



**Abstract Book**  
**of**  
**2017 Joint Academic Forum in Danang**  
**The University of Danang - University of Science and Technology - DUT**  
**with Japan University & Company Research Group**  
**Cooperated by IEEE**

**Danang City, December 1<sup>st</sup>, 2017**

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<b>Research Presentation IVa</b>	<b>11:20 – 11:50</b>	<b>Robotics &amp; network (1)</b>	
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**DUT Campus Tour**

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Invitation lectures (1)

**Unique COB packaging technology for high bright white LED  
and application of a variety LED lighting**

**Atsushi Okuno**

Green Planets CO.,LTD CEO

*Unique COB Packaging  
Technology for High Bright White  
LED and Application of a variety  
LED Lighting*

**Atsushi Okuno** (IEEE senior member)  
JAPAN LED Association :Adviser

**Green Planets CO.,LTD CEO**

## Invitation lectures (2)

# Empowering innovations and business strategy through convergence of IoT-big data and cloud

**Wimol San-Um**

Director, Center of Excellence in Intelligent System Integrations  
Acting Head of Digital Engineering Program (International Program)  
Thai-Nichi Institute of Technology (TNI)



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## Empowering Innovations and Business Strategy Through Convergence of IoT-Big data and Cloud

**Assistant Professor Wimol San-Um, PhD**  
Director, Center of Excellence in Intelligent System Integrations  
Acting Head of Digital Engineering Program (International Program)  
Thai-Nichi Institute of Technology (TNI)

**Invitation lectures (3)****Development of a Structural Health Monitoring System**

**Kiyoshi Hayakawa <sup>a</sup>, Tomoki Mino <sup>a</sup>, Eri Fujiura <sup>a</sup>, Kazuhiro Aoki <sup>a</sup>, Takeshi Wada <sup>a</sup>,  
and Takashi Otaba <sup>b</sup>**

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**Abstract—**

In Japan, deterioration of the infrastructures in 1970's becomes a social problem. It is important to check and manage infrastructures on a daily basis. Therefore, we are developing a health monitoring system. We have developed a testbed health monitoring system that finds damages with vibrometer using piezo-electric device. Indeed, we have to put many measurement modules on huge infrastructures in order to check damage of them. In the circumstances, the system needs time synchronization between the modules. Furthermore, the system provides energy harvesting system for infrastructure which is built on mountain area (it's hard to supply electric power). In this paper, we will introduce the structural health monitoring system, such as detection system, time synchronization, and energy harvesting system.

**Keywords—**mbed; FPGA; cloud; piezo-electric element; health monitoring system; sensor network; solar photovoltaic (PV);

**Research Presentation I (1)****Developing an effective workforce through curricular innovation****Phuc H. Nguyen<sup>1,\*</sup>, Hoang T. Huynh<sup>2</sup>**

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**Abstract**

As a member in the ASEAN Economic Community (AEC) Vietnam is now under high pressure to seek integration into the global economic market through transforming its engineering higher education to meet international standard workforce criteria. Since 2006 with the initiative of Vietnam Ministry of Education and Training a national-level project of Advance Program Training has been carried out in select Vietnam universities, in which the Ho Chi Minh City University of Technology with an undergraduate program in Electrical Engineering. The project main objectives are to implement a program of advanced undergraduate education to create conditions for building and development of a number of training programs, departments, universities meeting international standards, and to contribute to fundamental and comprehensive reform of Vietnam engineering higher education. The paper analyzes and evaluates the program's achievements after years of implementation in terms of its impacts on university engineering curricular transform process and serves for further improvements and developments of the country higher engineering education, in its comprehensive efforts to prepare a workforce meeting the needs of an emerging economy.

**Keywords** Engineering Higher Education Reform, International Standards, Advance Program, Engineering Curricula Innovation



## Research Presentation I (2)

### A Survey of knowledge and skills on Linux operation system of Thai government officers towards Thailand 4.0

**Thanabhop Thamthanabodee and Wimol San-Um**

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#### **Abstract—**

Thailand has been appointed to transform the country towards Thailand 4.0 in order to overcome middle income, inequality, and imbalance traps, through full and creative advantages of digital technologies. However, no information on digital literacy skills and a capability of utilizing digital technologies of Thai government officers available to serve “Thailand 4.0” national agenda. This paper therefore presents a survey of knowledge and skills on the utilization of Linux Operation System (OS) of Thai government officers. The objectives are gain information on digital literacy skills and a capability of utilizing digital technologies of Thai government officers. The focusing issue is a usage of Linux Operating System (OS) and its applications. The survey was conducted from 12 governmental organizations and the method was an online questionnaire for a focus group of 50 persons those who are with division of Information and Communication Technology (ICT).

