

Special Issue: Selected Best Papers of Innovations in Information Technology Conference 2006 (IIT2006)

Editorial

Information technology has touched every term of our lives covering all aspects. IIT 2006 aimed at bridging the digital gap by providing exciting technical and educational programs, tutorials, exhibits, demonstrations and many other activities to explore and learn about the latest frontiers in Information Technology. Sponsored by IEEE Communication Society, Innovations 2006 provided a rigorous technical paper program on a wide range of IT fields categorized in the following areas: Information & Communication Technology Infrastructure; Web Technologies, Applications & Service; E-Business, E-Governance & Information System and Socio-Economic Implications of ICTs.

Out of more than 300 papers submitted to IIT 2006 conference, we have chosen 9 outstanding papers to be published in this special issue. All of these papers have been reviewed a second time and were recommended to contain 30% more new material to be accepted and published in this Special Issue.

In the first paper, by A. Lakas and M. Boulmalf, an experimental analysis of VoIP over wireless LANs is discussed. They propose to study and measure the effect of the handover for both intra and inter-mobility for VoIP traffic. Then, E. Barka *et. al.*, investigate the impact of security on the performance of WLAN. More specifically, they analyze the impact of different implementations of encryption techniques used by two security protocols, namely Wired Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA) on the throughput over WLAN IEEE 802.11g. The results show that within the same access point range, the security adds moderate degradation on the throughput that may affect some applications over both infrastructure and ad-hoc WLANs. Next, O. Salazar *et. al.* study roaming in heterogeneous multi-operator wireless networks. They present a SIP-based roaming architecture to enable service mobility in heterogeneous multi-operator wireless networks. The objective is to establish mutual trust between cellular network operators and unlicensed wireless networks through an efficient SLA monitoring and enforcement and brokerbased access control.

Wireless LAN standard (Wi-Fi) and the WPAN standard (Bluetooth and Zigbee) products utilize the same unlicensed 2.4 GHz ISM band. Co-existence between such wireless technologies within the same frequency spectrum is crucial to ensure that each wireless technology maintains and provides its desired performance requirements. K. Shuaib *et. al.* provide a brief description of the newly introduced Zigbee standards including the Physical (PHY) and medium access control (MAC) layers. It focuses on developing MatLab/Simulink models for the Zigbee protocol and the performance evaluation of these models. The main contribution of the next paper, by I. Salehy *et. al.* is to propose a general framework for fault tolerance in wireless sensor networks (WSNs). The proposed framework can be used to guide the design and development of FT solutions and to evaluate existing ones. They present a comparative study of the existing schemes and identify potential enhancements.

In the next paper, F. Aloul *et. al.* propose a new approach to solve the shortest path problem using advanced Boolean satisfiability (SAT) techniques. SAT has been the focus of researchers in the last few years. SAT solvers use intelligent search algorithms that can traverse the search space and efficiently prune parts that contain no solutions. These solvers have recently been used to solve many problems in Engineering and Computer Science. In this paper, the authors show how to formulate the shortest path problem in non-optical networks as a SAT problem. They also show how to use SAT in finding routing and wavelength assignments in optical networks. This approach is verified on various network topologies.

Divisible loads are those workloads that can be partitioned by a scheduler into any arbitrary chunks. The problem of scheduling divisible loads has been defined for a long time. But, almost all proposed approaches attempt to perform scheduling in dedicated environments such as LANs, whereas scheduling in non-dedicated environments such as Grids remains an open problem. In the next paper, the authors first introduce a computation model that explains the impact of local (internal) tasks and Grid (external) tasks that arrive at a given worker. This model helps estimate the available computing power of a worker under the fluctuation of the number of local and Grid applications. Based on this model, they propose the CPU power prediction strategy. Then, they build a new dynamic scheduling algorithm by incorporating the prediction strategy into a static scheduling algorithm.

Finally, we chose two application papers: one on wireless biomedical system and the other on practical design of a smart antenna system. The former, by T. Landolsi *et. al.* proposes a wireless stand-alone, embedded system design that integrates the monitoring of three biomedical parameters into a single personal medical device. The goal is to build a compact and cost-effective device capable of monitoring several medical parameters while patients conduct their normal daily activities. A communication protocol and patient monitoring software application are developed to store data that can be later downloaded to a physician's workstation for analysis and diagnosis. The latter by R. M. Shubair *et. al.* presents a practical design of a smart antenna system based on direction-of-arrival (DOA) estimation and adaptive beamforming. DOA estimation is based on the MUSIC algorithm to identify the directions of the source signals incident on the sensor array comprising the smart antenna system. Adaptive beamforming is achieved using the LMS algorithm for directing the main beam towards the desired source signals and generating deep nulls in the directions of interfering

signals. The smart antenna system designed involves a hardware part which provides real data measurements of the incident signals received by the sensor array. Results obtained verify the improved performance of the smart antenna system when the practical measurements of the signal environment surrounding the sensor array are used.

