc.Prof. Jun Takamatsu)	
14:00-14:45	Invited Talk (Dr. Junji Watanabe)	
15 min.	Coffee Break	
15:00-16:20 (1.20hr)	Session 1 (4) Classification	
	March 23, 2015 (Monday)	
9:00-10:40 (1.40hr)	Session 2A (5) Detection	Session 2B (5) Control, Communications, and Power
20 min.	Coffee Break	
11:00-11: 45	Invited Talk (Assoc.Prof. Krisanadej Jaroensutasinee)	
1.15 hr.	Lunch	
13:00-13:20	Opening Ceremony	
13:20-14:20	Keynote Speech (Prof. Akira Chiba)	
20 min.	Coffee Break	
14:40-16:20 (1.40hr)	Session 3A (5) Hardware\Software Implementation	Session 3B (5) Image processing
18:00-21:00	Banquet	
	March 24, 2015 (Tuesday)	
8:20-10:00 (1.40hr)	Session 4 (5) Data Analysis	
10:00-10:45	Invited Talk (Prof. Kento Aida)	
15 minutes	Coffee Break	
11:00-11:45	Invited Talk (Mr. Motoharu Watanabe)	
1 hr.	Lunch	
12:45-14:25 (1.40hr)	Session 5 (5) Fingerprint and Object tracking	
20 minutes	Coffee Break	
14:45-15:45	Session 6 Short papers	

Message from General Chairs

It is my great pleasure to welcome you to the 6th International Conference on Information and Communication Technology for Embedded Systems (IC-ICTES) held at the Novotel Hua Hin Cha Am Beach Resort and Spa, Thailand, from March 22 to 24, 2015. This conference has been organized every year since 2010 and has served as an international forum for researchers and industry practitioners to share their new ideas, original research contributions, and practical development experiences from all embedded system-related areas. The range of topics includes embedded system designs, development of new hardware or software-related theories and techniques in embedded systems, and information and communication technology.

Without the enthusiastic support and hard work of many, this conference would have been impossible. Thus, I would like to take this opportunity to thank our sponsors, keynote and invited speakers, reviewers, authors, and especially, the tireless and dedicated organizing committee for making this conference a success. Finally, I am looking forward to a constructive and rewarding few days of sharing and exchanging ideas with all conference participants.

Peerayuth Charnsethikul
Kasetsart University
IC-ICTES 2015 General Co-chair

Message from General Chairs

On behalf of the Organizing Committee, I would like to extend to all of you our warmest welcome to the 6th International Conference on Information and Communication Technology for Embedded Systems (IC-ICTES) at Hua Hin, Thailand. IC-ICTES is a brand new conference which is organized to bring together academic researchers and industry practitioners working on all aspects of information and communication technology with particular focus on the applications to embedded systems. We are happy to have attracted 37 excellent papers from Thailand and Japan. I would like to thank all the presenters that have contributed to the conference. In addition, we are fortunate to have a number of distinguished keynote speakers and invited speakers that will clearly add a high note to this important event.

IC-ICTES has been jointly organized by the key members working in the field of ICTES from Sirindhorn International Institute of Technology, Kasetsart University, National Electronics and Computer Technology Center, and Tokyo Institute of Technology. I would like to thank all the members for their dedication and hard work to make this truly successful international conference. I sincerely hope that all of you enjoy this remarkable event.

Manabu Okumura
Tokyo Institute of Technology
IC-ICTES 2015 General Co-chair

Message from Technical Program Chairs

It is our great pleasure to welcome you to The 2015 International Conference on Information and Communication Technology for Embedded Systems (IC-ICTES 2015).

For this year conference (IC-ICTES 2015) the number of 37 contributed papers from 4 countries were totally submitted. The Technical Program Chairs and more than 55 reviewers, have worked very hard in the process of peer review and paper selection to accept papers in the program. Finally, an outstanding program of about 36 contributed papers is comprehensively offered at the conference. In addition, there are 2 keynote speeches and 4 invited talks. Consequently, the conference program is 7 regular sessions and 1 short paper session. This conference promises to be an inspiring and insightful experience containing a breadth of information on its theme.

I would like to deeply thank all the committee members and chairs who voluntarily invest their own time selecting papers and arranging such a successful and memorable conference.

Pisut Raphisak
Kasetsart University
IC-ICTES 2015 Technical Program Chair

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Keynote Speech

Realtime Human-Robot Interaction by an Actroid based on Motion Database and Efficient Acquisition of Database

Jun Takamatsu
Associate Professor, Nara Institute of Industrial Science and Technology, Japan

Abstract
Human-robot symbiosis is the most important thing in the next frontier in robotics field. Unlike well-controlled environments, such as plants, it is necessary to handle dynamic changes in our daily lives. Furthermore, a robot needs to decide appropriate reaction against the changes in real time. First, we introduce human-robot interaction by an android robot, which achieves motion naturalness and realtimeness by motion database and real-time collision avoidance/path adjustments. We also introduce our trial where we expand this system to a daily life manipulation, such as simple serving, by a humanoid robot. Next, we introduce the method for efficiently acquiring the database. Concretely, we introduce the first-person vision using an RGB-D sensor for recording and summarizing simple manipulation (e.g., pick and place) and the method for estimating semantics of 3D data.