The results reveal that Thai government officers have an average of knowledge on such Linux Operating System (OS) in low to medium levels. This suggests that the government should initiate an education or training programs as well as foster the use of digital tools for Thai government officers.

**Keywords—** Thailand 4.0; Linux OS; Digital Literacy; Digital Technology; Information and Communication Technology.

**Research Presentation I (3)****Advancing digital tourism in Thailand through Bluetooth low energy and mobile application****Wachira Suckaruck and Wimol San-Um**

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**Abstract**—this paper presents an acceleration of concrete implementation of digital tourism in Thailand through the use of advancing technologies, i.e. Bluetooth Low Energy (BLE) and mobile applications. As tourism industry in Thailand is expected to recover and expand by relying upon Asian tourists, which presents a dilemma and great growth potential from Asian tourism comes an increasing sensitivity to changes in tourist behaviors in this segment. This paper focuses on the utilization of BLE as an identifier for travel place, comprising information on background and history for tourists through RF-Based system operating at 2.4 GHZ. A specific mobile application called Bondy 4.0 is another part that presents the tourists with user-friendly graphic user interface along with a recommendation of nearby places. The implementation was conducted onsite at Chiang Khong District, Chiang Rai Province, Thailand. The survey results reveal high satisfaction from local people, and Thai as well as foreign tourists. Such a system will be further implemented throughout the country under a support of National Tourism Office of Thailand.

**Keywords**—Bluetooth Low Energy, Internet-of-Things, mobile application; Bondy 4.0; Chiang Khong District

**Research Presentation II (1)****Design and simulation in combination DC/DC with DC/AC converters  
for renewable energy system****Kim Hung LE, Minh Quan DUONG, Ngoc Thien Nam TRAN**

The University of Danang – University of Science and Technology

**Abstract—**

Due to the continuous development of the world, the demand for electricity raises higher and higher. Consequently, the renewable energy is becoming more and more essential. Nevertheless, renewable energy works depending on weather factors such as sunlight, surface coverage, wind elements, etc, which leads to unavoidable risks in consuming. For example, the unstable energy output mostly in solar system which produces DC output voltage. Therefore, power electronics converters play an indispensable part of renewable energy conversion systems in ensuring the conversion efficiency. A converter was designed with a variable DC voltage, combining DC / DC converter and DC / AC converter to keep the output voltage quality stable. The converter is modeled and calculated for spectral loads at 220V, 50Hz. The demonstration shows better quality of the output voltage: the higher stability and the standard sinusoidal waveform.

**Keywords:** DC/DC converter; DC/AC converter; Inverter; Renewable energy; PI control; Power transmission.

**Research Presentation II (2)****Combined Pulse-Width Modulation of Dual Active Bridge DC-DC Converter to Reduce Circulating Current at Bidirectional Power Transfer****MUHAMMAD Hazarul Azmeer Bin Ab Malek\*<sup>1</sup> and Hiroaki KAKIGANO\*<sup>1</sup>**<sup>1</sup>Ritsumeikan University

1-1-1, Nojihigashi, Kusatsu, Shiga, 525-8577, Japan.

A dual active bridge (DAB) dc-dc converter is widely used in energy storage system (ESS). It has a limited soft-switching range and high circulating current with the conventional phase shift modulation (PSM) when the input or output voltage varies. To solve these issues, this paper proposes a new modulation strategy, combined pulse-width modulation (CPWM) that combines single pulse-width modulation (SPWM) and dual pulse-width modulation (DPWM). The proposed modulation strategy considers the bidirectional power transfer, the circulating current, and the soft-switching range which are essential for an efficient ESS. The efficiency and peak current of the CPWM is compared with that of the PSM. The experimental results confirm that the CPWM has lower circulating current and higher efficiency than PSM.

