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In this Issue...

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Message from Editor

Dear Valued ECTI Association Members,

Sawaddee (Hello) to all ECTI members. The scope of research areas in ECTI association cover all aspects of today and future innovations ranging from power and green energy segments, smart electronics, computer hardware and software engineering, telecommunications, to the recent trends in data analytics and big data in information technology. The progress in these areas is regularly showcased during our flagship conferences, sponsored conferences as well as two journal publications: ECTI (CIT, EEC). In addition, active researchers in each of our 7 academic areas often host workshops and events. We welcome all ECTI members and interested public.

In this issue, we have a timely article titled "Visible Light Communication: An Innovative and Challenging Technology" by Assoc. Prof. Dr. Preecha Kocharoen (Sri Pathum University) and his teams from various universities/centers. They will review the status of VLC developments as well as research and developments activities in Thailand. This technology utilizes the data transmission via LED light system rather than conventional radio transmission. Recent progress in Gbits/sec speed will certainly ignite interests among the readers. In this issue, we start the new types of articles to describe the experiences of International graduate students in Thailand.

ECTI E-Magazine Editor

Pornchai Supnithi
King Mongkut's Institute of Technology Ladkrabang

Visible Light Communication: An Innovative and Challenging Technology

Preecha Kocharoen, Petch Nantivatana, Kata Jaruwongrungsee, Termpong Srited, Wannaree Wongtrairat and Piya Kovintavewat

ABSTRACT

Since the Internet of Things (IoT) allow devices to be interconnected across communication networks, the demand for bandwidth in personal communication is growing rapidly as the number of devices increases. Moreover, the location estimation in an indoor environment requires a proper technology because the global positioning system cannot provide satisfactory accuracy. Thus, a visible light communication (VLC) technology is introduced so as to add extra capacity to an existing radio frequency infrastructure. In practice, the VLC can utilize the lighting system infrastructure to transmit data via light intensity together with illumination. Several VLC standards have been published by the Japan Electronics and Information Technology Industries Association (JEITA) and the institute of electrical and electronics engineers (IEEE) in 2003 and 2011, respectively. In the past five years, many researchers in Thailand have focused on both VLC basic research and technology implementation. Additionally, the inter-University co-operation known as LED-SmartCon has also been established by ECTI Association to promote the VLC technology in Thailand. Moreover, the VLC development kit was developed by SARGMET researchers, according to the CP1223 standard definition. This helps reduce the time to develop the VLC products with the ease of use and low complexity.

Keywords

Visible Light Communication, Communication Standard, Thai Preparations

I. INTRODUCTION

Since the demand for bandwidths in personal communication, i.e., mobile phone, computer, wearable device, and Internet of Things, is growing rapidly as the number of users increases, an alternative communication technology is required to add extra capacity to an existing radio frequency infrastructure. Radio frequency communication has some limitation when people carry more than one communication device at the same time, because each device needs high data rates. Furthermore, a location-specific service has recently received more attention because the global positioning system (GPS) cannot provide satisfactory accuracy for estimating the location in both indoor and outdoor environments. Examples for indoor and outdoor environment services are location-specific multimedia contents, security messages, illuminated advertising boards, car-to-car communication, intelligent transportation systems (ITS), and so forth.

Visible light communication (VLC) is an emerging technology that is being researched to use light emitting diode (LED) as a transmitting light source for communication systems. Unlike radio frequency systems, VLC can be used in hospitals, under water communication and electromagnetic interference sensible locations. Applications such as VLC for audio systems and information broadcasting using traffic lights are examples of the capabilities of VLC. This optical communication could be used for addressing the congested spectrum bandwidth of radio frequency communication. This wireless communication carries information by modulating the light with wavelength of about 400 – 700 nm, which is in the visible light spectrum band. The VLC system can utilize the existing lighting system infrastructure to transmit data along with illumination, which can be achieved by sending data via light intensity. There are two common approaches to produce LED white light illumination, namely the blue LED with a phosphor, and the combination of red, green, and blue (RGB) LEDS. However, if a high transmission rate is required, the RGB method is preferred because the phosphor has a slow response and then the bandwidth is limited. Moreover, the RGB LEDs could be transmitted simultaneously by using a wavelength division multiplexing (WDM) technique, which could increase the transmission rate.

Now the light we use in our daily life is employed not only for providing light, but also for communication; however, many technical issues might need to be addressed. For visible light communication, two standards were published by the visible light communication consortium (VLCC) [1] and the institute of electrical and electronics engineers (IEEE) [2] in 2003 and 2011, respectively.

II. VLC System

Generally, VLC utilizes LEDs to transmit data by turning on and turning off the light at a speed undetectable by human eyes. At the receiver, the photodiode will convert the optical signal to the electrical signal, and then the modulating signal will be retrieved. A typical indoor VLC system is illustrated in Figure 1. The LED lamps are installed on the ceiling for illuminating all areas in a building, including rooms and corridors. One of the lamps is functioned as a coordinator to transmit visible light beacon or data frame, e.g., computer data, serial number, product information, or location information, through all LED lamps. Thus, the receiver or the VLC end device can obtain information from the coordinator device via light intensity. The information may include additional data, e.g., product name, product specification, or the location where the lamp is installed. The up-link from a VLC end device to a coordinator device could be on a modulated retro reflector [3], transmitting VLC in the dark [4], or existing RF or IrDA link. A modulated retro reflector controls the amplitude of the incident light from the LED transmitter before reflecting back to the coordinator. In the case of VLC in the dark, the duty cycle of the LED light is reduced so as to produce a very narrow pulse width such that the lamp appears dark, while the receiver in the coordinator device can still detect the transmitted signal.

"Unlike radio frequency systems, VLC can be used in hospitals, under water communication and electromagnetic interference sensible locations."