Biography
Jun Takamatsu received the Ph.D. degree in Computer Science from the University of Tokyo, Japan, in 2004. From 2004 to 2008, he was with the Institute of Industrial Science, the University of Tokyo. In 2007, he was with Microsoft Research Asia, as visiting researcher. In 2008, he joined Nara Institute of Science and Technology, Japan, as associate professor. His research interests are in robotics including learning-from-observation, task/motion planning, and feasible motion analysis, 3D shape modeling and analysis, and physics-based vision.

Improvements of Switched Reluctance Motor for Hybrid Electrical Vehicles

Akira Chiba
Professor, Tokyo Institute of Technology, Japan

Abstract
In order to reduce CO2 emission, the fuel efficiency improvement in automobiles is one of important issues. Hybrid, pure electric, and plug-in vehicles have been introduced in the international market. In most of these motors, rare-earth permanent magnets are used to enhance efficiency, torque density, and output. The rare-earth price was increased in 2011because of the limited supply. This problem is internationally identified as the Rare-Earth Problem. In this presentation, improvements of switched reluctance motor to be competitive or better than the rare-earth PM motor are presented. Efficiency improvements, torque density improvements, and better output range, as well as noise reduction method are presented in the rare-earth-free motor.

Biography
Akira Chiba has received the BS., MS. and Ph.D. degrees in Electrical Engineering from the Tokyo Institute of Technology, in 1983, 1985 and 1988, respectively. In 1988, he joined the Tokyo University of Science as a Research Associate in the Department of Electrical Engineering in the Faculty of Science and Technology. Since 2010, he has been Professor in the Graduate School of Science and Engineering in the Tokyo Institute of Technology. He has been studying magnetically suspended bearingless ac motors, super high-speed motor drives and rare-earth-free-motors for hybrid and pure electrical vehicles. He has so far published more than 954 papers including the first book on "Magnetic bearings and bearingless drives" in 2005. He received the IEEJ Prize Paper Awards in 1998 and 2005. He also received First Prize Paper Award from the Electrical Machine Committee in the IEEE IAS in 2011. He has been served as Secretary, Vice-Chair, Vice-Chair-Chair-Elect, and Chair in the Motor Sub-Committee in the IEEE PES in 2007-2008, 2009-2010, 2011-2012, 2013-2014, respectively. He has been a member, Chair and Past Chair in IEEE Nikola Tesla Field Award Committee in 2009-2011, 2012-2013, and 2014, respectively. He served as Chair in IEEE-IAS Japan Chapter in 2010-2011. He also serves as Editor and Associate Editor in IEEE Transactions on Energy Conversion and Industry Applications, respectively. He is IEEE Fellow.

He had a joint project with NECTEC in Thailand for the development of switched reluctance motor drives with Dr. Kanokvate.

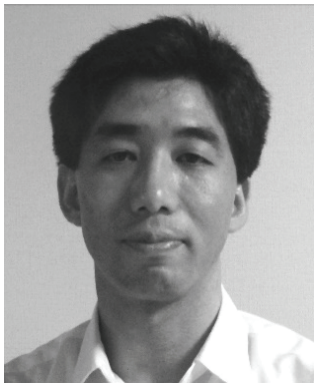
Invited Talk

Information Communication Technologies based on Human Perceptual Circuits

Dr. Junji Watanabe
NTT Communication Science Laboratories, Japan
Tokyo Institute of Technology, Japan

Abstract
Illusion is a phenomenon that results when there is a discrepancy between what our brain perceives and what actually exists. It forms the basis for presenting information using limited resources and for creating a sensation that has not been perceived previously. Understanding the principle of how humans sense their environment can be the key to developing new technologies for information presentation and communication. In the years ahead, I envision that technologies will play an important role in probing the depths and opening up new vistas of the human mind. Interface technologies available in today's modern society can provide experiences where people become aware of fundamental attributes and unconscious behaviors to which they normally pay little attention as they lead their lives. My colleagues and I have developed unique interface technologies based on the perceptual characteristics of humans and have had opportunities to introduce them to a wide range of people in the technology demos, presentations at science museums, and art festivals.

Biography
Dr. Junji Watanabe is a Senior Research Scientist at NTT Communication Science Laboratories. He received the Ph.D. in information science and technology from the University of Tokyo in 2005. From 2005 to 2009, he was a PRESTO researcher in the Foundation of Technology Supporting the Creation of Digital Media Content at the Japan Science & Technology Agency (JST). From 2009 to 2011, he was a Research Fellow at the Japan Society for the Promotion of Science. He became a research specialist in 2011, and a Senior Research Scientist in 2013 at NTT Communication Science Laboratories. From 2012, he became visiting Associate Professor at Tokyo Institute of Technology. He studies cognitive science and communication devices with applied human perception. His fields of interests are visual and haptic perception and communications.



