Mobile Netw Appl (2014) 19:360–362
DOI 10.1007/s11036-014-0515-x

Editorial for Special Issue on "Challenges Pervasive Network and Applications for Internet of Things"

Kyu Won Choi · Haiqing Nan

Published online: 18 June 2014

Editorial:

This special issue features seven selected papers with high quality.

The first article, "Mobile target positioning using refining distance measurements with inaccurate anchor nodes in chain-type wireless sensor networks" by Chengming Luo, Wei Li, Hai Yang, Mengbao Fan and Xuefeng Yang,

As a class of long and narrow structures widely exist such as the river, road, mine tunnel, pipe, chain-type wireless sensor networks (CWSN) can be applied to monitor these environments. The accurate position estimation is a key technology for the mobile target in CWSN. This paper proposes an innovative positioning method to estimate the position of mobile target. Firstly, wireless signals can be affected by measurement noises, coordinate errors of anchor nodes, and chain scene structure. Kernel canonical correlation analysis is applied to analyze the correlation coefficients of these nonlinear wireless signal sets. Secondly, we search out two maximum correlative sets of wireless signals and integrate them into a set of optimal wireless signals. Thirdly, the uncertainty coordinate of anchor node is modeled and the position of mobile target is estimated under measurement and geometry constraints. Furthermore, we simulate the proposed method for mobile target, in comparison with the weighted least squares (WLS) and CHAN methods. Estimation results indicate that the proposed method can refine distance measurement accuracy and perform better positioning performance than WLS and CHAN methods, when we vary the conditions of TDOA/AOA measurement errors, anchor nodes coordinate errors, and anchor nodes spacing distance. Finally, the actual positioning experiments are implemented in a corridor, which show that the practical estimation results are similar to the simulation results.

The second article, "Physical Memory Collection and Analysis in Smart Grid Embedded System" from Seokjun Lee and Taeshik Shon,

Unlike the existing electric grid, the smart grid has a variety of functions that enable electric utility suppliers and consumers to perform dual exchanges of real-time information by adding IT technology. Therefore, the systems of smart grid suppliers and those of users are always connected through a network, which means that the systems related to the smart grid could become targets of malicious attackers. The various smart grid systems could have different hardware configuration from those of general systems, but their fundamental operating mechanism is the same as that of the general computer system. When a system is operating, its information and the data used by a program are loaded into the system's memory. In this paper, we studied the method of physical memory collection and analysis in smart grid embedded systems in order to help investigate crimes related to smart grid s. In addition, we verify the method studied in this paper through the collection and analysis of physical memory in the virtual Linux environment using a virtual machine.

The third, "Behavior and Capability based Access Control Model for Personalized TeleHealthCare Assistance" by Meriem Zerkouk, Paulo Cavalcante, Abdallah Mhamed, Jerome Boudy, Belhadri Messabih,

With the growing proportion of dependant people (ageing, disabled users), Tele-assistance and Tele-monitoring platforms will play a significant role to deliver an efficient and less-costly remote care in their assistive living environments. Sensor based technology would greatly contribute to get valuable information which should help to provide personalized access to the services available within their living spaces. However, current access control models remain unsuitable due to the lack of completeness, flexibility and adaptability to the user profile. In this paper, we propose a new access control model based on

K. W. Choi (✉)
Georgia Institute of Technology, Atlanta, GA, USA
e-mail: kchoi.jopt@gmail.com

H. Nan
Illinois Institute of Technology, Chicago, IL, USA

the user capabilities and behavior. This model is evaluated using the data sensed from our tele-monitoring platform in order to assist automatically the dependent people according to the occurred situation. The design of our model is a dynamic ontology and evolving security policy according to the access rules that are used in the inference engine to provide the right service according to the user's needs. Our security policy reacts according to the detected distress situation derived from the data combination of both the wearable devices and the pervasive sensors. The security policy is managed through the classification and reasoning process. Our classification process aims to extract the behavior patterns which are obtained by mining the data set issued from our Tele-monitoring platform according to the discriminating attributes: fall, posture, movement, time, user presence, pulse and emergency call. Our reasoning process aims to explore the recognized context and the extracted behavior patterns which set up the rule engine to infer the right decision security policy.

The fourth article, "Toward Advanced Mobile Cloud Computing for the Internet of Things : Current Issues and Future Direction" by Taeshik Shon, Jaeik Cho, Kyusunk Han and Hyohyun Choi,

Cloud computing is the future of information processing and has proved its benefits in high scalability and functional diversity. However, almost all cloud-computing architectures including SaaS, PaaS, and IaaS are vulnerable to serious security issues. Similarly, Mobile Cloud Computing (MCC) is vital to overcoming mobile limited storage and computing capabilities. MCC authentication and authorization issues must be provided on two levels: login password control and the environment from where the cloud is accessed. MCC has overcome the barrier of limited storage by providing remote storage but requires a strict security system that is responsible for retrievability, integrity, and seamless storage access. Elasticity and connectivity are also of major concern in MCC because delays and jitters cause degradation in the user experience. Cloud-computing architecture creates more challenges in maintaining security because of the liberty of users to choose any MCC architecture. Thus in this paper we discuss current cloud computing issues and future directions..