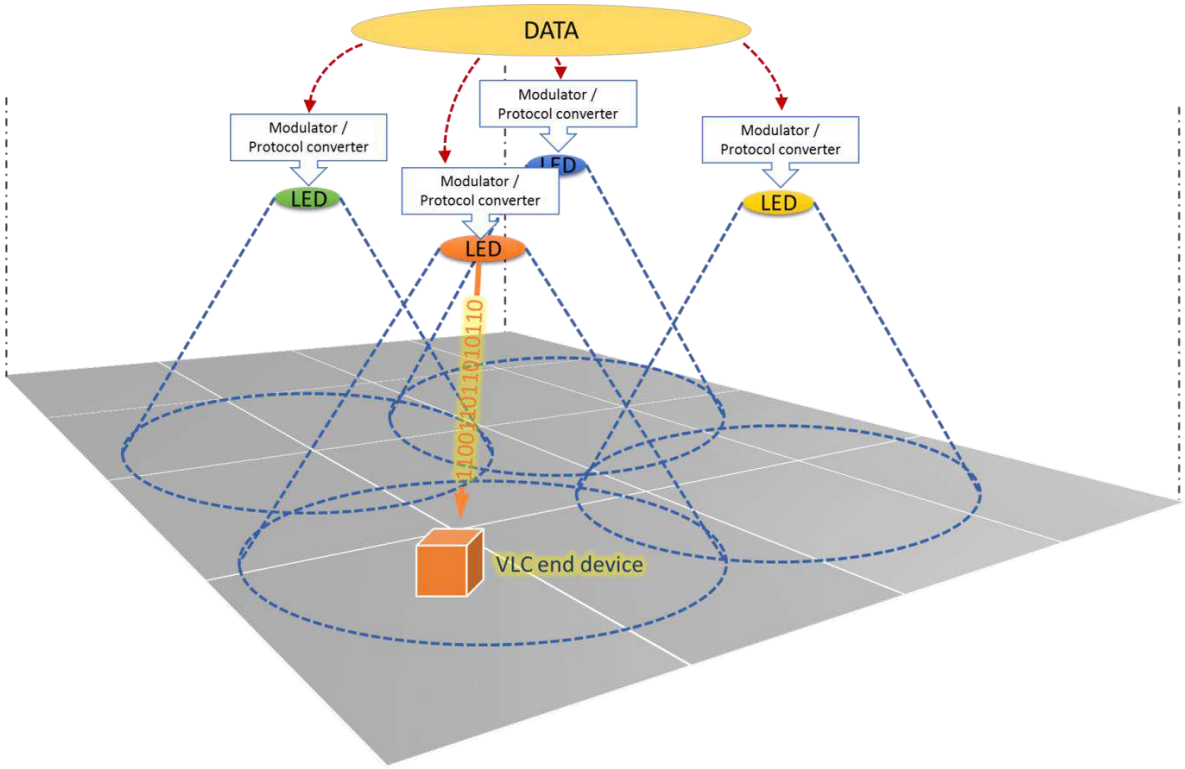


Figure 1: An example of an indoor VLC system.

In addition, Figure 2 shows an outdoor VLC system, which can provide connectivity between car and road infrastructure, e.g., car's head light and rear light, traffic light, or illuminated advertising board so as to exchange information among all devices in the intelligent transport systems.

Applications on VLC can be classified based on indoor/outdoor applications or low/high bit rate. An example of an indoor/low bit rate group is the infrastructure with fixed lamp location to enable identification broadcasting or location information, whereas that of an indoor/high bit rate group is data communication via a mobile device, which uses battery as a power supply; therefore, it can transmit data only for a short distance. On the other hand, an example of outdoor/low bit rate group is a car-to-car communication or car-to-road infrastructure communication that has a moderate power supply and intense light source for using long range communication, while that of an outdoor/high bit rate group is a communication between two network stations using a very intense light source with fixed coordinator. Examples of VLC potential applications are included:

1) Indoor data communication that uses light from LEDs as a medium to deliver high-speed communication.
2) Low-cost indoor navigation that uses existing ceiling lamps to broadcast location IDs that the mobile receiver unit can be used to calculate the current location.
3) Location based services that use the existing lighting infrastructure to deliver personalized content based on location e.g. pushing the digital content to shoppers in the stores or personalized content delivery in the museums or galleries.
4) Visible light barcodes broadcasted from billboards or advertising boards.
5) Intelligent transportation systems that could be used for vehicular communications, e.g., vehicle to infrastructure, vehicle to vehicle, or infrastructure to vehicle.
6) VLC can be used as smart lighting from public lighting, i.e., street lamps. The lamps could be used to provide communication hotspots or could be used to monitor or controlling some devices.

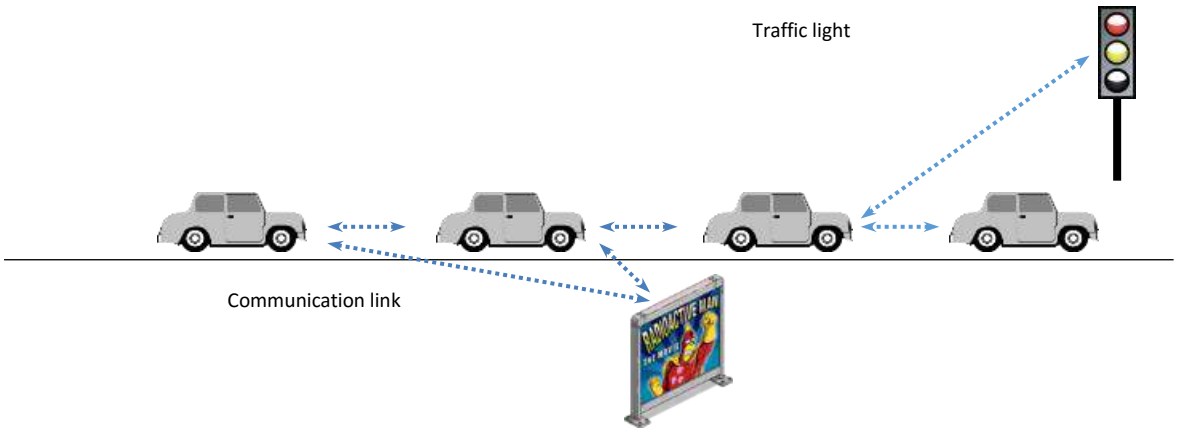


Figure 2: An example of an outdoor VLC system.

7) VLC can provide a robust communication comparable to radio frequency communication in the hazardous environments such as mines or industrial plants.
8) VLC does not interfere with medical instruments such as MRI scanners or aircraft radio communications; therefore, it could be used in the hospital or airplanes.
9) VLC could be used in underwater communications where radio frequency communication could not be used because of extremely high RF and acoustic wave signal distortion.

III. VLC Standard

There are several standards related to VLC, but only two potential standards are described in this paper, namely IEEE 802.15.7 and CP1223. The institute of electrical and electronics engineers defined a standard, called IEEE 802.15.7, for short-range optical wireless communication using visible light. This standard defines only two layers, physical layer (PHY) and medium access control layer (MAC), in OSI 7-layers model [2]. The PHY layer is responsible for controlling light transceiver along with signal-level control mechanism. Three types of PHY layer are supported, which are different in spectrum frequency band, data rate and optical clock rate. The PHY I is intended for outdoor use with low data rate applications. This mode can support a data rate up to 266.6 kbps. The PHY II is intended for indoor use with moderate data rate applications. It uses on-off keying or variable pulse position modulation as a modulation scheme with higher optical rate up to 120 MHz. This mode can support data rate up to 96 Mbps. The last mode, PHY III, is intended for application using multiple light sources and detector that can gain advantage from band-hopping to avoid interference. The PHY III uses color-shift keying (CSK) as a modulation scheme with optical rate up to 24 MHz. This mode can support data rate up to 96 Mbps.

The MAC layer handles all accesses to the PHY layer using superframe structure. The superframe composes of several slots, including active period, beacon, contention access period (CAP) or Contention free period (CFP), and inactive period. The beacons are used to synchronize end devices to the coordinator device. When any end device wants to communicate with the coordinator, it might have to compete with other devices via random access during a contention access period. On the other hand, for the end device that requires specific data bandwidth, the dedicate portions, called guaranteed time slots (GTSs), are assigned by a coordinator device during a contention free period.

"The VLC system can utilize the existing lighting system infrastructure to transmit data along with illumination, which can be achieved by sending data via light intensity."

The other standard called CP1223 was issued by the Japan Electronics and Information Technology Industries Association (JEITA), Japan. This standard prescribes the unidirectional communication system with visible light as a medium for multimedia applications. The visible light beacon transmitter can transmit information either arbitrary data or an ID code. Optical wavelengths of this standard are around 380 – 780 nm with data rate of about 4.8 kbps. The modulation techniques used in this system is inverted 4 pulse position modulation (I-4PPM). The transmission frame structure consists of a preamble (PRE), frame-type (F-TYPE), payload and cyclic redundancy check (CRC-16). The payload may contain ID information and/or 128-bits data. This standard can be applied for various multimedia applications, such as the transmission of advertisements or the security information from illuminated advertising board, emergency exit signs, where Content ID is sent from an LED light and various location-dependent contents directly from the light.