Sensor Networks Applications for Reefs at Racha Island, Thailand

Krisanadej Jaroensutasinee
Associate Professor, School of Science, Walailak University, Thailand

Abstract
Remote coral reef islands present a series of challenges for deploying coral reef sensor networks. We deploy sensor networks at Khon Kae and Patok Bays, Racha Yai Island in southern Thailand. Racha Yai Island is far offshore of Phuket and so the island suffers very little from sediment loads from Phuket. It is one of the most popular tourist sites for SCUBA/Snorkel activities in Phuket. It presents a logistically challenging environment for both researchers and instruments because it is characterised by large but shallow bays, storms, and occasional power and internet outages. The island's coral ecosystem consists of hard and soft corals with many marine resources. So far serious impacts on the ecosystem have included the 2004 tsunami, a major bleaching event in May 2010, and heavy tourist traffic from both snorkelling and SCUBA. In response to the bleaching event, a sensor network was installed in early 2011 to provide future real time information about events. The system installed includes an underwater camera, two shore cameras, CTDs, thermisters, and a weather station. The data are available on-line in near real-time.

Biography
Krisanadej Jaroensutasinee received Ph.D. degree in physics from University of Warwick in 1994. He joined Walailak University in 1998, an assistant professor at the School of Science in 2001, and an associate professor in 2008. His research interest is on applying near real time sensors to monitors tropical rain forest and coral reef ecosystems.

Advanced Academic Information Infrastructure Utilizing Clouds

Kento Aida
Professor, National Institute of Informatics, Japan
Visiting Professor, Tokyo Institute of Technology, Japan

Abstract
Cloud computing is now widely used as a computing platform in business communities. Currently, academic communities are also interested in using cloud computing as the platform of research and education. National Institute of Informatics (NII) has a mission to create a state-of-the-art academic information infrastructure in Japan. This talk presents our latest activities to build academic information infrastructure utilizing cloud platforms. First, we introduce academic use-cases of cloud computing in Japan. Then, we present our view of the future academic information infrastructure and R&D projects focusing on Inter-Cloud, a framework for federating multiple cloud platforms to deliver advanced services.

Biography
Kento Aida received Dr. Eng. in electrical engineering from Waseda University in 1997. He became a research associate at Waseda University in 1992. He joined Tokyo Institute of Technology and became a research scientist at the Department of Mathematical and Computing Sciences in 1997, an assistant professor at the Department of Computational Intelligence and Systems Science in 1999, and an associate professor at the Department of Information Processing in 2003, respectively. He is now a professor at National Institute of Informatics and a visiting professor at the Department of Information Processing in Tokyo Institute of Technology from 2007.

University and Industry Collaboration under AUN/SEED-Net

Motoharu Watanabe
Deputy Chief Advisor
JICA Project for AUN/SEED-Net

Abstract
AUN/SEED-Net projects.

Biography
Mr. Motoharu WATANABE joined Japan International Cooperation Agency (JICA) in 1991 and has been in several positions related to higher education development including team director for higher education division of Human Resource Department. He obtained the Master for Education for International Development in Institute of Education, University of London. He was in charge of Japanese Yen loan and technical cooperation projects for east African countries in JICA for several years as well. He was also stationed in Uganda and Tanzania. He took up the current position since September 2014.

Session 1 : Classification
Date:Time March 22, 2015 (Sunday) : 15:00 - 16:20
Venue Room A

1.1 Classifying Emotion in Thai YouTube Comments

Authors:
Phakhawat Sarakit[1], Thanaruk Theeramunkong[1], Choochart Haruechaiyasak[2], Manabu Okumura[3]

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Abstract:
To add more value on YouTube, a popular portal of social media clips, it is worth recognizing automatically the mood of a media clip using the comments given to such clip. This paper presents a method to classify emotion of a Thai media clip on YouTube using the comments given to the clip. Six basic emotions considered are Anger, Disgust, Fear, Happiness, Sadness and Surprise. Performances using three alternative machine learning algorithms, namely multinomial naïve Bayes (MNB), decision tree (DT) and support vector machine (SVM)are compared. As the result, SVM achieves the highest accuracy in the commercial advertisement (AD) genre with an accuracy of 76.14% while MNB with yields the best result in the music video (MV) genre with an accuracy of 84.48%.

1.2 Automatic Wedge Tightness Classifying System by Support Vector Machine

Authors:
Thanachai Poombansao[1], Waree Kongprawechnon[2], Chonlada Theeraworn[3], Somsak Kittipiyakul[4]

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Abstract:
This paper introduces a newly developed automatic classification system for wedge tightness inside the generator by applying support vector machine (SVM) classifier. The automatic classifying system for wedge tightness of the generator consists of 4 parts including data collection, preprocessing, feature extraction, and classification. Machine learning algorithm called SVM is used with the linear and radial basis function (RBF) classifier. Each input feature is extracted in different ways to evaluate the performance of classification. The evaluation is completed by using a 10- fold cross validation technique to provide high accuracy and a low number of False Negatives (FN). By applying the proposed system, the number of tightness and looseness inside wedge generator can be classified. Based on the classification results, the signals extracted in the frequency domain gives the best performance among the time domain and the frequency domain. This paper shows that the automatic classifying method has a high potential to identify the wedge tightness inside the generator.

