

GUEST EDITORIAL PREFACE

Special Issue on National Wireless Research Collaboration Workshop 2015 (NWRCW 2015)

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The National Wireless Research Collaboration Workshop 2015 (NWRCW 2015) was held in Arlington, Virginia, USA on March 13, 2015. It was aimed at open collaboration between research communities and integrated indoor and outdoor test facilities for performing deployable research and experimentation across various spectral bands and applications. This workshop was sponsored by the National Science Foundation in collaboration with the Idaho State University, Florida State University, and George Mason University. It brought together leading researchers from the academia, industry, and government across the nation to:

- Provide a platform for discussing and identifying research that has near-term development and deployment potential,
- Assist understanding cutting edge research solutions for rapid adoption into technology platforms and integration into global standardization efforts,
- Facilitate a unique opportunity for researchers to understand and collaborate, provide reports from May 2014 research symposium, and
- Come up with recommendations to NSF EARS Program regarding future research focus areas and issues as they related to EM spectrum utilization.

This issue includes outstanding papers selected from the Workshop. Regular papers submitted to the Journal are also included. A brief introduction of each of the four articles is given next.

Article 1 - Towards efficient spectrum utilization with polarization-based architectures:

Space-polarization MIMO (multiple-input and multiple-output) architectures are critical for advance efficient spectrum utilization. These architectures have the advantage of leveraging both space and polarization channel correlations, opening the door to diversities and to the effective application of technologies at both the transmit side and the receive side to support spectrum efficiency and sharing. This paper reviews some of works associated with polarization and space-polarization architectures, including (i) channel modeling, sounding, and parameter estimation to assist in the development of frequency-selective parametric models for performance characterizations, (ii) wideband polarimetric signal suppression, (iii) adaptive transmission for interference avoidance, and (iv) linear precoding with adaptive power control for energy-efficient communications in packet erasure channels.

Article 2 - Depth-vision coordinated robust architecture for obstacle detection and haptic feedback:

The 3-dimensional depth sensors have gained much attention in the computer vision and gaming industry. While its performance has been proven successful in the gaming industry, these sensors have not been utilized successfully for assistive devices. Leveraging on this gap, this paper presents the design, implementation, and evaluation of a depth-vision coordinated robust architecture for obstacle detection and haptic feedback system for the blind. The proposed system (i) scans the scene in front, (ii) converts it into depth matrix, (iii) processes the information, to identify obstacles including physical objects and humans, and (iv) provide relevant haptic feedback for navigation of the blind.

Article 3 - A joint power harvesting and communication technology for smartphone centric ubiquitous sensing applications:

Smartphone centric ubiquitous sensing applications use a smartphone with external sensors. However, for many smartphones, the existing technology is not able to harvest enough power to support external sensors. Based on frequency shift keying (FSK) modulation scheme, this research proposes a joint power harvesting and communication technology that can simultaneously harvest power and transfer data with the same earphone channels. Circuit measurements show that, the proposed technology can extract more than two times of power as from one earphone channel. Meanwhile, demodulation tests show that the newly developed timer-based FSK demodulator can reliably recover the data transferred from a smartphone to external sensors without any error.

Article 4 - Health diagnosis by single smartphone:

Mobile health is the practice of medicine and public health supported by mobile handheld devices, e.g., delivery of healthcare information anytime and anywhere, and real-time monitoring patients' vital signs. Mobile health promises to bring the ease and robustness of the thermometer to general health. Casual handling implies non-invasive measurements, where of old the hand is the main instrument to diagnose health. A smartphone or a wearable can "extend" the hand by embedding diagnosing intelligence. This paper discusses the role of neural modeling & matching to create such intelligence for the determination of general health factors. It shows the blood pressure measurement of 90-95% medical accuracy without additional accessories.

Spectrum crunch in the nation is building to a crescendo. Future availability of spectrum for national security endeavors and various applications, such as commercial cellular, electric grid, transportation, medical and advanced manufacturing systems in the nation is at risk. There has been extensive academic and industry research, over the last decade on developing

advanced spectrum—using concepts and architectures. However, deployable, dynamic, secure, spectrum sharing technologies that demonstrate spectrum sharing, co-existence trust, security and a viable economic model is still in its infancy. The NWRCW 2015 provided a forum for researchers from academia, industry, and government to sharing their knowledge of wireless research. The editors thank the reviewers, authors, and sponsoring organizations for their great help and contributions.

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Chengying “Cheryl” Xu is currently an Associate Professor at the Florida State University, Tallahassee, Florida. She received her PhD in 2006 in mechanical engineering from Purdue University, West Lafayette, Indiana, and her M.S. in 2001 in mechanical manufacturing and automation from Beijing University of Aeronautics and Astronautics, Beijing, China. Her research interests include manufacturing of advanced materials, manufacturing process optimization and control, high temperature sensor design. Xu has co-authored a textbook with her doctoral advisor: Intelligent Systems: Modeling, Optimization and Control (CRC Press, 2008, 433 pages), and four book chapters. She has authored and coauthored more than 30 journal papers and around 30 refereed conference proceedings. Xu is the Journal Guest Editor for ASME Transactions, Journal of Micro- and Nano- Manufacturing (ASME JMN), an Associate Editor of the International Journal of Nanomanufacturing (IJNM) from 2008 to 2010, and has been on the Board of Editors for Journal of Aviation and Aerospace Perspectives (JAAP) since 2010, and International Journal of Computational Materials Science and Surface Engineering since 2007. She served on the Conference Organizing Committee for ASME Dynamic Systems and Control Conference (DSCC), International Symposium on Flexible Automation (ISFA), SPIE Conference, Smart Structures/NDE, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems. She won the Office of Naval Research Young Investigator Award and Society of Manufacturing Engineers’ (SME) Richard L. Kegg Outstanding Young Manufacturing Engineer (OYME) Award in 2011. She actively participates in proposal panel review for NSF Control System division, NSF EFRI-SEED program, DOE panel, Hong Kong Research Grants Council, and Hong Kong Innovation and Technology Commission. She is actively in conducting research in manufacturing field and has attracted an impressively high level of research funding (total > \$3.6M, where her share > \$2.5M). She has secured significant support from National Science Foundation (NSF), Department of Energy (DoE), Office of Naval Research (ONR), Florida State, international/national companies, and her university to conduct research. She has graduated five Ph.D. and nine M.S. students. Currently she is supervising one postdoctoral associate, two Ph.D. students, and one undergraduate student.

S. Hossein Mousavinezhad received his PhD in Electrical Engineering from Michigan State University, East Lansing, Michigan. He is currently a professor of the Department of Electrical Engineering Computer Science (EECS), Idaho State University, Pocatello, Idaho. His research interests include digital signal processing, bioelectromagnetics, and communication systems. Mousavinezhad is a recipient of the Institute of Electrical and Electronics Engineers (IEEE) Third Millennium Medal. He received American Society for Engineering Education (ASEE) Electrical and Computer Engineering Division's Meritorious Service Award in June 2007. Professor Mousavinezhad is a program evaluator for the Accreditation Board for Engineering and Technology (ABET).

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 the Association of Computing Machinery (ACM).