IV. RECENT RESEARCHES IN THAILAND

In the past five years, many researchers in Thailand have focused on the VLC technology. For example, researchers at the faculty of engineering, Chulalongkorn University and the national electronics and computer technology center (NECTEC) presented channel modeling of visible light communication [5]. Moreover, they proposed an indoor positioning system for LEDs based on received signal strength and fingerprinting in order to estimate the position of the receiver [6]. On the other hand, at the industrial robot research and development center, King Mongkut's University of Technology North Bangkok, researchers have proposed an indoor positioning system for robot localization. They proposed an integrated angle of arrival-received signal strength (AOA-RSS) localization method using the VLC. It has been implemented to achieve high accuracy for robot localization with a small error approximation of a few centimeters [7].

The alternative technique for location estimation using spread spectrum has been proposed by researchers from the faculty of engineering, Sripatum University. This technique embeds the Gold sequence to LED lamp, which can distinguish from other sequences by using the correlator [8]. The study on handover in visible light communication was reported by researchers at the faculty of engineering, Naresuan University [9]. In addition, Researchers at the Bangkok University center of research in optoelectronics, communications and control systems (BU-CROCCS), school of engineering, Bangkok University has concentrated mainly on low cost transceiver design supporting both digital and analogue intensity modulation formats. The transceiver has been designed to support VLC over dimmable light. A software defined approach has been used for the implementations of the modulation and coding schemes to improve the quality of VLC communication links. They also present an application of software defined communication systems to transmit location information of displaying item in a smart museum [10]. Application of LED for health has been focused by researchers at Rajamangala University of Technology Isan and demonstrated at the 7th Rajamangala University of technology conference [11].

To accelerate the VLC technology development in Thailand, both fundamental research and technology implementation have to be developed at the same time. The VLC development kit that in compliance with CP1223 standard has been developed by inter-University co-operation, Sripatum University, Nakhon Pathom Rajabhat University, Rajamangala University of technology Isan, King Mongkut's University of technology north Bangkok and NECTEC, in order to accelerate the product time to market for industrial partners. Not only the inter-University co-operation has been set up, but also Thai VLC consortium, called LED-SmartCon, has been established by ECTI Association.

The LED-SmartCon aims to promote the LED for communications, industrial applications, and health, among researchers, students, and industrial partners. One of LED-SmartCon activity is to promote VLC by arranging a meeting for researchers, students, and industrial partners from all around Thailand. The website and social media are also set up for LED-SmartCon, which can be found at http://led-smartcon.org/, https://www.facebook.com/VisibleLightThailand, and http://dept.npru.ac.th/vlc.

V. VLC Development Kits

To accelerate the VLC technology development, the guideline of development platform both hardware and software are needed. Therefore, the VLC development kit in compliance with the CP1223 standard has been developed in order to accelerate the production time to market for industrial partners. The development kit consists of two parts, namely the hardware and the software. In the hardware design, the ease of use and cost of building or development work have been taken into account. The ease of use has made the selection of Arduino microcontroller in order to start the development of optical communication products quickly and easily. The selected Arduino microcontroller model used in this design is Arduino Pro micro (mini Leonardo), which is popular among developers and it is small and affordable. This Arduino Pro micro is employed to control the operation of electronic hardware. In the software or programming part, the structure of the program is made clear and easy to edit. Moreover, we are also preparing all source codes so as to demonstrate a large number of applications.

The wireless optical development kits consist of a wireless transmitter and receiver kits as shown in Figure 3. Both devices have the same hardware that can be configured to be a transmitter or a receiver module. Each development board equipped with a main board, a microcontroller Arduino Pro micro (mini Leonardo), and the extensions that are supported input and output as illustrated in Figure 4.

The block diagram of the development board is also given in Figure 5. The processing equipment and a controlling device utilize the Arduino Pro microcontroller that has to be programmed differently. For the transmitter board, the information signal generated from the microcontroller is fed to a transmitting circuit that is connected to the LED light source device. The information is transmitted via the illumination of the emitted light by the LED driver circuit on the development board.

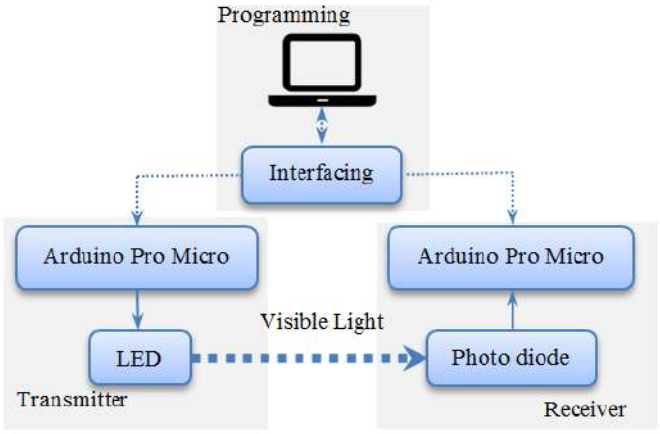


Figure 3: System overview.

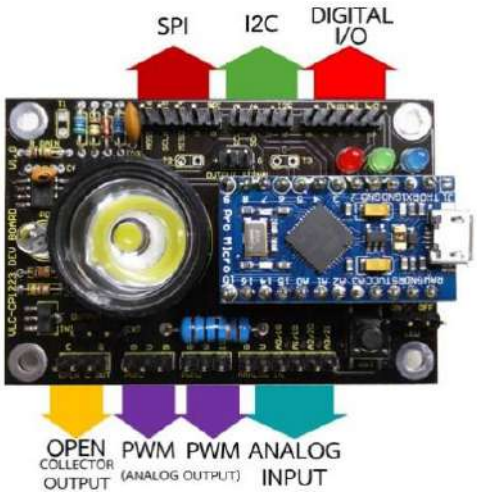


Figure 4: A development board.