Session 1 : Classification
Date:Time March 22, 2015 (Sunday) : 15:00 - 16:20
Venue Room A

1.3 Design Pattern Recommendation: A Text Classification Approach

Authors:
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Abstract:
A design pattern provides a proven solution to a problem that commonly occurs in software design. It provides a flexible, reusable, and modular software design with objectoriented programming. The selection process of design patterns is however a difficult task, especially for novice designers. In our previous work, we constructed a pattern usage hierarchy for helping a designer to select Gang-of-Four patterns. The pattern usage hierarchy was constructed based on the intentions of a user, which can be divided into five categories. The experimental results motivated an improvement by incorporation of an algorithm for recommending the category to which a given problem belongs. We apply a text classification approach in order to guide the user to select an appropriate category. Famous classification methods, i.e., Nai€ve Bayes, J48, k-NN, and SVM, are used to classify given textual problems. The framework was evaluated with 26 case studies. The results of the experiment are reported.

1.4 Similarity Measures for FL0 Concept Descriptions from an Automata-Theoretic Point of View

Authors:
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Abstract:
In Description Logics (DLs), information in knowledge bases (KBs) is captured by concept descriptions. The traditional reasoning problem of subsumption has been proven indispensable in DL systems and applications. However, when no subsumption relationship between two concepts is identified, no classification relationship among the two concepts can be given. In this work, we present novel semantic similarity measures for the small language FL0. The measures are derived from the structural characterization subsumption considered from an automata-theoretic point of view. The proposed concept of semantic similarity measures for the language FL0 computes a numerical degree of similarity between two FL0 concept descriptions w.r.t. unfoldable terminologies.

Session 2A : Detection
Date:Time March 23, 2015 (Monday) : 9:00-10:40
Venue Room A

2A.1 A Drowsiness Detection Method using Distance and Gradient Vectors

Authors:
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Abstract:
This paper presents a drowsiness detection for drivers. The drowsiness is detected by monitoring the eye state (open or close). Firstly, human face detection is performed using the Haar cascade method. Within the facial region, we can approximately determine the eye regions, further restricting the region of interest (ROI). We then locate a dark circular object using two vectors: one is distance vectors and the other gradient vectors. The cross-correlation between these two vectors should be maximized at the center of a dark circle. Experimental results show that the proposed method works well in both bright and dark conditions. The computation speed of the proposed method is fast enough to perform at a video rate.

2A.2 Automatic blob-based Glistening Detection

Authors:
Teeranoot Japunya[1, 2], Parisut Jitpakdee[2], Bunyarit Uyyanonvara[2], Chanjira Sinthanayothin[3], Hirohiko Kaneko[4]

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Abstract:
When the IOL is in an aqueous environment, fluid-filled microvacuoles are form within an IOL, called glistenings. Due to glistenings can affect human vision, this work proposes the novel method which can automatic glistening detection based on blob detection. The proposed method can detect glistening from IOL image. The result showed accuracy is 98.01% and sensitivity is 72.67%.

2A.3 Automatic Acne Detection for Medical Treatment

Authors:
Thanapha Chantharaphaichit[#1], Bunyarit Uyyanonvara[#2], Chanjira Sinthanayothin*, Akinori Nishihara[+]

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Abstract:
In this paper, an effective image processing technique has been studied to develop a system of acne detection. The focus is on binary thresholding applied to facial images with various types, shapes or amounts of acne. A typical image on a cheek has been usually used to take in the experiment which results are markings on acnes automatically, this method is more effective than manual counting by a typical dermatologist. An input image is first taken into gray and special color model from regular red-green-blue version, this work is for comparison and revelation of region of interest. The regions of interest are mostly acnes but it can contain some noise. Then binary threshold has been used to clearly show and can remove the noise easier from regions of acne. A box shape is constructed to mark the final result of acne detection, so that correct and incorrect detected acne can be displayed and calculated for a system efficiency. Experimental output can be summarized that accuracy, precision and sensitivity are quite fluctuated depending on color, shape and lighting condition of acnes in the image.

Session 2A : Detection
Date:Time March 23, 2015 (Monday) : 9:00-10:40
Venue Room A

2A.4 Smart Cage Using Object Detection

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Abstract:
A dog is a pet that very popular in every household. Sometimes owner is lack of time to taking care of it or does not want to leave it with stool which might cause some smell and become dirty. Therefore, it is great if there are some things to take care of it, in case of owner has no time to make it happy and healthy or owner do not want to leave it look dirty. This paper uses image processing to detect a dog and excrement in a closed space (cage), with the intention of using the detection to control the cleaning of the space with an automatic conveyor when excrement is detected (and the dog is not on the conveyor).

2A.5 Multi Kinect Cameras Setup for Skeleton based Action Recognition

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Abstract:
In this research, we investigated and discussed several camera setup methods from different perspectives in order to exhibit advantages and shortcomings, as well as to reveal potentials of other camera setups in terms of image acquisition for action recognition system. Stability and accuracy of tracked skeletons of 10 actions from different views of camera settings are investigated. Experimental results indicates consistency of estimated skeleton lengths regardless of orientation placement of Kinect cameras. Accuracy of estimated skeleton data is less on actions with occluding body parts.

