Guest Editorial Preface

Special Issue on 2017 IEEE International Conference on Electro/Information Technology (EIT 2017): Part I

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The 2017 International Electro/Information Technology Conference (EIT 2017) was hosted by the University of Nebraska–Lincoln on May 14-17, 2017. The Conference brought together internationally renowned scholars, researchers, technologists, and practitioners to present their latest research, technology, and practices in all areas of information technology related to communication, power and energy, computers, signal processing, health sciences, and STEM education, including theory, methodology, hardware, software, applications, processing, and security. One of the themes of the EIT 2017 is handheld/mobile computing. This special issue includes outstanding papers selected from the Conference. A brief introduction of each of the four articles is given next.

Article 1. An Efficient Incentive Mechanism for Cloud-Based Mobile Sensor Network: A mobile sensor network (MSN) has mobile, instead of static, sensor nodes of a wireless sensor network (WSN). Often, a mobile sensor node consists of a radio transceiver, a microcontroller, and some sensors for detecting physical stimuli like motion, light, sound, temperature, etc. Besides, cloud computing is the remote use or access of the storage or software on the Internet from a computer to perform various operations. The storage and software could be a shared pool of configurable computing resources such as networks, servers, storage, applications, and services. By using cloud computing, the resources can be improved, updated fast and conveniently, and the end-user operations would not be disrupted by the change. This paper presents a novel cloud-based MSN model. Three parties are considered, including data request party, cloud-based platform, and sensing users. A data quality model is proposed to measure the credit level of sensing users. In addition, with consideration of social connections of sensing users, a sensing user recruitment strategy is presented. Sensing users are divided into first and second degrees. The utility functions of first degree sensing users and cloud-based platform are presented, respectively. At last, an efficient incentive mechanism is proposed by formulating a Stackelberg game. The simulation results illustrate that the proposed IM ensures data quality and recruits sensing users more efficiently.

Article 2. A Distributed Least-Squares Algorithm in Wireless Sensor Networks with Unknown and Limited Communications: The method of least squares is a standard approach in regression analysis, a set of statistical processes for estimating the relationships among variables. The method finds the overall solution minimizing the sum of the squares of the residuals from every single equation in a set of equations, where there are more equations than unknowns. This paper proposes a new distributed least-squares algorithm to address the sensor fusion problem in using wireless sensor networks (WSN) to monitor the behaviors of large-scale multi-agent systems. Under a mild assumption on network observability, that is, each sensor can take the measurements of a limited number of agents

but the complete multi-agent systems are covered under the union of all sensors in the network, the proposed algorithm achieves the estimation consensus if local information exchange can be performed among sensors in the sense that the graph induced by communication topology is strongly connected. The proposed distributed least-squares algorithm can handle the directed communication network by explicitly estimating the left eigenvector corresponding to the largest eigenvalue of the sensing/communication matrix. The convergence of the proposed algorithm is analyzed, and simulation results are provided to further illustrate its effectiveness.

Article 3. WSN Lifetime and Reliability Analysis from the Death Criterion Perspective: A wireless sensor network (WSN) performs the following two steps: (i) spatially distributed autonomous sensor nodes are used to collect to physical conditions, such as temperature and humidity, and (ii) the collected data is passed through the network to a server. This paper assesses the impact of the death criterion on the network lifetime and reliability. The authors relate how the data from the different sensors are aggregated to the death criterion. Additionally, they study the impact of the number of sensing cycles per network master on the network lifetime and energy efficiency for the different considered death criteria. The effect of the network master selection process on the energy efficiency is also examined. Finally, the authors analytically evaluate the impact of the death criterion on the reliability of the WSN.

Article 4. A Study of Recursive Techniques for Robust Identification of Time-Varying Electrical Equivalent Circuit Models of Li-Ion Batteries: Lithium-ion batteries are replaceable, rechargeable batteries that are the batteries most commonly used by handheld devices these days. They generate electricity via electrochemical reactions. This paper presents results of a comparative study of recursive techniques for robust identification of time-varying electrical equivalent circuit models of lithium-ion batteries. Two such methods are studied here, a direct continuous time system identification method and an indirect discrete time technique. The results of this study indicate that although both methods work equally well for identification of time-invariant circuit models from clean voltage-current data, the direct continuous time method outperforms indirect discrete time technique for identification of time-varying circuit models. Similar conclusions can also be drawn for identification of equivalent circuit models in the presence of noise and/or unmodeled dynamics.

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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. Dr. 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.