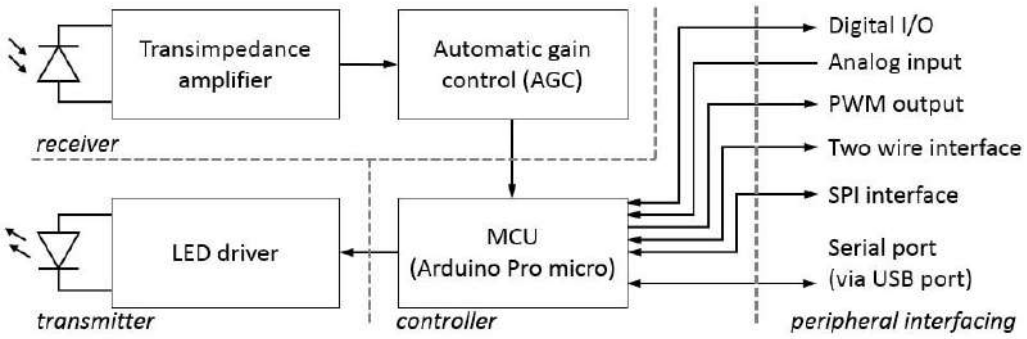
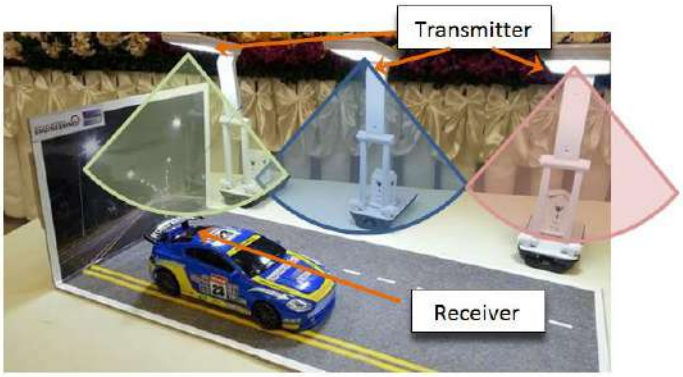
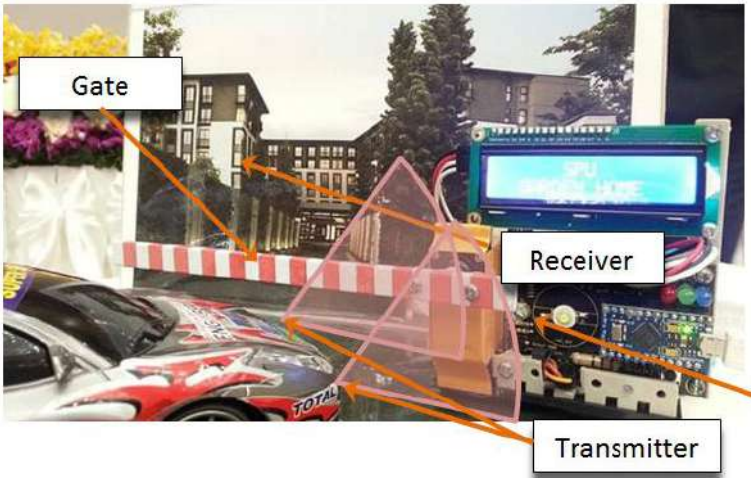


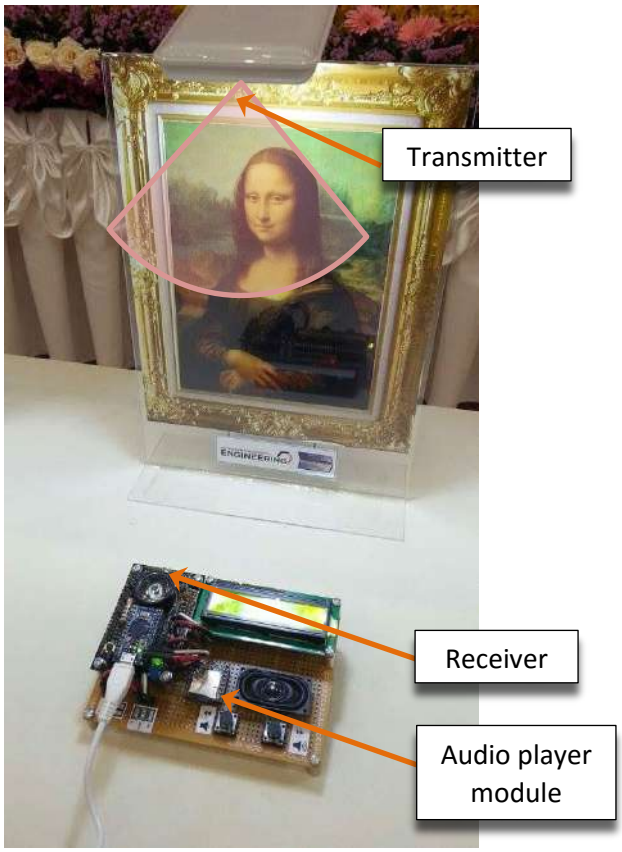
Figure 5: Block diagram of the development board.

At the receiver, the signal is retrieved by using a photo diode with an amplifier and then passes through the microcontroller, which is programmed to decode the transmitted sequences. The operation of the control system for this wireless optical communication can be done by microcontroller software programming through a computer via an interface board. To control the microcontroller Arduino Pro micro (mini Leonardo), the Arduino IDE program is used. This Arduino IDE program is an open source that is developed for programming and uploads the program sketch to the microcontroller device. The Arduino IDE can be downloaded at https://www.arduino.cc/en/Main/Software. The microcontroller programs are developed by the two major parts, namely the main program and the function library. Generally, the main program is used to control the development board, including commands to control variables, registers and ports, and command sequence control functions to control the program procedure. Moreover, the program that controls the basic level, which is called the function library, VLC_CP1223_QSC.h, is written separately from the main program and will be run when needed. This function library is written to declare addressing, the list of critical functions, constants and variables of the transmitter and the receiver.

Examples of implementation by using VLC Development Kits are shown in Figure 6 to Figure 9. Figure 6 demonstrates three different visible light data from three street light models. The photo diode receiver is installed on the car model when the signal from the street light model above the car, the VLC signal is demodulated and decoded. After moving the car to the other street light, the different information from the next transmitter is then obtained. Therefore, this can be used to broadcast information by using street light. Figure 7 demonstrates the vehicle gate control application. The VLC system is installed on the car model that can transmit the gate-open code from the car front light. When the car is closed to the gate, the receiver will receive the gate-open code from the front light. If the gate-open code is correct, then the gate will be opened. Moreover, the smart museum application is displayed in Figure 8. The VLC system is installed in the flood light to broadcast the object's identity. When the VLC receiver receives the data from the floodlight, the receiver will demodulated and decoded to get the information and command the audio player module to play the audio file on the memory card. This can be used in the smart museum that each flood light can represent the object's identities and the visitor who want to get the information of the displayed object only need to take the receiver be shined under the object's flood light. Finally, the signal of both transmitter and receiver of the VLC development kits is measured and shown in Figure 9.







