

Special Issue on Advances in Wireless Communications and Networks

Guest Editorial

K. M. Iftekharruddin
Old Dominion University
Department of Electrical & Computer Engineering
231 Kaufman Hall Norfolk, Virginia 23529, USA

M. N. Islam
State University of New York, Farmingdale
Department of Security Systems
2350 Broadhollow Road
Farmingdale, New York 11735, USA

M. A. Karim
Old Dominion University
Office of Research
4111 Monarch Way, Suite 203
Norfolk, Virginia 23508, USA

M. A. Salam
Southern University
Department of Computer Science
Baton Rouge, Louisiana 70813, USA

Wireless communication has been growing significantly in recent years with the development of communications systems, network architecture and sensors. Wireless systems will play important role in future internet and information systems. Intense research in wireless systems includes developments in many application areas such as medical, agriculture, and military. This special issue on advances in wireless systems presents research trends and recent developments in the areas of multi-antenna sensing system, radio power optimization, reliable routing protocols, digital filter design, and mobile ad hoc networks.

The special issue invited papers from around the world which prompted a significant number of submissions. In addition, a selected number of authors were invited from the IEEE International Conference on Computer and Information Technology held on December 23-25, 2010 in Dhaka, Bangladesh. We received a total of thirteen submissions which went through rigorous review process by the experts in the field. Seven papers are finally selected for publication to appear in the special issue of the journal. The authors represent academic and/or research institutions from Bangladesh, China, India, Thailand, and United Kingdom.

The first paper deals with the primary user detection in cognitive radio systems. Alghamdi and Ahmed developed an optimum linear combiner multi-antenna based spectrum sensing technique using the multitaper spectrum estimation method. They showed through analyses and simulation that the proposed optimal technique requires a signal-to-noise ratio (SNR) of the order of -12 dB to achieve a probability of detection of 99.99% at a false alarm rate of 1% with additive white Gaussian noise.

Han, Wang, Liu and Zhu investigate the power allocation in coordinated multi-point transmission system with remote radio units power constraints. They developed a modified water-filling power allocation technique in order to obtain the optimum downlink sum capacity with a minimum complexity. Simulation results made it obvious that the proposed method can achieve the near-optimal sum data rate utilizing relatively more transmit power.

An efficient cluster head selection method is proposed in the third paper, which is based on sensor nodes' energy per unit cost. Debroy, Sadi, and Imran showed through experimentation that adoption of certain selection criterion in the proposed method can increase the system lifetime and maximize data communication significantly as compared to similar approaches in the literature.

The fourth paper presents a methodology to improve the performance of orthogonal frequency division multiple access system by employing adaptive resource allocation based on channel state information (CSI). Sivridis, Wang, and Choi minimize the effect of errors from imperfect CSI in fast fading environment and hence optimize the overhead load

and uplink resources used for feedback purpose. Effectiveness of the proposed scheme is demonstrated through simulation in providing a higher overall fairness and system throughput.

Channa and Ahmed propose an efficient routing scheme for post-disaster ad hoc communication networks based on the shortest possible routes with all reliable nodes. The technique detects packet forwarding misbehavior caused by network fault or congestion in an active route and reroutes packets through other reliable route. Theoretical analyses and simulation results verify the significant performance improvement in terms of packet delivery ratio and delay in the presence of network fault with a reasonable increase in routing overhead.

The impact of weighting factor and crossover probability on the design of low pass finite-duration impulse response digital filter as well as on the convergence behavior of the differential evolution (DE) technique is investigated by Chattopadhyay, Sanyal and Chandra in the fifth paper. The DE-optimized filter is then incorporated in a quadrature phase shift keying (QPSK) modulated system for pulse shaping purpose. Performance of the QPSK system is quantified in terms of bit error rate in order to obtain the optimized control parameters for the filter design.

The final paper proposes an adaptive receiver power routing protocol for mobile ad hoc wireless network. Bello, Bakalis, Rapajic, Anang and Eneh investigate the impact of environment and signal path loss on the quality of service and throughput performance. Analytical and simulation results show that the proposed protocol increases the throughput by 62% as compared to conventional dynamic source routing protocol. The average received power for individual nodes is claimed to 1×10^{10} watt compared to 5×10^2 watt in conventional model.