Session 2B : Control, Communications, and Power
Date:Time March 23, 2015 (Monday) : 9:00-10:40
Venue Room B

2B.1 Bilateral Control in Delta Robot by using Jacobian matrix

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Abstract:
Delta robot is a parallel robot with rigid body and fast movement potential that suitable for human interface device via bilateral control. The workspace is relatively small due to the complex interference between three legs and lead to various size of delta robot to compatible with the preference work. As the size is vary, the kinematic and dynamic of delta robot is also difference and required new control method to compensate the changing kinematic such as micro/macro bilateral control in task space. However, those method required high calculation power to calculate the position and force feedback by using angular motor position and torque from disturbance observer. New approach of speed and force bilateral control to reduce the complexity and computational time by using Jacobian matrix (J) is proposed. The angular velocity of motor is calculated within disturbance observer. The simulation is carry out to verify the proposed method.

2B.2 Quadrotor Tuning for Attitude Control based on PID Controller using Fictitious Reference Iterative Tuning (FRIT)

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Abstract:
This paper proposes a method for quadrotor tuning focusing on attitude control (roll, pitch and yaw channel). The control structure is based upon PID control which is widely used in many flight controller boards. However, it is not easy to tune control parameters of a PID controller that satisfies the desired transient response, especially using manual tuning. Thus, this paper proposes the method for quadrotor tuning by using the fictitious reference iterative tuning (FRIT) to tune the PID gains for attitude control. The proposed method is to tune the PID gains by using FRIT so that the attitude response of a quadrotor of each channel matches with a reference model response by using only one-shot first experimental input-output data from each channel. Simulation results are provided to show the effectiveness of the proposed method.

2B.3 Modulation Performance for Visible Light Communications

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Abstract:
LEDs can transport the signal or data via visible light instead of radio wave in some place that the radio wave will effect the human or damage the component. Therefore, this paper presents about the digital modulation for improving not only data rate and bit error rate but also flickering, colour rendering, dimming range, luminous efficacy rate that are required to keep in a satisfactory level. There are many types of the modulation that have different property. Therefore, the literature review is discussed and shows the comparison of Return-to-zero On-Off Keying (RZ-OOK), Non-Return-to-zero On-Off Keying (NRZ- OOK), and Binary Phase Shifted Keying (BPSK) in the form of analytical and simulation by the graph of BER versus SNR and also the comparative table of On-Off Keying (OOK), Colour Shifted Keying (CSK), Pulse Position Modulation (PPM), Pulse Width Modulation (PWM), and Orthogonal Frequency Division Multiplexing (OFDM).

Session 2B : Control, Communications, and Power
Date:Time March 23, 2015 (Monday) : 9:00-10:40
Venue Room B

2B.4 Impacts of Home Electric Vehicle Chargers on Distribution Transformer in Thailand

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Abstract:
We study impacts of electric vehicle (EV) home chargers on a typical three-phase distribution transformer (DTR) in distribution grid. We focus on the DTR loading and voltage imbalance. We focus on the distribution grid operated by the Provincial Electricity Authority (PEA), which is a major utility provider in Thailand. We determine the maximum number of the EV chargers that can be supported by a DTR assuming the current typical base load profile and no coordinated charging scheduling exists (that is, the EV chargers start operation right at the time they are plugged in). For the typical base load profiles, we found that that DTR loading is more critical than the voltage imbalance and the maximum number of EV's per phase is 3, 6, 10, and 14 for the 50, 100, 160, and 250 kVA DTR, respectively.

2B.5 An Investment Decision Support Tool for Horticulture with an Adaptive Energy Management System

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Abstract:
In this paper, we provide a simulation-based framework to estimate the electricity cost of cooling and lighting systems in horticulture for a given desired average temperature setting. Since the electricity price follows a Time-of-Use (TOU) pricing program which asks for a higher price during the peak period, the electricity cost could be reduced by having an adaptive Energy Management System (EMS) performing a demand response function, shifting some electricity demand from the high to low pricing periods. To allow demand shifting, we assume that the temperature settings of the cooling system at different times can be varied within a range but their average must meet the desired setting. Following Yoon et al., we build a model of a simple greenhouse and use EnergyPlus, developed by Lawrence Berkeley National Laboratory, to estimate the electricity consumption for the temperature settings determined using genetic algorithm in MATLAB. Our framework is an attempt to provide a simulation-based decision support tool for horticulturists and investors, to determine the best average temperature setting that maximizes the estimated profit, which is the estimated revenue minuses the estimated minimum electricity cost, of producing a given plant with TOU pricing. To illustrate our tool, we consider the Pharachatan-80 strawberry and determine the optimum average temperature setting to grow it indoor with an estimated ambient temperature profile and the TOU pricing in Thailand.