**Research Presentation II (3)****DC Capacitor Voltage Control using Symmetrical Coordinates Frame  
for STATCOM****Ryo UEDA<sup>\*1</sup>, Hiroaki KAKIGANO<sup>\*1</sup>**<sup>\*1</sup> Ritsumeikan University

1-1-1, Nojihigashi, Kusatsu, Shiga, 525-8577, Japan

STATCOMs have attracted attention as var compensators on electric power distribution systems. In this study, a star-connected modular multilevel converter (MMC) was applied to STATCOM. MMCs can be interconnected without a transformer because they have high equivalent carrier frequency through phase-shifted pulse-width modulation. This paper presents a new dc capacitor voltage control method using symmetrical components. The proposed dc capacitor voltage control and reactive power control were verified through experiments.

**Research Presentation III (1)****Characterization of Mechanical Properties of Solder Material  
Using Digital Image Correlation****Linh Giang Nguyen<sup>1</sup>, Quang Bang Tao<sup>1,\*</sup>**<sup>1</sup>The University of Danang – University of Science and Technology – Viet Nam

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Solders joints are essential components in microelectronic devices. Characterization of solder alloys is of primary importance for manufacturers due to the wide use of these alloys as interconnects for electronic packaging. There are many tests used to identify the material parameter of the solder alloys. The conventional techniques are used extensometer to measure the tensile strain between two points that provides average strain over an area. However, the results of the technique are not accurate and it is difficult to find the strain information at necking's position. Therefore, this paper presents the application of a non-contact method, Digital Image Correlation, to identify the solder material parameters during loading test. According to the method, pictures of solder samples were used to measure the displacement and strain field.

## Research Presentation III (2)

### Research for fabrication of lithium-ion battery through consistent work in vacuum glove box

**Konosuke Shimmori, Shouji USUDA and Isao IYODA**

Osaka Electro-Communication University

Lithium ion batteries are widely used from home appliances, solar battery power generation systems to industrial equipment and emergency power supply systems, plug-in hybrids and electric vehicles. Since the energy density and the output density of lithium ion battery are higher than those of other secondary batteries, when comparing with the same weight, it is possible to accumulate larger energy and to obtain higher output power. Also, since the energy density is high, it is possible to reduce the size and weight. The production of lithium ion batteries is roughly divided into “upstream” and “downstream” processes, each process is accompanied by more complicated processes, and batteries are assembled through many of these processes. In addition, dedicated jigs and tools are required for each process, and there are many elements of know-how about details. Particularly, when pouring the electrolytic solution, assembly work inside vacuum glove box is indispensable. If these manufacturing processes can be consolidated as much as possible, the working time is shortened, the working efficiency is improved, and in turn the quality is improved. For this reason, reviewing the process of battery fabrication is one of the important themes.

### **Research Presentation III (3)**

## **Research for fabrication of lithium-ion capacitor**

**Tetsuroh Hisada, Shouji USUDA and Isao IYODA**

Osaka Electro-Communication University

A lithium-ion capacitor is called a “hybrid capacitor.” It is a new energy storage device that combines the advantages of lithium ion batteries that have been widely used until now and with those of electric double-layer capacitors used for energy regeneration and electric power storage of automobiles. As it has not been long since the development of lithium ion capacitors was started, they are in a difficult situation in being procured generally from the market excluding overseas manufacturers and some Japanese manufacturers. However, many different varieties of lithium ion capacitors seem to be put on the market in the future and are expected to be commonly used with the future development of the market.



**Research Presentation III (4)****Research for Application of Lithium-Ion Capacitor Module****Masanori Shibata, Shouji USUDA, Isao IYODA**

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**ABSTRACT**

A lithium ion capacitor is a hybrid type of new energy storage device that combines the advantages of a lithium ion battery with those of an electric double-layer capacitor. As it has not been long since the development of lithium ion capacitors was started, they are in a difficult situation in being procured generally from the market excluding overseas manufacturers and some Japanese manufacturers. However, many different varieties of lithium ion capacitors seem to be put on the market in the future and are expected to be commonly used with the future development of the market.

**KEYWORDS:** lithium ion capacitor, capacitor module, robot cleaner, lithium ion battery

**Research Presentation IVa (1)****Implementation of an electric guitar pedal device based on  
Arm Cortex-A9 processor****NGUYEN Binh Thien, CAO Hai Nhi, NINH Khanh Duy**

Faculty of Information Technology, University of Science and Technology, The University of Danang

Electric guitar pedal is a device that alters how an e-guitar sound. It modifies the signal coming from the electric guitar (which is just a wooden guitar with a pickup), adding “effects” that change the way it sounds in order to add interest or create more impact. This paper describes the implementation of an electric guitar pedal device based on Arm Cortex-A9 processor, using mbed OS API. This device has the looper mode that allows users to record and play back in a loop. It also has the tuner mode that helps users to tune the guitar correctly. Finally, we have built a prototype of an electric guitar pedal device using Renesas’s GR-PEACH boards for demonstrating research results.

