Guest Editorial Preface

Special Issue on Current Trends of Global ICT Education, Design, and Research Challenges in IoT and Wireless Networks

Surjit Singh, Department of Computer Engineering, National Institute of Technology, Kurukshetra, India
Rajeev Mohan Sharma, Department of Computer Engineering, National Institute of Technology, Kurukshetra, India

INTRODUCTION

Recent major development in wireless networks has facilitated a dramatic growth of new technical implementations, such as the Internet of Things (IoT), cloud computing, big data, fog computing, pervasive computing, and social cyber-physical systems. Enabling a smart life has become a popular research topic with an urgent demand from consumers. Smart cities, smart homes, security, patient monitoring systems, healthcare, agriculture, GSM technology, and robotics are among the popular and major research areas which significantly affect the IT industry.

In the IoT, sensor based devices now communicate with computing platforms such as Fog and Cloud Computing platforms for processing raw sensor data to take wise and smart actions (Atzori, 2010) and (Gubbi, 2013). The distinct feature of IoT which differentiates it from its precursor technologies, is the use of a middleware to support processing and long-term analysis of sensor big data stream to take wise actions. The IoT middleware (computing infrastructure to enable IoT data storage, processing and analysis) can be cloud based (Gubbiet al., 2013) or fog computing based (Bonomi et al., 2012; Dastjerdi et al., 2016). WSN is a key enabling technology for IoT (Singh & Sharma, 2016; Singh et al., 2016; Singh & Sharma, 2017a; Singh & Sharma, 2017b).

The concept of Smart home aptly justifies the popular thought by (Weiser, 1999) about technology becoming an integral and indistinguishable part of everyday life. Making everyday life easier with the help of technology dates back with notable works in embedded electronics such as washing machines, ovens and dishwashers. This was followed by innovations in wireless sensor networks (WSN) including senor based things such as taps and doors, which are now being endowed by the upcoming technology of the Internet of Things (IoT).

In addition to the IoT, smart home has been discussed widely in literature in the field of ubiquitous computing, particularly in the field of context-aware computing. Researchers applied context-aware computing approaches to realize smart home scenario in order to understand the user context and learn user habits for providing personalized smart home services.

Cloud security is also one of the major research areas today. Network traffic contains many bots, worms, and even planned attacks for certain purpose. Each will contribute to increasing the number of cybercrimes. In order to protect our organizations, security tools for monitoring purposes and prediction of possible harms should be deployed at the organizational level.

IDS (Intrusion Detection Systems) technologies are designed to monitor network traffic, operating systems logs, and/or application programs for signs of intrusions. Thus, developing more sophisticated and specialized sensors to be deployed at sensitive locations as supplemental systemsis recommended. In general, a variety of means and mediums of delivering and receiving data and information, using the Internet, will enable gathering forensic evidence. However, finding clear and direct evidence for cybercrimes is critical, because of the huge amount of data on the network and the complexity of analyzing such data. In fact, due to the extreme increase in the volume of network data packets and the volume of data and information captured, large amount of storage will be wasted, regardless of the accuracy of the possible evidence (Saari & Jantan, 2011; Saari & Jantan, 2013).

The collaboration of telecommunication techniques with healthcare directs a way towards "e-Health" (Salman, Sabrin, Aymanur, Sayeda, & Saniat, 2015). This is established with the help of Wireless Sensor Network (WSN). The inclusion of WSN with the healthcare industry is definitely considered a boon which results in smart and diverse practices for monitoring one's health. A telemedicine system with sensors and GSM technology is required to design. The sensors are able, for example, to record the temperature and the pulse rate of a person. For immediate help, the output of the sensors is transmitted to the doctor's phone through a GSM module.

There are various applications where Wireless Sensor Networks can be useful like Climate Monitoring, security monitoring and many more. For example, agriculture is the biggest component of the Gross Domestic Product (GDP) of the Indian economy. Garden as well as agriculture requires a large amount of water for better crop yields. Several factors affect the growth of a crop including irrigation, fertilization and field monitoring. The most important factor in irrigation is water which is an important natural resource. The development of a system that focuses on utilizing available ground water is an effective way to utilize this valuable asset.

As another example, recently multi-robots have experienced increased attention because of their performance compared to a single robot. Cooperation and coordination between the different members tend to improve their performance. Many applications use the multi-robot: rescuing survivors during natural disasters, surveillance in several environments and monitoring in areas contaminated by nuclear or chemical waste, are all examples.

AIM AND SCOPE OF CONFERENCE

The First International Conference on Smart Technologies in Computer and Communication (SmartTech-2017) has focused on both smart computing and communications fields and aims to collect recent academic work to improve the research and practical applications.