The guest editors would like to express their sincere gratitude to the reviewers, who have finished their reviews in the shortest possible time and dedicated their precious time to ensure the quality of this special issue. Finally, the guest editors would extend their sincere appreciation to the Associate Editor-in-Chief, Dr. Haohong Wang for providing them with this opportunity and facilitating preparation of an excellent journal special issue.



Khan Mohammad Iftekharuddin is a Professor in the department of Electrical and Computer Engineering at the Old Dominion University (ODU). He directs the Vision lab at ODU. Prior to joining ODU, he was in the Electrical and Computer Engineering department at University of Memphis (UoM). He was also an associated faculty in the Institute for Intelligent Systems at U of M. Further, he held a joint appointment with the joint graduate program in biomedical engineering at the U of M and University of Tennessee at Memphis. Prior to U of M, he was on the faculty of the departments of Computer Science and Electrical & Computer Engineering at North Dakota State University. His research interests include biomedical image analysis, sensor signal acquisition and modeling, digital, optical and multimedia signal and image processing, optical computing and interconnection, applications of artificial-neural inference techniques, automatic target recognition (ATR) and biologically inspired ATR. Dr. Iftekharuddin is the author of five book chapters and more than hundred refereed

journal papers and conference proceedings. He is an associate editor for *Optical Engineering*, *International Journal of Imaging, Open Cybernetics and Systemic Journal* and *International Journal of Tomography and Statistics*. He has served as guest editor for seven journal special issues. He is an elected fellow of SPIE, a senior member of IEEE, a member of IEEE CS and OSA. He obtained his B.Sc. degree from Bangladesh Institute of Technology in 1989. He received an M.S. and a Ph.D. both in electrical engineering from the University of Dayton in 1991 and 1995, respectively.



Mohammed Nazrul Islam is an Assistant Professor in the Department of Security Systems at the State University of New York at Farmingdale. He received his BS and MS in Electrical and Electronic Engineering from Bangladesh University of Engineering and Technology in 1991 and 1994, respectively, and his PhD from Muroran Institute of Technology, Japan in 1999. Prior to joining Farmingdale, he worked as a Research Scientist and Adjunct Assistant Professor at Old Dominion University. He also served respectively as an Associate Professor at Bangladesh University of Engineering and Technology, as a Postdoctoral Research Fellow at the University of South Alabama and as a Visiting Assistant Professor at the University of West Florida. He authored and co-authored more than 110 publications in refereed journals and conference proceedings. His research interests include optical communication, wireless

communication, digital image processing and solid state devices. He is a Senior Member of IEEE and a Member of SPIE.



Mohammad Ataul Karim is Vice President for Research of Old Dominion University in Norfolk, Virginia. Previously, he served as dean of engineering at the City University of New York. His research areas include information processing, pattern recognition, computing, displays, and electro-optical devices and systems. Dr. Karim is author of 18 books, 7 book chapters, and over 360 articles. He is North American Editor of *Optics & Laser Technology* and an Associate Editor of the *IEEE Transactions on Education*. He has served as guest editor for over 25 journal special issues. Professor Karim is an elected fellow of the Institution of Electrical and Electronics Engineers (IEEE), Optical Society of America (OSA), Society of Photo-Instrumentation Engineers (SPIE), the Institute of Physics (InstP), the Institution of Engineering & Technology (IET), and Bangladesh Academy of Sciences. He received his BS in physics in 1976 from the University of Dacca, Bangladesh, and MS degrees in both physics and electrical engineering, and a Ph.D. in electrical engineering from the University of Alabama respectively in 1978, 1979, and 1981.



Mohammad Abdus Salam is an Associate Professor in the Department of Computer Science at Southern University, Baton Rouge, Louisiana. He received his BS degree in Electrical and Electronics Engineering from Bangladesh Institute of Technology, Rajshahi in 1991 and MS and Ph.D. degrees from Fukui University, Japan, respectively in 1998 and 2001. Prior to 2005, he worked as an adjunct faculty member of Mathematics and Computer Science at the City University of New York at York College, and as a postdoctoral fellow in the Department of Electrical and Computer Engineering at the University of South Alabama, Mobile, Alabama. He is a member of IEEE, IEICE (Japan), and AIAA. His research interests include wireless communication, error-control coding, and sensor networks.