**Research Presentation IVa (2)****Heterogeneous intelligent devices network based on Internet of Things ecosystem gateway for smart campus****Ngo Dinh Thanh, Pham Nguyen Phu Hien, Le Loc Minh Phuc, Doan Quang Vinh**

University of Danang – University of Science and Technology

The vast development of Internet of Thing (IoT) applications in industrial automation, healthcare, smart grid, smart buildings, smart public transport system and so on have showed that IoT is the promising solution in the future. In addition, thousands of famous companies and start-up about IoT have developed their IoT products and solutions with many advantages in order to improve life quality. At the same time, the evolution of IoT architecture design face many challenges such as interfaces, communication standards, protocols and scalability. This paper proposed a method of wireless integration of smart things on IoT ecosystem gateway to extend the system into more advanced interface. In addition, we show implementation results in which different IoT devices work cooperatively and exchange data through the network at our campus.

**Keywords:** Internet of Things ecosystem gateway, heterogeneous devices network, smart campus

**Research Presentation IVa (3)**

**Ball balancing robot**

**Le Hoai Nam, Nguyen Danh Ngoc, Cao Thanh Bo, Pham Truong Hung**

**Research Presentation IVb (1)****Design and build a wireless sensor network for landslide monitoring  
and early warning****Quoc-Huy LE<sup>\*1</sup>, Hai-Au TRAN<sup>\*1</sup>, Thanh-Nhan MAI<sup>\*1</sup>, Huu-Duc-Phong TRINH<sup>\*1</sup>**<sup>\*1</sup>The University of Danang – Danang University of Science and Technology

This paper presents our preliminary results on the design and building of a wireless sensor network for early landslides prediction and warning. For landslide prediction, a sensor node with multiple sensors play a key role in measuring environmental and soil parameters for landslide prediction and detection. Sensor nodes can communicate to the central node through wireless transmission to form a wireless sensor network for measuring, monitoring a wide area and applicable to remote areas. Measurement results from the sensors are used to determine landslide probability and then takes appropriate local and remote warning measures to mitigate landslides consequences.

**Research Presentation IVb (2)****Characteristic Functions of Sensing Node in Telemetric Sensor Network  
for Measuring Landslide Disaster****Takeyoshi Nakano <sup>\*1</sup>, Vu Van Khoa <sup>\*1</sup>, Masanori Homma <sup>\*1</sup>, Shigeru Takayama <sup>\*1</sup>**<sup>\*1</sup> Ritsumeikan University

This paper shows the study on telemetric sensing network system for landslide disaster (LD) surveillance. The sensing network system consists of Local Sensing Node Network System (LSNNS) and Host System (HS). They are connected by dual way communication. LSNNS is placed at monitoring area (slope of mountains and hills). LSNNS is a network of distributed sensing nodes. HS is placed at a remote location. The HS manages the operation of LSNNS remotely and monitor landslide disasters. The characteristics of telemetric sensing network system are autonomous operating function of LSNNS and remote management function of HS. This paper shows the effectiveness of autonomous functions of Sensing Nodes in LSNNS to sense landslide disaster, to relay data and to execute commands sent by HS.

**Research Presentation IVb (3)****Implementation of Spherical Robot using Reaction Flywheel****Kitmonta Sangkaew, Wachira Sukaruck, and Wimol San-Um**

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**Abstract**— this paper presents the design and implementation of a spherical robot through the use of reaction flywheel that can operate with same efficiency regardless to gravity. Most spherical robot operated on “Barycenter Offset” concept in the way that the spherical robot simply shifts a robot’s center of mass to produce a desired motion. However, such a Barycenter offset concept has limited torque which is related to gravity which might lead to a disadvantage under microgravity plane such as outer space operations. The proposed spherical robot alternatively realizes a reaction flywheel based on conservation of angular momentum, rotational kinetic energy in flywheel, and gyroscopic precession. The proposed spherical robot has been simply implemented using microcontrollers, Bluetooth communications, motor and its drivers, Lithium-Ion battery, and a flywheel. Experimental results reveal that the robot could operate efficiently for educational purposes.

