

## GUEST EDITORIAL PREFACE

# Special Issue on 2014 IEEE International Conference on Electro/Information Technology (EIT 2014)

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The 2014 International Electro/Information Technology Conference (EIT 2014) was hosted by Milwaukee School of Engineering (MSOE), Milwaukee, Wisconsin on June 5-7, 2014. It was sponsored by the IEEE Region 4 (R4) and was focused on basic/applied research results in the fields of electrical and computer engineering. It provided a forum for educators, researchers, industrial investigators, and students to exchange ideas and discuss developments in these growing fields. There were also exhibits showcased the latest electro/information technology tools and products. In addition, the EIT 2014 was an opportunity for professional activities development, workshops, and tutorials. Paper submission trends this year included substantial work in software engineering, wireless sensor networks, and robotics. These papers were complemented by a broad selection from the other traditional areas of electrical and computer engineering. Thus, the technical program included 90 blind peer-reviewed papers placed into four parallel tracks: (i) communications and digital signal processing, (ii) computer and software engineering, (iii) power systems and control systems, and (iv) other special topics. This issue includes outstanding papers selected from the Conference. Regular papers submitted to the Journal are also included. A brief introduction of each of the four articles is given next.

*Article 1. Reducing tracking error in RFID real-time localization systems using Kalman Filters:* An RFID (Radio-Frequency IDentification) device, consisting of a small chip and an antenna, serves the same purpose as a bar code. Other than providing a unique identifier for that object, it is able to carry more data, 2,000 bytes, than a bar code or magnetic strip does. There is a commercial interest in using RFID to provide real-time localization. However, efforts to use RFID technology in this way experience localization errors due to noise and multipath effects inherent to these environments. This paper presents the use of both linear Kalman filters and non-linear Unscented Kalman filters to reduce the error rate inherent to real-time RFID localization systems and provide more accurate localization results in indoor environments.

*Article 2. Smart prosthetic hand with object slippage detection, measurement and control:*

More than two million Americans live with a lost limb. With the advancements in technology, the latest prosthetic hands come with electrodes which are invasive in nature and require surgery to place the prosthetic hand in the human arm and replacement of it is difficult. With the advent of newer surface electromyography (sEMG) based prosthetic devices, the problem with invasive procedures are reduced for the potential user. This research proposes a strategy which involves EMG based position control, an independent slippage control working together complementing each other. The proposed design is robust, platform independent and cost effective. In addition, it is tested and validated using real time embedded system consisting of a microcontroller and plant model.

*Article 3. A secure wireless spectrum control, error correction scheme in synchrophasors:*

Synchrophasors (synchronized phasors) are used to measure the electrical quantities from across the power system in real-time. A synchrophasor includes five major components: (i) GPS satellite-synchronized clocks, (ii) phasor measurement units (PMU), (iii) a phasor data concentrator (PDC), (iv) communication equipment, and (v) visualization software. Among the components, the sensors communicate in both wireless and wired network to a centralized system. As studied in many literatures, the internet is vulnerable to many cyber threats. There is an immediate need to find solution on spectrum crunch for communication framework and how to defend against cyber-attacks while sustaining energy delivery function specifically carried by PMUs and PDCs. This paper uses the concept of exploiting antenna directivity by assigning the same frequency to all three directions, and thus co-channel isolation will be increased, and eventually reducing the interference and increasing the channel capacity.

*Article 4. A device centric communication system for 5G networks:*

Fifth Generation (5G) denotes the next generation of mobile telecommunications standards beyond the 4G standards. Other than providing faster speeds, the 5G networks will also provide extra features such as meeting the needs of new use-cases, broadcast-like services, and lifeline communications. This paper presents a novel architecture for a 5G network, which allows mobile device centric communication regardless of the presence of a base station. The major contribution of this paper lies in the proposed system and protocol design of a device-to-device communication system for 5G mobile system. The proposed design has two sub-categories: fully device centric and partially device centric. Additionally, the devices have been designed to communicate independently or with partial dependency on support from the base station. The proposed system has been simulated under various parameters and the simulation results showcased the efficiency and effectiveness of the proposed design.

The EIT conference series began in the year 2000 as a technical forum for researchers and practicing engineers in IEEE Region 4 to gather together, network, and talk about the technical, economic, and sociopolitical challenges facing electrical and computer engineering in the 21<sup>st</sup> century. Over the past fourteen years, EIT has grown to become a truly international event with authors, attendees, and keynote speakers from all over the world. We are pleased that this year the papers and the registered attendees again reflect the international nature that defines modern engineering in the globalized manufacturing era. The editors thank the reviewers and authors for their great help and contributions. Without them, this special issue would not be possible.

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*Wen-Chen Hu received a BE, an ME, an MS, and a PhD, all in Computer Science, from Tamkang University, Taiwan, the National Central University, Taiwan, the University of Iowa, Iowa City, and the University of Florida, Gainesville, in 1984, 1986, 1993, and 1998, respectively. He is currently an associate professor in the Department of Computer Science of the University of North Dakota, Grand Forks. He was an assistant professor in the Department of Computer Science and Software Engineering at the Auburn University, Alabama, for years. He is the Editor-in-Chief of the International Journal of Handheld Computing Research (IJHCR), the general chairs of a number of international conferences such as the 2015 International Conference on Big Data, IoT, and Cloud Computing (BIC 2015), and associate editors of several journals like Journal of Information Technology Research (JITR). In addition, he has acted more than 100 positions as editors and editorial advisory/review board members of international journals/books, and track/session chairs and program committee members of international conferences. He has also won a couple of awards of best papers, best reviewers, and community services. Hu has been teaching more than 10 years at the US universities and over 10 different computer/IT-related courses, and advising/consulting more than 100 graduate students. He has published over 100 articles in refereed journals, conference proceedings, books, and encyclopedias, edited more than 10 books and conference proceedings, and solely authored a book entitled "Internet-enabled handheld devices, computing, and programming: mobile commerce and personal data applications." His current research interests include handheld/mobile/smartphone/tablet computing, location-based services, web-enabled information system such as search engines and web mining, electronic and mobile commerce systems, and web technologies. He is a member of Association of Computing Machinery (ACM).*