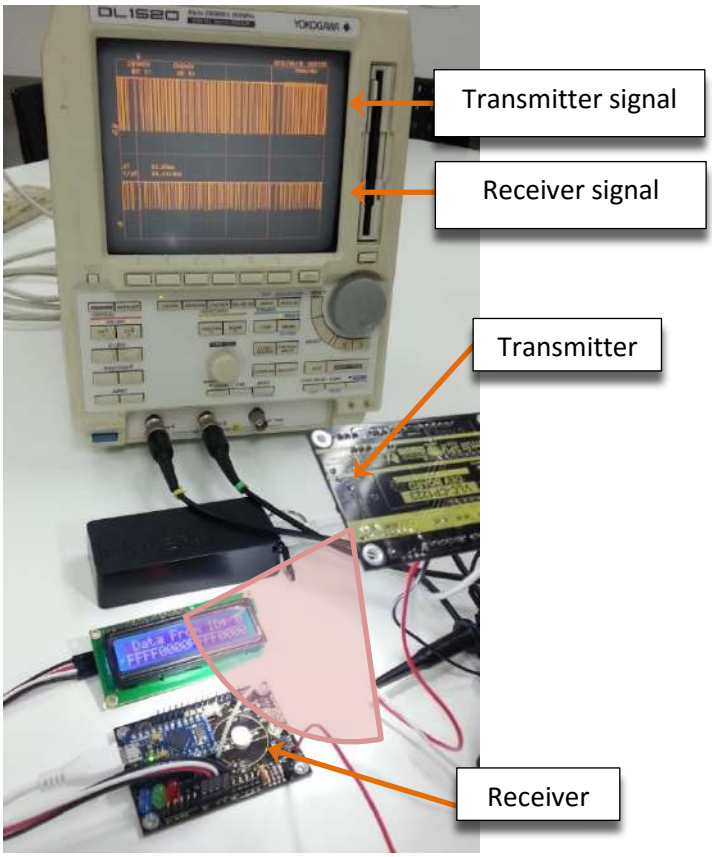


Figure 6

Figure 7

Figure 8

Figure 9

VI. CONCLUSIONS

As we rapidly run out of radio spectrum, VLC could be an alternative technology to support the Internet of Things age. Applications on VLC can be classified into four groups based on indoor/outdoor with low/high bitrate. For indoor, the VLC could use the existing infrastructure of the lighting system to transmit visible light beacon or data frame along with illumination. For outdoor, VLC can be used in the intelligent transportation systems by providing communication between car to car and car to road infrastructure. Currently, Thai VLC consortium, namely LED-SmartCon, has been established by ECTI Association to accelerate both VLC fundamental research and technology implementation in Thailand. The LED-SmartCon aims to promote the LED for communications, industrial applications, and health, among researchers, students, and industrial partners. Furthermore, the VLC development kit has been developed by SARGMET researchers, which could be used to expedite the production time to market for industrial partners. The guideline of development platform both hardware and software for CP1223 standard has been introduced to accelerate the development of VLC technology in Thailand.

VII. ACKNOWLEDGEMENTS

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BIOGRAPHY

Associate Professor Dr. Preecha Kocharoen has been working as a lecturer with the Sripatum University since 1999. He graduated in B.Eng. (Electrical), M.Eng (Communications), and D.Eng (Telecommunications) in 1997, 1998, and 2006 respectively. He received best faculty award for young researcher and best faculty award in academic in 2009 and 2013 respectively. He has been serving to several professional organizations for many years including Thai Embedded System Association (TESA) and IEEE ComSoc (Thailand). He is currently an IEEE senior member and ECTI member.

Petch Nantivatana has been working as a lecturer with the Sripatum University. He graduated in B.Eng. (Electrical) from Sripatum University and M.Eng (Electronics) from King Mongkut's Institute of Technology Ladkrabang (KMITL), in 2000 and 2005 respectively. His current research interests include microwave ablation, signal and image processing, embedded system, wireless sensor network and visible light communication.

Kata Jaruwongrungsee received his B.Eng. (electronics), M.Eng. (electronics) and D.Eng. (Electrical) from King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand, in 2003, 2005, and 2015 respectively. He has been working as a Researcher in Nanoelectronics and MEMS Laboratory, National Electronics and Computer Technology Center (NECTEC), Thailand, since 2006. His research is mainly focused on chemical and biological sensing technology.

Termpong Srited has been working as a lecturer with the Sripatum University since 2001. He graduated in B.Eng. (Electrical) in 1998. His current research interests include embedded system, wireless sensor network and visible light communication.

Assistant Professor Dr. Wannaree Wongtrairat was born in Nakhonratchasima, Thailand. She received the B.Eng. and M.Eng. degrees in telecommunications engineering in 2000 and 2003, respectively, and D.Eng. degree in Electrical Engineering in 2009 from King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand. She is a lecturer at the Department of Electronics Engineering, Faculty of Engineering and Architecture, Rajamangala University of Technology Isan, Nakhonratchasima. Her research interests wireless communications, digital signal processing, and electronic application device for agricultures.

Associate Professor Dr.Piya Kovintavewat received the B.Eng. summa cum laude from Thammasat University, Thailand (1994), the M.S. degree from Chalmers University of Technology, Sweden (1998), and the Ph.D. degree from Georgia Institute of Technology (2004), all in Electrical Engineering. He currently works at Nakhon Pathom Rajabhat University. His research interests include coding and signal processing as applied to digital data storage systems. Prior to working at NPRU, he worked as a research assistant at National Electronics and Computer Technology Center (1999), both in Thailand. He also had work experiences with Seagate Technology, Pennsylvania, USA (summers 2001, 2002, and 2004).

My Study and Research Experience in Thailand

Dr. Muhamad Saadi, Pakistan

I instigated my doctoral degree journey from Chulalongkorn University in December 2011 which was essentially scheduled earlier but deferred due to country's most devastating flood. Like other PhD candidates, I was in touch with my supervisor Assoc. Prof. Dr. Lunchakorn Wuttisittikulkij through emails and my first expression about my advisor was prodigious. As a welcoming gesture, Dr. Lunchakorn sends his student at the airport to receive me. As it was planned earlier that apart from my PhD studies, I will be working as a part time researcher with National Electronics and Computer Technology Center (NECTEC), my boss also came to receive me which was indeed a kindness nod.

My experience as a scholar in Thailand was really phenomenal. Graduate program at Electrical Engineering Department, Chulalongkorn University is very rich and students are offered with a number of courses from which they can opt for the most suitable courses. All the course instructors have earned their academic degrees from highly esteemed universities. Chula graduate program is more like a U.S graduate program where a doctoral student has to go through extensive course work, tough qualifying exam, thesis proposal, thesis defense, and impact factor journal publication. In a nutshell, the PhD program not only engages the students in intensive research but also rigorous coursework.

The best part of steering research in Thailand is, the advisor enthusiastically joins student's research, sometimes taking more pain than the advisee. Such attitude crafts a healthy student teacher relationship resulting in directional and fruitful research output. I have seen many PhD candidates working as an unguided missile but in Thailand, this is not the case.

Professors are not only well-connected with their peers but also jointly running projects with other universities and collaborates with the industry. Such environment help students to gain rich experience and utilize facilities which their respective laboratory might lag. Another admiring physiognomy of Thai professors is that they take students for outing, dinning, Karaoke at their own expense which develops a friendly relationship and students can discuss their study or even person problems with their teachers in a lighter mood.

During my PhD, I work with four different organizations both governmental and private. One thing which was conjoint in all four workplaces was the respect and special protocol which they give to foreigners. Everyone whether junior or senior, boss or subordinate warmly greet and extend their hands for full cooperation. I along with my supervisor worked as a consultant in industrial project and I found that all the meetings were very productive, well planned and result oriented followed by lavish dinning.

The problems which foreigner students mostly face in Thailand is the language barrier. Generally, Thai people are not comfortable with English which sometimes make the life problematic. Personally, I consider Thai as a hard to grasp language and I feel doing PhD might be easier than become proficient in Thai reading. Apart from this, Bangkok particularly is notorious for its traffic, roadside markets which sometimes affects the mobility of pedestrians. Last but not the least the hot and humid atmosphere.

I would like to conclude my 4 years' life in Thailand as the most memorable event. I wish to see my second home i.e. Bangkok again and again.

About the Author

Dr. Muhammad Saadi is currently working as an Assistant Professor at Department of Electrical Engineering, University of Central Punjab, Pakistan. He stayed in Thailand from Nov 2011 to December 2015.