Information Technology today has evolved into a rapidly changing and dynamic science. The pace of change has become blisteringly fast. Timelines have shrunk drastically for technology from being termed cutting edge to becoming obsolete. There is technology in everything and everywhere. Information Technology has a profound influence on all branches of science and engineering. This conference included oral or poster presentation of research papers grouped into parallel tracks. The Smart Technologies, proclaimed as the smart of everything, is the system of physical articles or "things" implanted with gadgets, programming, sensors, and availability to empower items to gather and trade data. Smart Technology is anticipated to create massive amounts of information from different areas that is accumulated rapidly, thereby expanding the need to better record, store and process such data.

The scope of SmartTech-2017 covered a broad extent, from smart data to smart communications, from smart cloud computing to smart security. The conference has gathered high-quality research/industrial papers related to smart computing and communications and targets at proposing a reference guideline for further research. The conference has not only taken stock of trends and developments

of the globally competitive environment, but has been also provided future directions to young researchers and practitioners. The conference was of immense benefit to Management, Researchers, Academicians, Industry and participants from Technical Institutes, R & D Organizations and students working in the field of smart technologies.

LIST OF PUBLICATIONS

This special issue contains a total of five papers, four papers as listed below from the International Conference on Smart Technologies in Computer and Communication (SmartTech-2017) that was organized in Jaipur (Rajasthan), India duringMarch27-29, 2017 and one paper that was an external submission:

1. **Paper Title:** Enablement of IoT based Context-Aware Smart Home with Fog Computing
   Author1: Maggi Bansal, Thapar University, Punjab, India
   Author2: Inderveer Chana, Thapar University, Punjab, India
   Author3: Siobhan Clarke, Trinity College, Dublin
2. **Paper Title:** On Cloud Data Transaction Security Using Encryption and Intrusion Detection
   Author1: Mahmoud Jazzar, Royal University for Women, Bahrain
3. **Paper Title:** Design and Development of Real Time Patient Monitoring System with GSM Technology
   Author1: Sindhu Suryanarayanan, Amrita Vishwa Vidyapeetham, Bengaluru
   Author2: Sreekala Manmadhan, Amrita Vishwa Vidyapeetham, Bengaluru
   Author3: N Rakesh, Amrita Vishwa Vidyapeetham, Bengaluru
4. **Paper Title:** Case Study on WSN Based Smart Home Garden with Priority Driven Approach
   Author1: Santosh R Durugkar, Amity University
   Author2: Ramesh C. Poonia, Amity University
   Author3: Radhakrishna B Naik, MIT COE, Maharashtra
5. **Paper Title:** New Approach to Optimize Cooperation Mobile Robots for Ideal Coverage with an Architecture Designed with Multi-Agent Systems: Designed with Multiagent Systems
   Author1: Mami Mohammed Amine, University of Oran1 Ahmed Ben Bella, Algeria
   Author2: Khelfi Mohamed Fayçal, University of Oran1 Ahmed Ben Bella, Algeria
   Author3: Dr. Zineb Laouici, University of Blida, Algeria
   Author4: Benyettou Noria, USTOMB Oran, Algeria

The conference received tremendous response with 803 papers in total from national as well as international level i.e. authors of 23 countries and 14 foreign universities. Due to a high rejection rate and maintaining high quality of the publication only 36.73% papers were accepted i.e. only 295 articles were accepted and 508 were rejected. And, a total of 266 papers were presented during the conference. Out of those, only 1.5% papers have been selected for publication with this special issue due to very tough and blind peer-review process of the JCIT journal.

We are delighted that due to the hard work of the editorial board and reviewers in refereeing the papers submitted, we maintained a high standard of quality of papers. We are highly obliged by them and would like express our sincere thanks to the Editor-in-Chief of JCIT, who has given us opportunity to publish this special issue and to the organizing secretary and scientific committee members of the conference.

This special issue is a small step towards understanding the trends in smart technologies and global ICT education. We will not stop here but will continue our association for publishing special issues on global ICT education on current research trends in the coming years.

ACKNOWLEDGMENT

The guest editors would like to take this opportunity to thank authors who have contributed to this special issue. We would also like to acknowledge the help provided by the Editor-in-Chief Dr. Andy Borchers of the *Journal of Cases on Information Technology* for his kind support during this process.

Surjit Singh
Rajeev Mohan Sharma
Guest Editors
JCIT

REFERENCES

Ahmed, S., Millat, S., Rahman, M. A., Alam, S. N., & Zishan, M. S. R. (2015). Wireless health monitoring systems for patients. In *Proceedings of the International WIE Conference on Electrical and Computer Engineering* (pp. 164-167).