**Keywords**- Spherical Robot; Barycenter Offset; Gravity; Kinetic Energy; Flywheel; Gyroscopic Precession

## Research Presentation IVb (4)

### Position Control of an Unmanned Aerial Vehicle Based on Visual Feedback

**Riku TATSUTA <sup>\*1</sup>, Seiru WAYU <sup>\*1</sup>, Keita YOSHIDA <sup>\*1</sup>, Yohei NISHIGAKI <sup>\*1</sup>,  
Koji TOKUDA <sup>\*1</sup>, Yoshimichi ITO <sup>\*1</sup>**

<sup>\*1</sup> Osaka Electro-Communication University

This report concerns with the position control of an unmanned aerial vehicle (UAV) based on visual feedback. We claim that the combination of AR.Drone 2.0 [1], which is an UAV released by Parrot, and CV Drone [2], which is a program library for AR.Drone 2.0, sometimes causes unstable behavior when a sample code for tracking a marker using PID control together with visual feedback is employed. We clarify the reason why such a behavior occur, and propose a method for avoiding the problem.



**Research Presentation V (1)****Monozukuri - Based Learning Philosophy in Teaching  
an Internet-of-Things (IoT) Course****Sorawit Fong-in and Wimol San-Um**

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**Abstract**—this paper presents Monozukuri-based learning philosophy for teaching an Internet-of-Things (IoT) course. Typically, the Monozukuri philosophy provides a mindset of creativity in applied science and engineering. Monozukuri-based learning can be considered as a student-centered technique in which students can design and learn core knowledge through the assigned IoT projects in order to provide students the visibility of IoT components such as microcontroller, sensors and actuators, intelligent system and technologies. This study was conducted by undergraduate third-to-fourth-year students under Computer Engineering Program who enrolled in IoT course. The methodology was to motivate students to think, design, create, and evaluate IoT projects. The results showed that the students had improved grades and skills due to increased interest in creative engineering. Therefore, Monozukuri-based learning can enhance personal ability of skilled engineers for industries and companies.

**Keywords**—Monozukuri, Internet-of-Things, Mindset, Project-Based Learning

**Research Presentation V (2)****ICT learning support material in technical high school of Japan****Masanobu Nagata<sup>1</sup> and Shoshi Inoue<sup>2</sup>**<sup>1</sup> Iwate Prefectural Ichinoseki Technical High School, Japan

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**Abstract**

We report the present education of the technical high school in Japan and ICT support teaching materials to solve the problems. We provided ICT support learning material to promote the voluntary learning of the professional subject of technical high school. Through the development of robot we could support the student of independent learning and communicative competence. Virtual experiment could promote the understanding with the actual feeling and assent, LMS of the qualifying examination provides the voluntary learning and nominates remarkable results for the qualifying examination. We also provided the Japanese grammar re-learning program to promote the logical thinking. These action secure the positive daily life style and scholastic ability to eager learning of the more special fields.

## Research Presentation V (3)

### **Japanese language education for international students -- How to learn Japanese words**

**Hironari NOZAKI, Kyoko UMEDA, and Tetsuro EJIMA**

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In this paper, we describe the Japanese language education. We are committed to assisting all international students in writing Japanese language as early as possible. Especially, it is very difficult for Non-Chinese-speaking (NCS) students to write Japanese in kanji (Chinese characters). So, we focus on the support for international students in learning the Japanese words. This paper discusses the effective method to learn Japanese words as a second language. The authors have already developed many kinds of basic Japanese words lists to help students to start learning Japanese words. This paper shows our researches that we have done so far.

**Research Presentation VI (1)****Simulation Study on Neural Pattern of Bio-Realistic  
Cerebellar Neuron Network****Thanh Vo Nhu**

The University of Da Nang, University of Science and Technology

Spiking neural networks, which are recognized as the third generation of neural network, are more powerful and biologically plausible than their non-spiking predecessors because they encode temporal information within the neuron signals. However, they are more complex to model and analyze than the other artificial neural networks. In this study, the author introduces the result of the simulation of simplified 20000 neurons cerebellum-like neural network.

**Research Presentation VI (2)****Possibility of scattering media tomography by neural network**

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**Abstract**

The possibility of scattering media tomography by the convolutional neural network is discussed. The convolutional neural network constructed of three layers is trained by the blurring sinogram images, which are generated from a simple sigmoidal function. The average accuracy of 3 output parameters of a sinogram is obtained about 5% after the training of 4,000 images. If we refine this procedure to multi object system, the near-infrared blood vessel tomography could have the possibility of realization.