We hope that the readers of this Special Issue enjoy reading and finding it useful in their future research. We first would like to thank the authors who worked hard to add substantial materials to the conference versions. Also, we would like to thank the Editor In Chief, George J. Sun for his patience throughout this process.

Guest Editors:

Yacine Atif, UAE University, United Arab Emirates

Mohsen Guizani, Western Michigan University, USA



Yacine Atif received the PhD degree in Computer Science from Hong Kong University of Science and Technology (HKUST) in 1996. After graduation, he worked at Purdue University in the USA as a Post-Doc and then joined a faculty position at Nanyang Technological University (NTU) in Singapore. Since 1999 he is with the UAE University as faculty, then Program Chair at the College of Information Technology.

Dr. Atif has made a number of research contributions particularly in the area of Internet Computing and Multimedia Communication. His teaching, scholarship and academic excellence have been acknowledged by several awards including Best Teaching Award, Best Funded Project Award in the area of Electronic Transfer of Educational Media and Resources, and Excellence in Academic Services Award from the UAE University. He is also involved in the Technical Programs of several research forums such as Program Co-

Chair for *WCNC 2007* (Wireless Communications and Networks Conference) and *Innovations 2006* (Innovations in Information Technology).



Mohsen Guizani is currently a Full Professor and the Chair of the Computer Science Department at Western Michigan University. He served as the Chair of the Computer Science Department at the University of West Florida from 1999 to 2003. He was an Associate Professor of Electrical and Computer Engineering and the director of graduate studies at the University of Missouri Columbia from 1997 to 1999. Prior to joining the University of Missouri, he was a Research Fellow at the University of Colorado Boulder. From 1989 to 1996, he held academic positions at the Computer Engineering Department at the University of Petroleum and Minerals, Dhahran, Saudi Arabia. He was also a Visiting Professor in the Electrical and Computer Engineering Department at Syracuse University, Syracuse, New York during academic year 1988-1989. He received his B.S. (with distinction) and M.S. degrees in Electrical Engineering; M.S. and Ph.D. degrees in Computer Engineering in 1984, 1986, 1987, and 1990,

respectively, all from Syracuse University, Syracuse, New York.

His research interests include Wireless Communications and Computing, Computer Networks, Design and Analysis of Computer Systems, and Optical Networking. He served/erving on the editorial boards of more than 20 journals, such as the IEEE Transaction on Wireless Communications (TWireless), IEEE Transaction on Vehicular Technology (TVT), IEEE Communications Magazine, and the Journal of Parallel and Distributed Systems and Networks. He served as a guest editor in the IEEE Communication Magazine, IEEE Journal on Selected Areas in Communications, IEEE Network Magazine, Journal of Communications and Networks, and few others. Dr. Guizani is the founder and Editor-In-Chief of "Wireless Communications and Mobile Computing," Journal published by John Wiley (<http://www.interscience.wiley.com/jpages/1530-8669/>). He is also the Founder and General Chair of the two International Conferences: International Wireless Conference on Wireless Communications and Mobile Computing (ACM IWCMC 2006) and Wireless Networks, Communications, and Mobile Computing (IEEE WirelessCom 2005). He is the author/co-author of six books and about 180 articles in refereed journals and conferences in the areas of wireless networking and communications, mobile computing, optical networking and network security. He served as a Keynote Speaker for many international conferences as well as presented a number of Tutorials and Workshops. He served as the General Chair for the *Parallel and Distributed Computer Systems* (PDCS 2002), *IEEE Vehicular Technology Conference 2003* (VTC'03), *PDCS 2003*, *IEEE WirelessCom 2005*, *ACS/IEEE AICCSA 2006*, and *IEEE IWCMC 2006*. He also served as the program and Symposia chair for a number of conferences and Symposia in the IEEE Globecom and IEEE ICC.

Dr. Guizani is the Chair of the IEEE Communications Society Technical Committee on Transmissions, Access, and Optical Systems (IEEE TAOS), the Secretary of the IEEE Communications Society of Personal Communications (IEEE TCPC), and a member of other IEEE ComSoc Technical Committees. Dr. Guizani was the IEEE Computer Society Distinguished National Speaker from 2003 to 2005. He is also ABET Accreditation Evaluator for Computer Science and Information Technology Programs.

He received both the Best Teaching Award and the Excellence in Research Award from the University of Missouri-Columbia in 1999 (a college wide competition). He won the best Research Award from KFUPM in 1995 (a university wide competition). He was selected as the Best Teaching Assistant for two consecutive years at Syracuse University, 1988 and 1989. Dr. Guizani is a senior member of IEEE, member of IEEE Communication Society, IEEE Computer Society, ASEE, and ACM. For more details, please visit: <http://www.cs.wmich.edu/~mguizani/>