Session 3A : Hardware and Software Implementation
Date:Time March 23, 2015 (Monday) : 14:40-16:20
Venue Room A

3A.1 Design Space Exploration of Control System with Hardware-implemented Interrupt Handler

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Abstract:
In this paper, we propose a system-level design tool for control systems that enables the development of hardware-implemented interrupt handler. The increasing complexity of control systems has led to a rise in the frequency of interrupts. As a result, the processor load increases, leading to deterioration in the latency of interrupt processing. To solve these problems, we require dedicated hardware that is activated by an interrupt and can directly access devices during its processing. The proposed method enables control systems with above dedicated hardware to be developed using a model that abstracts an interrupt, interrupt processing, and communication between the control processing and devices. Case studies on a motor control system show that the proposed method enables the designer to explore design space of control system, reduces the processor load and improves the latency of the interrupt processing.

3A.2 C-Based RTL Design Method for Circuit Switched Network on Chips

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Abstract:
Network-on-Chips (NoCs) are needed to interconnect the cores which are processors and memories in Systems on Chips (SoCs). For designing new NoCs, highly accurate simulation and efficient design procedure are desired. In this paper, we present C-based RTL design method for circuit switched NoC what RTL structure of NoC is directly described on dataflow C coding style and a fast simulation and verification model by the same C code. Also, we show how the method is used to accelerate the design and verification of the NoC by designing a simple NoC architecture. The entire C model consists of about 200 lines, including C header file. Also, it generates the RTL descriptions which consists of 1,500 lines of Verilog code.

3A.3 Design of Energy Harvesting Thermo Generator with Wireless Sensors in Organic Fertilizer Plant

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Abstract:
Every manufacturing process leaves waste to environment. Some waste must be controlled. Some waste can be utilized. Like the organic fertilizer plant, it leaves waste from chicken manure digestion of bacteria. The air pollution has ammonia gas and heat. The gas has to be deodorized by deodorizer tank. On the other hand, the heat can be harvested for electrical energy. The plant needs to monitor ammonia gas level in the waste out air. We propose a design the energy harvest appliance to produce electrical power from a temperature difference which is caused by heat energy on surface of the deodorizer tank. The electricity powers wireless sensors which check quality of the waste air. The thermoelectric generator (TEG) is used to convert the heat energy to be electrical power. It converts temperature gradient between its hot side and cool side to be electrical power based on the Seebeck effect. For long life time, the two energy storage concept (a super capacitor primary storage and a battery secondary storage) is used and the power management is proposed. The system can work and stand alone. The experimental results show that the system can generate continual power up to 290mW.

Session 3A : Hardware and Software Implementation
Date:Time March 23, 2015 (Monday) : 14:40-16:20
Venue Room A

3A.4 An Efficient Way of Providing Information in Ubiquitous Tourist System

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Abstract:
A ubiquitous tourist system provides information and services available at tourist spots to the tourists unobtrusively. The information need to be provided in personalized way suitable to tourists with different requirements. To enable such efficient way of information provision, we need to consider the QoS requirements of the application and maintain it with the changing context of the tourist by monitoring the network and information usage. Predicting and maintaining QoS for the ubiquitous tourist system is very difficult as the user is highly mobile in a ubiquitous network, as the resources requirement of the system changes continuously. Similarly, monitoring the devices used by the tourist is also challenging because of the dynamically changing user's position in the ubiquitous network consisting of several heterogeneous subnetworks. Hence, there is a need to ensure QoS maintenance and monitoring the resource utilization to provide the tourist exhibit information in an efficient way. In this paper, we discuss about an efficient way to provide information to the tourists by considering the context of the user, the profile information, the types of services user needs, and the history information. The system predicts the QoS requirements of the different tourist devices, and provides the network resources in different subnetworks by sending mobile agents to negotiate with the local administrators. The ubiquitous system is fully aware of user's knowledge level, network conditions, interests, daily routine, etc. So, it plans accordingly to provide required service without interruption. The designed system is tested by simulation with different scenarios and showed the efficiency of our model.

3A.5 Branch Bitstream: Machine Instruction-level System Tracing

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Abstract:
Tracing is an approach used for debugging and profiling software. Conventional approach to create traces is to instrument program's code tapping data out from an execution. An original execution is mixed with tracing routines. In consequent, a program in production state and development state are not identical. In addition, instrumentation code adds execution overhead and increases error probability to a traced program. Branch Bitstream (BB) aims to solve aforementioned drawbacks by partitioning tracing routines to an execution environment instead. Traces are generated without modifying a program. A trace-driven simulator uses a trace file and a program to perfectly reconstruct previous execution. This work implemented this concept in QEMU 0.14 for TCT architecture. Linux 3.0.0-rc7 booting was used as a profiling example. Emulation overhead is 2 times longer than one without BB in the current implementation.

Session 3B : Image processing
Date:Time March 23, 2015 (Monday) : 14:40-16:20
Venue Room B

3B.1 Image Inpainting by Minimum Energy Restoration with Edge-Prioritized Filling Order

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Abstract:
We propose a texture synthesis image inpainting method that minimizes energy function with the filling order which facilitates propagation of edge from the data region to the target region. As a result, the proposed method provides plausible restoration while propagating information of edge for the target region. Experimental results show the validity of the proposed method.