**Keyword:** near-infrared CT, scattering media, reconstruction, convolutional neural network

**Research Presentation VI (3)****OBTAINING HUMAN BEHAVIOR INFORMATION FROM MOVIES WITH  
CAMERAS USING IMAGE ANALYSIS****Itou Satoshi<sup>(1)</sup>, Oishi Harumi<sup>(1)</sup>, Washino Kaei<sup>(1)</sup>, Inoue Shoshi<sup>(2)</sup>**<sup>(1)</sup>Gifu Shotoku Gakuen University, Gifu, 500-8288, Japan<sup>(2)</sup>Hokaido University of Education, Sapporo, 022-8501, Japan

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**ABSTRACT**

This research attempted to examine human behavior such as face movement and pulse wave from video using a camera. Face movement and pulse wave were verified by simultaneous measurements with the conventional methods. Face movement indicated a high degree of agreement between both methods. The pulse wave gave a result reflecting the trend of changes. The results suggested that when engaging in face movements.

**KEYWORDS:** pose, pulse, RealSense SDK, inertial sensor

**Research Presentation VI (4)****Qualitative Human Support by Dynamic Data Flows Management  
in Telemetric Body Area Network System****Kenji HAYASHI and Shigeru TAKAYAMA**

Department of Science and Engineering, Ritsumeikan University, Japan

Telemetric Body Area Network (TBAN) system is one of the useful methods to realize improving user's physical behavior and monitoring health condition. Not only showing physical parameters by feedback of vital information to user, but also TBAN system is extended to the autonomous system closed to user. Getting such information, user is able to improve his physical behavior consciously. Moreover, telemetric function realizes to inform user's physical condition dynamically to his family or home doctor far from him. It is necessary to design dynamic and robust data flows among Sensor nodes, HUB system, Local Human Interface and Remote Host System. For realizing some practical usages in daily life, it is essential to verify that this system is stable using dynamic data flows. This paper describes the design of dynamic data flows and management of this system for qualitative physical caring.

## Company and Business Presentation39

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## Company and Business Presentation

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## Company and Business Presentation

### COM Institute

#### Method for evaluating properties of prototype aroma diffusers driven by a dry battery

Yasuyuki Komaki

#### [Background]

Interest in “smell” is growing. There are various smells, from good smells, favorite smells or offensive smells, and smells arising from emotion of foul-smelling, etc. to forest, rain, and other natural smells and smells that have therapeutic effect prescribed by historical knowledge, such as aromatherapy. In addition, commercialization with “deodorization” as a keyword advances and deodorization has been habituating consumers. In this paper, simplified aroma diffusers driven by a dry battery were produced experimentally and the smell properties were evaluated.

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## Company and Business Presentation

### Morabu Hanshin Industries, Ltd.


#### Company Information and Recruitment of New Graduates in Vietnam

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- Graduating students whose major is in math and science
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  - ⇒be able to understand work contents in Japanese
  - ⇒be able to write reports in Japanese
- Applicants must work at least 3 years in Japan continuously.

**【Conditions】**

- valid working visa
- hired as a contracted employee
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- wage
- work for well-established company contracted in the Kansai region.
- working conditions followed by our employment regulations .

**【Termination of the work agreement】**

- Lack of diligence
- Lack of desire for employment
- No skill improvement
- No flexibilities to the society
- Break Japanese law

**Research Article (1)****Programing distribution power and calculator value in Viet Nam wholesale electricity market****Huu Hieu NGUYEN, Minh Quan DUONG, Thi Dung NGUYEN, Duc Anh NGUYEN**

The University of Danang – University of Science and Technology

**Abstract** - In the current competitive wholesale market in our country, the exchange and purchase power between sellers (power generation company) and buyers (power corporation) are no monopoly like before. This competition shows that buyers can buy the best price from the electricity market and sellers can sell at higher prices. Therefore, in order to be able to allocate the required power of each unit to the most appropriate and efficient generators, we will develop this program, which calculates, choose the factory has the right power; so this unit will purchase the appropriate power, cost savings for purchasers from the plants that bid in the electricity market, thanks to the program will make the selection. The program will select the capacity with the priority of purchase at the lowest price to ensure the interests of the buyer, as well as satisfy the conditions of power generation company; the program will also set the cost to pay for the plant is how much according to the regulations of the Ministry of Industry and Trade about how to calculate cost pricing on the spot delivery market.