Paper List of ECTI Transaction

ECTI-EEC Transaction: Vol. 14, No. 2,
Website: http://www.ecti-eec.org/index.php/ecti-eec/

Regular paper

Micro-slotted Dual-stage Spectrum Sensing for Cognitive radio networks
Kanabadee Srisomboon, Wilaiporn Lee, Kornkamol Thakulsukanant, Akara Prayote

A Nonisolated Bidirectional ZVS Converter for Low Power Application
mahmood vesali, majid delshad

Nonlinear Adaptive Controller Design for Power Systems with STATCOM via Immersion and Invariance
Adirak Kanchanaharuthai

A Distributed Target Localization Algorithm for Mobile Adaptive Networks
Amin Lotfzad Pak, Azam Khalili, Md Kafiul Islam, Amir Rastegarnia

Statistical characterization of ischemic stroke lesions from MRI using discrete wavelet transformations
Karthik R, Menaka R

Special section on papers selected from ECTI-CON 2015 paper

Experimental Study in Error Vector Magnitude of Bidirectional Confidential with Median Filter on Spatial Domain Optical Flow under Non Gaussian Noise Contamination
Darun Kesrarat, Vorapoj Patanavijit

Special section on papers selected from the 41st Congress on Science and Technology of Thailand

Optimum Threshold for Velocity Considered-SINR Based Vertical Handoff Decision in HetNet
Damar Widjaja, Peerapong Uthansakul

ECTI-CIT Transaction: -
Website: https://www.tci-thaijo.org/index.php/ecticit

Two issues are available annually. The next issue will be available soon.

Report from Conferences/Workshops/Seminars/Events

ECTI Professorship Roadshow

Date: 11 July, 2016
Venue: Rajabhat University Ayuddhaya (As part of the 7th National Ayuddhaya-Region Conference 2016)

Three speakers: Prof. Prayoot Akkaraektharin (KMUTNB), Prof. Issarachi Nagamroo (KMITL) and Prof. Pornchai Supnithi (KMITL) were invited to share the inspiration, career planning and regulation aspects related to academic promotion. About 60 people attended this event.

Research methodology and paper writing

Date: 9 September, 2016
Venue: Petcharat Room, The Empress Hotel, Chiangmai

This is organized by the North Section of the ECTI Association for lecturers and graduate students in the north of Thailand. About 50 attendants participated this event. The speakers include Assoc. Prof.Dr. Somsak Chumchuay (ECTI President), Prof. Dr.Pornchai Supnithi (KMITL), Prof. Dr. Prabhas chongstitvatana (Chula), Dr.Sataporn Promwong (KMITL) and Prof.Dr. Prayoot Akkaraekthalin (KMUTNB).

How to use Software defined radio (SDR) dongles for learning communication system

Date: 21 July, 2016
Venue: Department of Electronics and Telecommunications, National University of Laos (NUOL)

ECTI association representative, Prof. Pornchai Supnithi visits NUOL for a new collaboration project on Telecommunication field to boost up the quality of teaching activities at FE, NUOL. We provided the training on using SDR dongles and relate softwares to receive and visualize the radio signals and spectrum. About 40 students and staffs at NUOL attended this event.

The 4rd ECTI Workshop on Journal Writing

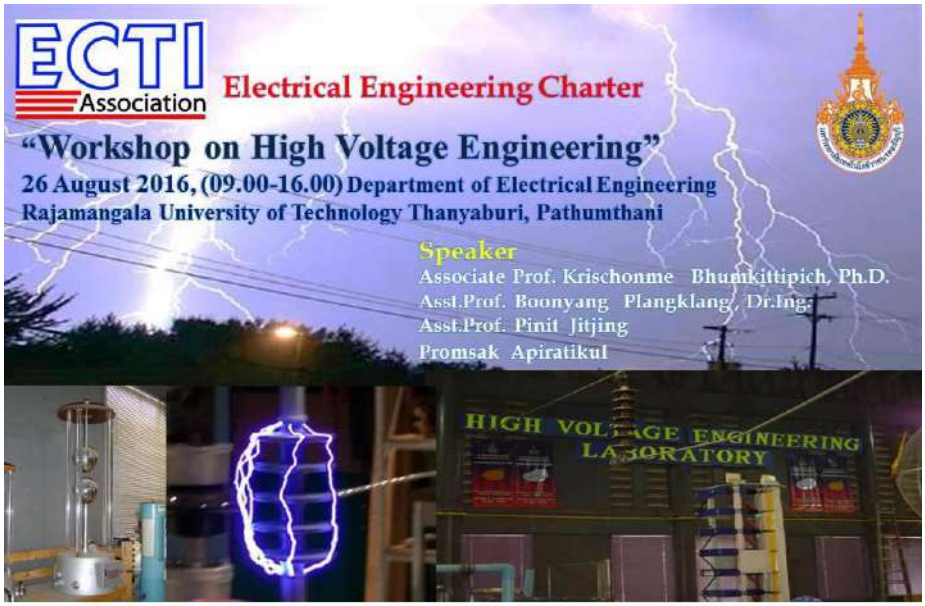
Date: 11 August, 2016
Venue: International College, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok
Organizer: ECTI-Signal Processing
Total attendee: 45 (Thai: 30 and International: 15)
Keynote speaker: Associate Professor Dr.Paisarn Muneesawang, Naresuan University, Thailand

IEICE-ECSS Practice Seminar on Scholarly Publishing

Date: 10 August, 2016
Venue: King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok
Organizer: ECTI-Electromagnetics

IEICE-ECSS Practice Seminar on Scholarly Publishing

Date: 26 August, 2016
Venue: Rajamangala University of Technology Thanyaburi, Pathumthani
Organizer: ECTI-Electrical Engineering



Assist. Prof. Nattachote Rugthaicharoencheep, Ph.D.
Technical Chair (Electrical Engineering)
ECTI Association
e-mail: nattachote@ieee.org
Tel: 089-6071641

ECTI-CON 2016

Date: 28 June – 1 July, 2016
Venue: Chiang Mai, Thailand

Keynote Speaker:

Sensing Systems in Cyber-Physical Systems
Prof. Dr. Satoshi Honda, Keio University, Japan

Impedance-based Immunosensor for Point-of-care Diagnostic Testing
Prof. Dr. Cheng-Hsin Chuang, Southern Taiwan University of Science and Technology, Taiwan

Toward Smarter Power Grid: New Stabilizing Control Concept
Prof. Dr. Issarachai Ngamroo, King Mongkut's Institute of Technology Ladkrabang, Thailand.

Satellite Communication in The Changing Environment
Mr. Ekachai Phakdurong, Senior Vice President of Corporate Affairs, Thaicom Public Co., Ltd.