3B.2 Glaucoma Screening using Rim Width based on ISNT Rule

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Abstract:
This paper introduces an screening method for detecting glaucoma using rim width indicator. Due to some special cases, such as myopia eye, only cup-to-disc ratio may not efficient for screening glaucoma. Rim width based on ISNT rule can be a feature for classification. Rim width in each section of optic nerve will be measured and then we compare them with ISNT rule for glaucoma classification. According to our results, we can show that the proposed method is an efficient feature for screening glaucoma.

3B.3 A Saturation-based Image Fusion Method for Static Scenes

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Abstract:
In this paper, we present a saturation-based image fusion method for static scenes, which is aimed at generating high-dynamic range images. A set of images of the same stationary scene with different exposure levels, such as, overexposed and underexposed images is blended together into one. The weighting factors, for blending the images, are dependent on the saturation values of the images. Higher saturation indicates more vivid colors. Thus, we assign a heavier weight to the pixels with higher saturation while lighter weights are used for those pixels whose saturations are lower. Our experimental results show that the proposed method can produce satisfactory results without adjusting any parameters at a low computational cost. Moreover, the output images are fairly free from the halo effect problem.

Session 3B : Image processing
Date:Time March 23, 2015 (Monday) : 14:40-16:20
Venue Room B

3B.4 An SAR Image Speckle Removal Algorithm via Image Segmentation

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Abstract:
In this paper, we propose the speckle removal algorithm from Synthetic Aperture Radar (SAR) images via a segmentation technique based on Öztürk algorithm. The Öztürk's algorithm is used to determine the distribution for each sample. These procedures are processed to see the relation between distribution of each pixels and segments of the image. We demonstrated the effectiveness of our algorithm by filtering speckle from an SAR image on study areas. As a result, our algorithm is able to preserve the quality of edge areas while speckle noise in homogeneous areas are suppressed.

3B.5 A Level-based Method for Urban Mapping using NPP-VIIRS Nighttime Light Data

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Abstract:
In this paper, we propose a level-set method to identify urban areas using a nighttime light data of Suomi National Polar-orbiting Partnership (NPP) Visible Infrared Imaging Radiometer Suite (VIIRS). Our method is compared to two standard methods, called the Otsu's threshold-based method and the k-mean clustering method. The experimental results indicates significant improvement in terms of the Kappa coefficients.

Session 4 : Data Analysis
Date:Time March 24, 2015 (Tuesday) : 8:20-10:00
Venue Room A

4.1 Cluster Analysis for Primary Feeder Identification Using Metering Data

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Abstract:
This paper presents a methodology to identify the connected feeder of high-usage customers in a primary distribution network. The proposed methodology considers voltage characteristics of radial distribution and actual measurements. Based on 15-minute intervals metering, cluster analysis is applied to categorize customer patterns on the basis of voltage correlation. Afterwards, support vector classification is also introduced for outlier assigning and cluster separation. The feasibility of this method is demonstrated on a practical distribution network of industrial estate area. The result indicates that all of the customers is correctly identified, and its correctness percentage is also better than the existent network representation. Additionally, wavelet reduction offers the same performance as the original time-domain feature but more efficient use of time.

4.2 A Novel Method for Contact-free Heart Rate Measurement Using Simulink

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Abstract:
This paper presents a method for a contact-free heart rate measurement on a video sequence using Simulink. The heart rate is measured by detecting the prominent frequency of the skin-color change in a human face. As color features in a video sequence, we utilize both green and hue signals. The frequencies of the two color signals are analyzed using multiple observing times. The prominences of the Fourier spectrums of the two color signals at multiple observing times are then evaluated statistically. Finally, the heart rate measurement is conducted based on the first and second most distinct spectrums and the most reliable result can be selected from multiple observing times. Experimental results show that the proposed method can perform heart rate measurement accurately in real time.

Session 4 : Data Analysis
Date:Time March 24, 2015 (Tuesday) : 8:20-10:00
Venue Room A

4.3 Rice Phenology Estimation Using SAR Time-series Data

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Abstract:
The actual field survey data from the Rice Department of Thailand's Ministry of Agriculture over a large area wastes a huge amount of resources. To solve this problem, this paper proposes a new approach to estimate rice phenology using SAR images derived from the RADARSAT-2 data. In this work, we divided the rice phenology into five stages, consisting of seedling, tillering, reproductive, ripening, and harvested stages and applied them to the hidden Markov model (HMM). Then, we estimated the backscattering coefficient time-series data to be used in the Viterbi algorithm. We were able to estimate the rice phenology, with 77.5 % accuracy when compared to the ground data.