**Keywords** - Power distribution, Calculate the price payable, Wholesale electricity market, The lowest bid, Bid.

**Research Article (2)****Performance Analysis and Simulations of a transformer different protective relay SEL387 in Lang Co Substation****Le Kim Hung <sup>\*1</sup> Vu Phan Huan <sup>\*2</sup>**<sup>\*1</sup> University of Science and Technology <sup>\*2</sup> Center Electrical Testing Company Limited

The aim of this paper is to present the influences of current transformer connection, CT errors, magnetizing inrush current, errors because of tap changing and fault conditions on differential protection function. We establish a numerical relay SEL 387 concerning the protection of the 115/24 kV transformer at Lang Co Substation in Viet Nam that base on Matlab/Simulink, and setting calculation of actual two slope characteristics ( $O87P = 0.3$ ,  $U87P = 10$ ,  $SLP1 = 25\%$ ,  $SLP2 = 50\%$ , and  $IRS1 = 3$ ). It applies to the use of computers for solving the performance of the relay in accurate and reliable differential protection, which is for power transformers against internal faults. Simulation results simplify the process of selecting relay and protection system. This can improve the quality of the protection system design early, thereby reducing the number of errors founded later in the operation.

**Research Article (3)****Design a blade of small wind turbine for low wind speed applications****Thành-Long PHAN<sup>1</sup>, Kim-Tú HUỠNH<sup>2</sup>**<sup>1</sup>The University of Danang - University of Science and Technology<sup>2</sup>PTSC Quang Ngai

There are the largest problems of small wind turbines operating at low wind speed including unstable wind conditions and the generation of laminar separation and laminar separation bubbles on the blades because of low Reynolds number. Thus, the power coefficient of small wind turbine is lower than large wind turbines. Using the blade element method and SG6043 airfoil, which is suitable for the working conditions of small turbines, a small turbine blade has been designed for higher efficiency. The aerodynamic characteristics of turbine blade are simulated by using a computational fluid dynamics method with ANSYS Fluent software.

**Research Article (4)****MULTI-OBJECTIVE IN ECONOMIC COMPENSATION  
IN ELECTRICAL DISTRIBUTION NETWORK****Văn Ngọc Thắng<sup>(1)</sup> ; Phạm Quý Nin<sup>(1)</sup>**<sup>1</sup>The University of Danang - University of Science and Technology

**Abstract** – The power loss reduction has been one of the primary missions of electricity distribution companies. In order to reduce power losses, many technical and non-technical methods have been employed. Currently, on distribution network, there are two technical methods which are employed to reduce power losses: load compensation, optimal network opening. To perform this, researchers often use the PSS/ADEPT software. In calculation, there are, however, some drawbacks: specifically, in load compensation, merely minimal cost is taken into account, the other factors are limited when comes to calculation. In this paper, authors propose using multi-objective optimal algorithm in calculation of power loss reduce and establishing an optimum program in Matlab environment. Multi-objective optimal algorithm helps network designers and operators locate optimal point corresponding to different objectives. The paper's authors utilized proposed algorithm and built program for optimization of model distribution network IEEE-16 buses with two objectives: calculating cost when installing, operating capacitor and amount of money gained from reduction of power losses when installing capacitor.

**Key words** – Power losses, load compensation, multi-objectives optimization, Pareto front

**Research Article (5)****Improving autocorrelation algorithm for detecting fundamental frequency of guitar signals on Arm Cortex-A9 processor****NGUYEN Binh Thien, NINH Khanh Duy**

Faculty of Information Technology, University of Science and Technology, The University of Danang

Detecting the fundamental frequency of signal is a common issue in audio signal processing, especially music processing. This paper implements pitch detection algorithm for guitar signals using autocorrelation function on Arm Cortex-A9 processor. To increase the accuracy of the algorithm, Gaussian filter and cubic spline interpolation were used. Experiments on guitar signals show that the root mean square errors of the autocorrelation algorithms with and without using cubic spline interpolation compared to the RAPT algorithm are 1.0147 Hz and 1.1199 Hz, respectively. Experimental results also exhibit that the use of cubic spline interpolation has more effectiveness when the estimated fundamental frequency is higher. Finally, we have built a prototype of a guitar tuner device using Renesas's GR-PEACH boards for demonstrating the research results.