Best Paper Awards

Low-Voltage Bulk-Driven QFG-Regulated Self-Cascode Super MOS Transistor
Thawatchai Thongleam, Apirak Suadet and Varakorn Kasemsuwan
King Mongkut's Institute of Technology Ladkrabang, Thailand

A Hybrid Approach for Thai Word Segmentation with Crowdsourcing Feedback System
Kriangkrai Chaonithi and Santitham Prom-on
King Mongkut's University of Technology Thonburi, Thailand

Floor Localization Algorithm utilizing Different Order of Access Point from Wi-Fi Signal Fingerprint
Teerapat Vongsuteera, Kulit Na Nakorn, and Kultida Rojviboonchai
Chulalongkorn University, Thailand

Optimal Tuning of Power System Stabilizers by Probability Method
Korakot Thanpisit , Issarachai Ngamroo and Worawat Nakawiro
King Mongkut's Institute of Technology Ladkrabang, Thailand

A Comparative Study of Vector Control Strategies for Rotor-side Converter of DFIG Wind Energy Systems
Watcharin Srirattanawichaikul, Suttichai Premrudeepreechacharn, and Yuttana Kumsuwan
Chiang Mai University, Thailand

Ultrasound Beamforming and Image Reconstruction using CPU and GPU
Wittawat Boonleelakul, Udomchai Techavipoo, Denchai Worasawate, Rachaporn Keinprasit,Treepop Sunpetchniyom, Nobuhiko Sugino, Pairash Thajchayapong
Kasetsart University, National Electronics and Computer Technology Center, Thailand and Tokyo Institute of Technology, Japan

Best Poster Awards

Dual-band Wilkinson Power Divider Based on Composite Right/Left-Handed Transmission Lines
Country: Iran

Simulation of Magneto-Elastic Materials Using a Novel Vector Hysteresis Model
Country: Egypt

Hermite Polynomials in The Fractional Order Domain Suitable for Special Filters Design
Country: Egypt

Switched Active Control Synchronization of Three Fractional Order Chaotic Systems
Country: Egypt

Charging and Discharging RC• circuit under Riemann-Liouville and Caputo fractional derivatives
Country: Egypt

Using Bioimpedance Plethysmography for Measuring the Pulse Wave Velocity of Peripheral Vascular
Country: Taiwan

Performance Evaluation of Vector Controlled Asymmetrical Two-Phase Induction Generator Using Three-Leg Voltage Source Inverter
Country: Thailand

Continuous and Discontinuous Space Vector Pulsewidth Modulator Using a TMS320C2000 F28335 Board
Country: Thailand

Humidity Sensor Using Carboxymethyl Cellulose Hydrogel Membrane
Country: Thailand

ECTI-CARD 2016

Date: 27 - 29 July, 2016
Venue: Prachuap Khiri Khan, Thailand

Keynote Speaker:
Metrology to encourage productivity and creative innovation for industry
Mrs.Ajchara Charoensook, Deputy Director of National Institute of Metrology (Thailand)

Brain-Computer Interface (BCI) for Preventive, Treatment, Rehabilitation and Assistive Technologies
Asst. Prof. Dr. Yodchanan Wongsawat, Mahidol University, Thailand

Innovation Development 4.0 Model
Dr. Sakda Panwai, Director of Expressway Engineering System Research and Development Division Expressway Authority of Thailand

Best Paper Awards: ORAL PRESENTATION

Microcontroller Based for Smart Mushroom Cropping
Nimirt.H, King Mongkut's Institute of Technology Ladkrabang

Blood infusion warmer for patient blood transfusion in operation room
Saner.S , Rajamangala University of Technology Srivijaya

Lead-Acid Battery Burp Charge for Photovoltaic System
Udom.K , Rajamangala University of Technology Lanna (TAK Campus)

Application design and development for controlling "diamon" robot for public relation of school of engineering, Bangkok university
Kriangkri.T, Bangkok University

Analyzing the Query performance of weather stations data using Hadoop-Hive
Teerayut.K, Songkhla Rajabhat University

A Voice-Able Device of Checking Cash for the Northern School for the Blind under the Patronage of the Queen in Chiang Mai Province
Yupade.H, Rajamangala University of Technology Lanna (Chiang Mai Campus)

Voice Extraction from Object Movement in Silent Video
Pattrawut.K, Mahidol University

Automatic inspection machine using fiber optic sensor & low cost USB camera
Siripong.W, Mahanakorn University of Technology

Wheel Chair control by Head
Montiean.NG, Rajamangala University of Technology Isan

Pitch Bend and Vibrato Control System for Piano-Style Keyboard by Using a Touch Sensor
Nattapong.W, King Mongkut's Institute of Technology Ladkrabang

Best Paper Awards: POSTER PRESENTATION

Motorcycle Alarm and Tracking System
Jeerasuda.K and Paramote.W, King Mongkut's Institute of Technology Ladkrabang

ITC-CSCC 2016

Date: 10 - 13 July, 2016
Venue: Okinawa, Japan
Number of Papers: 278

Keynote Speaker:

Dependable Wireless BAN of Things beyond IoT - Its R&D, International Standard IEEE802.15, Global Business
Prof. Ryuji Kohno, Yokohama National University, Japan

Wireless Energy Transfer Techniques for Future Communication Systems
Prof. Inkyu Lee, Korea University, Korea

Non-Destructive Measurement Algorithms and Systems for Healthy Food
Prof. Kosin Chamnongthai, King Mongkut's University of Technology Thonburi, Thailand

Best Paper Awards

Artificial Neural Network Based Visible Light Positioning System Employing Received Signal Strength
Chulalongkorn University, Thailand

Optimal Robust Controller for a Ball-Riding Robot
Kasetsart University, Thailand

A Place-Invariant Based Method for Supervisory Control of Workflow Nets
Yamaguchi University, Japan

A Leightweight OpenCL Framework for Embedded Multicore Processors
Ritsumeikan University, Japan

Geometric Method for Detection of Image Quadrilateral
ETRI, Korea

A Design of a Wide Range Low Power Delay-Locked Loop for High Efficiency Synchronous Rectifier
Sungkyunkwan University, Korea

ITC-CSCC
International Technical Conference on Circuits/Systems, Computers and Communications

Announcements/Upcoming events/Call-for-Papers

ISPACS 2016
Phuket, Thailand
24-27 October 2016

2016 International Symposium on Intelligent Signal Processing and Communication Systems

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Takayuki Nakachi, *NTT Corporation, Japan*
Trio Adiono, *Institut Teknologi Bandung, Indonesia*
Yoshio Itoh, *Tottori University, Japan*

Call for Papers

The 2016 International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS 2016) will be held during 24-27 October 2016 at Phuket Graceland Resort & Spa, Patong, Phuket, Thailand. The symposium presents every possibility on new technologies based on signal processing and communications. ISPACS 2016 (IEEE Conference Record Number #37442) will include regular sessions on the topics listed below and some special sessions on emerging topics concerning intelligent signal processing and communication systems.

1. Communication Systems
- Radio Propagation and Channel Modeling
- Communication Theory
- Antenna and Propagation
- Wideband Communications
- Wireless Systems
- Intelligent Communication Systems and Network Protocols

2. Multimedia and Systems
- Speech Processing and Coding
- Image Processing
- Video Processing and Coding
- Video and Multimedia Technology and Communications
- Audio/Acoustic Signal Processing
- Multimedia Processing for e-Learning

3. Signal Processing
- Digital Filters and Filter Banks
- Wavelets and Multi-rate Signal Processing
- Adaptive, Non-linear and Multidimensional Signal Processing
- Fast Computations for Signal Processing, and Communication Systems
- Radar, Antennas and Mobile Signal Processing
- Intelligent Signal Processing for Communications and Systems
- Security Signal Processing
- Optical Signal Processing
- Medical Signal Processing
- Noise Control

4. VLSI
- Analog and Digital ICs for Communications
- Low Power Design and VLSI Physical Synthesis
- Modeling, Simulation and CAD Tools
- VLSI Architecture for Signal Processing

5. Circuits and Systems
- Analog Circuits, Filters and Data Conversion
- Analog and Mixed Signal Processing
- Numerical Methods and Circuit Simulation
- Circuits and Systems for Communications
- Neural Networks and Fuzzy Logic Processing
- Sensors and Devices
- Intelligent Instrumentations
- Wireless Sensor Networks

6. Emerging Technologies in Signal Processing and Communications

Important Dates
Submission of Special Session Proposals:
30 April 2016
Submission of Full Papers:
15 June 2016
Acceptance Notification:
15 August 2016
Submission of Camera-ready Manuscripts:
10 September 2016

Travelling grants, around 5% of the number of actual participants, will be given to participants who truly need support, especially the ASEAN Economic Community (AEC) members. The applications are required and will be considered by the TPC committee.