Atzori, L., Iera, A., & Morabito, G. (2010). The Internet of Things: A survey. *Computer Networks*, *54*(15), 2787–2805. doi:10.1016/j.comnet.2010.05.010

Bonomi, F., Milito, R., Zhu, J., & Addepalli, S. (2012). Fog computing and its role in the internet of things. In *Proceedings of the first edition of the MCC workshop on Mobile cloud computing - MCC '12*. doi:10.1145/2342509.2342513

Dastjerdi, A. V., & Buyya, R. (2016). Fog Computing: Helping the Internet of Things Realize Its Potential. *Computer*, *49*(8), 112–116. doi:10.1109/MC.2016.245

Gubbi, J., Buyya, R., Marusic, S., & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems*, *29*(7), 1645–1660. doi:10.1016/j.future.2013.01.010

Saari, E., & Jantan, A. (2011). F-IDS: A technique for simplifying evidence collection in network forensics. In J. M. Zain et al et al. (Eds.), *ICSECS 2011, Part III, CCIS 181* (pp. 693–701). Springer-Verlag Berlin Heidelberg. doi:10.1007/978-3-642-22203-0_58

Saari, E., & Jantan, A. (2013). E-cyborg: The cybercrime evidence finder. In *Proceedings of the 2013 8th International Conference on Information Technology in Asia (CITA)*. doi:10.1109/cita.2013.6637579

Singh, S., & Sharma, R. M. (2016, March). Optimization Techniques in Wireless Sensor Networks. In *Proceedings of the Second International Conference on Information and Communication Technology for Competitive Strategies* (p. 140). ACM.

Singh, S., & Sharma, R. M. (2017). Localization System Optimization in Wireless Sensor Networks (LSO-WSN). In Handbook of Research on Wireless Sensor Network Trends, Technologies, and Applications. Hershey, PA: IGI Global.

Singh, S., & Sharma, R. M. (2017). HSCA: a novel harmony search based efficient clustering in heterogeneous WSNs. *Telecommun Syst.* Springer. Retrieved from https://doi.org/10.1007/s11235-017-0365-5

Singh, S., Sharma, R. M., & Kumar, P. (2016). WSNs and PDNs: Similarities, Challenges and Application of Computational Intelligence. *International Journal of Control Theory and Applications*, *9*(41), 489–497.

Weiser, M. (1999). The Computer for the Twenty-First Century. *Mobile Computing and Communications Review*, *3*(3), 3–11. doi:10.1145/329124.329126

Surjit Singh is currently a faculty member with the Department of Computer Engineering at National Institute of Technology, Kurukshetra, Haryana, India. He has several years of experience in teaching and research. He is pursuing Ph.D. in Computer Engineering from NIT Kurukshetra. He has received B.Tech. degree with Honors in Computer Engineering from Kurukshetra University in 2008, and completed his M.Tech. degree with Distinction in Computer Science in 2012. He holds State Rank during his diploma course in engineering. He has authored many publications with reputed publishers including ACM, IET, IEEE, Springer, Elsevier, Pearson and IGI Global. He has authored a Book entitled "Computer Systems and Programming in C" with publisher Pearson Education and one Book Chapter with IGI Global, USA. Also, he is editing a book "Handbook on Power and Energy System Optimization" and serving as a member of the Editorial Advisory Board of Advances in Educational Technologies & Instructional Design (AETID) Book Series, IGI Global USA. He is also serving as reviewer and or technical committee member for IEEE, Elsevier and other international conferences including SmartTech-2017, IEEE ICIC 2015. He is member of the International Advisory Board of WoS/Scopus indexed journals including, International Journal of Wireless Networks and Broadband Technologies (IJWNBT), International Journal of Information and Communication Technology Education (IJICTE), Journal of Cases on Information Technology (JCIT), and Reviewer of several journals in the publication house of Inderscience and IGI Global, listed in WoS/Scopus indexed databases. His areas of current interests are Advanced Computer Networks, WSNs, Computational Intelligence in Optimization, and Internet of Things.

R.M. Sharma is Associate Professor in the Department of Computer Engineering at National Institute of Technology, Kurukshetra, India. He is working with NIT Kurukshetra since 1991 and having 26 years of teaching experience in the same institute. He completed his Ph.D. in the area of Computer Networks from NIT, Kurukshetra. He received B.Tech. degree from HBTI (now H.B. Technological University), Kanpur, India from Department of Computer Science and Engineering in 1990, and completed his M.Tech. Degree from Regional Engineering College (REC) Kurukshetra (now NIT Kurukshetra) in 1998 from the Department of Computer Engineering. He is Guest Editor for the Special Issue of "Journal of Cases on Information Technology (JCIT)" which is listed in WoS/Scopus indexed journal of IGI Global USA. He is also serving as reviewer and member of Technical Program Committee for different reputed International Conferences and Journals. He has published many research publications with reputed publishers including ACM, IEEE, Elsevier, Springer and IGI Global etc. He has authored one book chapter also with international publisher IGI Global, USA. His areas of current interests are MANETs, WSNs, Computational Intelligence, and Cloud Computing.