4.4 Ku-band (12 GHz) Earth-Space Rain Attenuation Statistics in Nonthaburi, Thailand, in 2013-2014

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Abstract:
Rain attenuation statistics for an average year in Nonthaburi, Thailand, in 2013-2014, are presented. Particularly, two statistics were calculated from the raw and preprocessed power-level data of the Ku-band beacon signal received at the Thaicom earth station. These statistics were compared with the ITU-R prediction models in 1999 and 2007-2013. The results show that preprocessing is necessary to generate the statistics and the ITU-R prediction models are not very accurate; the ITU-R models generally tend to underestimate the rain attenuation statistics. Specifically, these models underestimate by more than 4 dB when the availability is more than 99.9%

4.5 EEG-Based Analysis of Auditory Stimulus in a Brain-Computer Interface

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Abstract:
This research is related to Neuroscience research fields that study sounds which affect the state of mind of a person. The main focus of this research is to create a system that observes the effects of the auditory stimulus including binaural beats and relaxing music by analyzing the Electroencephalogram (EEG) readings of the participants. EEG is mostly used for recording electrical brain wave signal readings. In addition, the Brain-Computer Interface (BCI) is used to decipher the EEG brain spectrum readings and distinguish between the different EEG bands including Delta, Theta, Alpha, Beta and Gamma. There are 40 participants (20 males, 20 females) around the age group 31 – 70 yrs. in this research. The EEG recorded from the participants using the Brain-Computer Interface (BCI) is analyzed using a statistic-based Paired T-test to find the significant difference of each stimulus with each group that separate by age of participants.

Session 5 : Fingerprint and Object tracking
Date:Time March 24, 2015 (Tuesday) : 12:45-14:25
Venue Room A

5.1 SIFT-based Algorithm for Fingerprint authentication on smartphone

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Abstract:
Fingerprint authentication with small area sensor “touch sensor” becomes the most promising technology for network user authentication on mobile devices such as smart phones. In this situation, the size of touch sensors becomes so small that the conventional minutia method should be replaced with a new approach. We consider Scale Invariant Feature Transform (SIFT) approach for fingerprint authentication with a touch sensor on smart phones. In this paper, we focus on template expansion on registration in order to accept any small part of the query finger for verification.

5.2 Fingerprint Recognition Performance with WSQ, CAWDR, and JPEG2000 Compression

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Abstract:
In this paper, fingerprint images compressed with WSQ, CAWDR and JPEG2000 are evaluated for fingerprint recognition performance. With high compression ratio between 40:1 to 160:1, fingerprint images which lost a lot of their details are used to find fingercodes, or core point. Euclidean Distance is the method used to find the matched fingerprint. We also proposed the subband-reduced CAWDR method which results in comparative recognition performance to the conventional CAWDR. The results of recognition performance of all coders are summarized in the paper.

5.3 An EVolutionary Algorithm for Fingerprint Matching to Obtain a Diverse Database (EVAFMODD): It does not have to be like police fingerprint matching!

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Abstract:
Fingerprint matching is a tough task especially when there are millions of images as potential match like in criminal matching. In this paper, we have tried to improve on the fingerprint matching technique in a particular scenario where a person is authorizing against an user id. Since we already know the user id of the person, we just need to match against fingerprint of that user id provided during registration. A match is sufficient for authorization. The other aspect is the evolution of matching by updating the database with the latest fingerprints of the person to be authorized. We also show that this improves the matching accuracy of the system over state of the art system.

Session 5 : Fingerprint and Object tracking
Date:Time March 24, 2015 (Tuesday) : 12:45-14:25
Venue Room A

5.4 A Particle Filter for Objects Tracking in Cognitive MIMO System

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Abstract:
In this paper, we concern with a Cognitive radar operating in an environment with multiple interested targets. It is an intelligent parameter estimation system that the transmitted signal depends on the input signal. The mean-square error of the estimated parameters is derived in the Cram\'{e}r-Rao Lower Bound that represent the performance of the system. To improve the ability to find a new target when the number of targets is changing, we degenerate the prior information about the targets. A Bayesian approach is used to estimate state space of the system or tracking target parameters. For non-linear system and non-Gaussian distribution, a sampling method called particle filter is introduced. We also consider the effect of the Importance Sampling in the particle filter to the performance of the system. Finally, the simulation result is provided to demonstrate the capability of the cognitive radar system to track the targets.

5.5 A Robust Moving Object Tracking

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Abstract:
This paper extends the work in [4] by introducing the neighborhood querying process for reducing the effects of sensor observation errors. The objective of this work is to track moving objects by using one-bit information from sensor nodes that provide information whether an object is moving towards a group of sensors or moving away. In [3], they allowed that sensor nodes make observation errors but did not introduce the methodology to handle this problem. In this work, we use the neighborhood query process to mitigate the effects of observation errors. The process is based on neighboring information that can be used to confirm whether the current observed data are correct or not. After that, it is the responsibility of the support vector machine to classify groups of data and particle filters to track objects that follow the direction of the vector perpendicular to the optimal hyper plane obtained by the support vector machine.

Session 6 : Short Papers
Date:Time March 24, 2015 (Tuesday) : 14:45-15:45
Venue Room A

6.1 Underwater Positioning Systems for Underwater Robots Using Trilateration Algorithm

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Abstract:
This paper proposes an underwater positioning system (UPS) for remotely operated underwater vehicle (ROV). The system uses two underwater speakers as anchor nodes and a hydrophone as a receiver node. Time-of-arrival (ToA) is locally measured by sensors to identify distances from the hydrophone to the two anchor nodes. Then, using 2-D trilateration algorithm and depth from a pressure sensor, the position of the hydrophone can be identified. In addition, we also find the optimal frequency range that is suitable for the model and use these frequencies in the simulation of the system.