For more information about the conference, please visit our official web site: http://ispacs2016.psu.ac.th or contact ispacs2016@coe.psu.ac.th.

Phuket is one of the most internationally well-known and popular islands. Phuket, known as "Pearl of the Andaman Sea" and its unique combination of the sea and mountains, has many fine white sandy beaches and deep blue sea as well as fascinating history and mixed cultures such as Sino-Portuguese architecture, local traditions, living styles and food.

See more information about Phuket at http://www.phukettourist.com/index.php.

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2016 International Workshop on Smart Info-Media Systems in Asia (SISA 2016)

Classic Kameo Hotel & Serviced Apartments, Ayutthaya

September 14 – 17, 2016

Ayutthaya City, World Heritage, Thailand

http://www.ieice-sisa.org/

Call for Papers

2016 International Workshop on Smart Info-Media Systems in Asia (SISA 2016). The symposium will be held at Pranakhon Si Ayutthaya, 600-year-old ancient capital of Thailand and now become the world heritage as a historical city. The SISA 2016 presents every possibility on new information technologies and its smart systems.

The SISA 2016 is aiming at promoting young researchers in the fields of multimedia system and wireless communications. We plan to organize short oral presentations with poster discussion for regular sessions as well as a keynote talk and special sessions. Prospective authors are invited to submit their papers reporting original works in these fields.

The topics in SISA 2016 include the followings but not limited to:

1. Communication Systems
- 1.1 Smart Wireless Systems, Smart Mobile Systems
- 1.2 Cognitive Systems, Intelligent Soft-Wireless Systems
- 1.3 Multi-Media over Wireless
- 1.4 Signal Processing for Communication Systems
- 1.5 Intelligent Communication systems
- 1.6 MIMO Systems
- 1.7 NFC, RFID Sensor Network Systems, Mesh Network
- 1.8 WAN/MAN/LAN/PAN/BAN
- 1.9 Emerging Technologies for communications

2. Multimedia and Systems
- 2.1 Speech Processing and Coding
- 2.2 Video Processing and coding
- 2.3 Video and Mutimedia Technology & Communications
- 2.4 Audio/Acoustic Signal Processing
- 2.5 Signal Processing for Medical Technologies
- 2.6 Intelligent Signal Processing for Multimedia & Systems
- 2.7 Security Signal Processing for Multimedia & Systems
- 2.8 Parallel Implememtation for Multimedia & Systems
- 2.9 Emerging Technologies for Multimedia & Systems

3. Information Science and Technologies
- 3.1 Intelligent Transport Systems
- 3.2 Bioinformatics, Neural Networks and Fuzzy Systems
- 3.3 Informatics for Green Earth & Environmental Technologies

SISA 2016 Student Paper Awards

Any paper can be nominated for the Student Paper Awards, provided that the first author is a full time undergraduate, Masters or Ph.D. student.

Special Section on IEICE Trans. Fundamentals

We plan to publish a Special Section on IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences on November 2017. Authors who presented their original works in SISA 2016 are solicited to submit papers to this special section.

Author's Schedule

Deadline for Special Session Proposal:	April 29, 2016
Deadline for Submission of 6-page Full-Paper:	~~May 20, 2016~~ June 6, 2016 FINAL EXTENSION
Notification of Acceptance:	July 11, 2016
Deadline for Submission of Camera Ready Paper:	August 12, 2016

Submission Instruction

Paper must be written in English and should describe the authors' original research work. The length of the paper is limited to 6 pages including figures, tables and references. The paper must be in A4 size, two-column format. Please download paper template from SISA 2016 website.

Contact information: sisa2016aru@gmail.com, rdiaru@gmail.com

Sponsored by Smart Info-media System (SIS) Technical Committee, Engineering Science Society (ESS), The Institute of Electronics, Information and Communication Engineers (IEICE), In Cooperation with Electrical Engineering/Electronics, Computer, Communications and Information Technology (ECTI) Association, Thailand, and IPSJ Special Interest Group on Audio Visual and Multimedia Information Processing (IPSJ-AVM).

The 20th International Computer Science And Engineering Conference

"Smart Ubiquitous Computing And Knowledge."

14 - 17 December 2016, Chiang mai, Thailand

ICSEC 2016 Maejo University

Co-hosts

ECTI Association

Important Date

Paper Submission Deadline
September 30, 2016

Acceptance Notification
November 1, 2016

Camera-Ready Submission
November 15, 2016

Conference Dates
December 14-17,2016

Host
Maejo University

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The 2016 International Computer Science and Engineering Conference (ICSEC2016) is the twentieth year premier international conference, this year's theme is ***"Smart Ubiquitous Computing and Knowledge."*** ICSEC2016 is hosted by Maejo University, Thailand. This conference not only brings both academicians and practitioners in the field of Computer Science and Engineering from around the world to disseminate the results of their research, but also provides a platform to build a network of researchers in both computational and applied science. The event will be held for three days with well-recognized keynote speakers, advanced workshops and high-quality research presentations delivered by researchers and experts from the international communities. Authors should submit papers reporting original work that are currently not under review or published elsewhere in the areas of Computer Science and Engineering and emerging technologies in the related fields. ICSEC2016 includes, but are not limited to, the following topics:

- Information Retrieval
- Knowledge and Data Management
- Multimedia and Computer Graphics
- Pervasive and Mobile Computing
- Information Technology
- Cluster and Grid Computing
- Computer Networks and Communications
- Machine Learning and Intelligent Systems
- Internet of Things
- Computer Vision
- Ontology and Semantic Web
- Software Engineering
- Algorithmic Bioinformatics
- Computer and Internet Security
- Embedded Systems
- Geoinformatics

Paper Submission

Submissions must not exceed six (6) pages in the standard IEEE Conference Proceeding format and all submissions must be in PDF format. Manuscript templates are made available on the website (***http://www.icsec2016.mju.ac.th***). Only electronic submissions in PDF format will be accepted via Confserve submission system (the link will be available soon). All submissions will be subjected to a double-blind review procedure. At least one of the authors is expected to register and present the paper at the conference upon acceptance.

Accepted papers will be published in the ICSEC2016 Proceedings. The non-presented papers will be withdrawn from the conference proceedings. For international track, conference content will be submitted for inclusion into ***IEEEXplore Digital Library***. In addition, the authors of the high quality papers in international track will be invited to extend their works for the submission to the regular issues of ***"Maejo International Journal of Science and Technology (MIJST)"*** (ISI Impact Factor 0.367). Moreover, the selected papers in Thai Track will be invited for extending works for submitting to the special issues of ***FEU Academic Review*** (TCI1).

More Information

For any question, please send your email to: icsec2016@gmaejo.mju.ac.th

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