The fifth article, "Real-time refinement of Kinect depth maps using multi-resolution anisotropic diffusion" by Krishna Rao Vijayanagar, Maziar Loghman, Joohee Kim,

In this paper, we present a novel real-time algorithm to refine depth maps generated by low-cost commercial depth sensors like the Microsoft Kinect. The Kinect sensor falls under the category of RGBD sensors that can generate a high resolution depth map and color image of a scene. They are relatively inexpensive and are commercially available off-the-shelf. However, owing to their low complexity, there are several artifacts that one encounters in the depth map like holes, mis-alignment between the depth map and color image and lack of sharp object boundaries in the depth map. This is a potential problem in applications that require the color image to be projected in 3-D using the depth map. Such applications depend heavily on the depth map and thus the quality of the depth map is of vital importance. In this paper, a novel multi-resolution anisotropic diffusion based algorithm is presented that accepts a Kinect generated depth map and color image and computes a dense depth map in which the holes have been filled and the edges of the objects are sharpened and aligned with the objects in the color image. The proposed algorithm also ensures that regions in the depth map where the depth is properly estimated are not filtered and ensures that the depth values in the final depth map are the same values that existed in the original depth map. Experimental results are provided to demonstrate the improvement in the quality of the depth map and also execution time results are provided to prove that the proposed method can be executed in real-time.

The sixth article, "Replacing Cryptographic Keys in AMI Mesh Networks with Small Latency" from Incheol Shin, Jun Ho Huh, Sinkyu Kim and Jungtaek Seo,

Advanced Metering Infrastructures (AMI) facilitate efficient and reliable exchange of electricity information between the homes and utilities. Their unique characteristics (e.g., connecting millions of smart meters; accessing customers' private information), however, make them a lucrative target for adversaries. For example, an attacker might try to compromise the head-end of an AMI and send "remote disconnect commands" to the smart meters, disconnecting a large number of customers. To implement message authentication and protect message integrity and confidentiality, a number of cryptographic keys are being utilized. A "command key", for example, signs messages that are sent from the head-end to the meters. Such keys, however, introduce their own set of problems if they ever get compromised. A stolen command key would allow an adversary to continuously send malicious commands to the meters. Hence, the compromised keys must be revoked and replaced as quickly as possible. This paper proposes an efficient and reliable key distribution framework for the AMI mesh networks based on the connected dominating set approach. The keys are replaced with minimal latency through our "hexagon-tile coloring scheme", which allows the maximum number of keys to be transmitted in parallel, free of collision.

The last article, "Mobile Web-based system for remote-controlled electronic devices and smart objects" by Jordán Pascual Espada, Vicente García-Díaz, Rubén González Crespo, Oscar Sanjuán Martínez, B. Cristina Pelayo G-Bustelo, Juan Manuel Cueva Lovelle,

Nowadays there are many intelligent electronic devices in the everyday environments: appliances, industrial machinery, devices for service providers in the cities, etc. These electronic devices usually communicate with other devices and people in order to perform tasks or provide services. The most common form of interaction between people and devices is using the device interfaces (buttons, touchscreens, etc.). However, there are other ways of interacting such as Smartphones, which are

used to communicate users with electronic devices. Normally, the user selects the commands or actions from an application installed on the Smartphone. This application uses the Smartphone communication hardware elements (e.g., Bluetooth, Wi-Fi) to send the selected commands to the electronic device. Native mobile applications are platform dependent (Android, Symbian, etc.) and are developed for multiple platform usually have high development costs. We present a proposal that allows web applications to access the device communication hardware elements, making possible the communication with physical devices.

Acknowledgments The guest editors are thankful to our reviewers for their effort in reviewing the manuscripts. We also thank the Editor-in-Chief, Dr. Imrich Chlamtac for his supportive guidance during the entire process.

Kyu Won (Ken) Choi received the PhD. degree in electrical and computer engineering from Georgia Institute of Technology, Atlanta, USA in 2003. During the PhD, He proposed and conducted several projects supported by NASA (National Aeronautics and Space Administration), DARPA (Defense Advanced Research Projects Agency), NSF (US National Science Foundation), and SRC (Scientific Research Corporation) regarding power-aware computing/communication (PACC). Since 2004, he had been with the Takayasu Sakurai Lab. in the University of Tokyo, Japan as a post-doc research associate, working on leakage-power-reduction circuit techniques. Dr. Ken Choi was a senior computer aided design (CAD) engineer and a technical consultant for low-power system-on-chip (SoC) design in Samsung Semiconductor and Sequence Design prior to joining IIT. In the past, he had 6-year working experience in the area of VLSI chip design and wireless telecommunication, and authored 11 papers and a book chapter for low-power design from compiler level to circuit level. Last few years, by using his novel approaches, several chips were successfully fabricated in deep-sub micrometer technology. His research interests include DFP (Design For Power) and DFM (Design for Manufacturing). Dr. Choi is the founder and chief advisor of his currently setup laboratory VLSI Design and Automation at the Illinois Institute of Technology in the Fall of 2007.

Haiqing Nan received his Ph.D. degree in Electrical and Computer Engineering from Illinois Institute of Technology, Chicago, IL, U.S.A. in 2012. During his Ph.D. he conducted several research topics including leakage power reduction techniques with novel power gating structure, aging effect aware circuit design, TDDB monitoring and compensation circuit design, soft error tolerant latch circuit design and etc. His proposed methodologies were published on more than 20 peer reviewed IEEE Transactions (TCASI, TCASII, TDMR, etc.) and IEEE Conferences (ISQED, ISCAS, SOCC etc.) His research interests include low power circuit design, reliability aware (aging effect, soft error) circuit design for deeply scaled CMOS technology as well as Carbon nano tube FET based circuit design methodology. During his Ph.D. he was also involved in RFID related company project. And now he is working in Intel Corp. as a senior engineer for mobile phone chip design.