Preface

The goal of pervasive computing is to thoroughly integrate information processing into everyday objects and activities. With recent advances in software and hardware technologies in such areas as smart sensors, wireless sensor networking, sensor data management, data stream processing, RFID, embedded systems, distributed processing, artificial intelligence, agent theory, speech recognition, image and video analysis, signal processing, computational intelligence, machine learning, data and text mining, information retrieval, gesture recognition, biometrics, text-to-speech processing, software engineering, …, etc., it has become possible for someone engaging in pervasive computing to enjoy the many benefits it is supposed to bring about in a Smart Home (SH) environment and it is for this reason that the objective of this special issue "*Pervasive Technology and Applications in Smart Home Environments*" is to foster the dissemination of state-of-the-art research in the use of the latest pervasive technologies in SH environments. From the many submissions to this special issue, we have decided to choose several of them that can bring us up-to-date research results in deploying pervasive technologies and applications in smart homes. We expect that they will stimulate further research and development of innovative services and solutions in smart homes.

The first paper, which is titled "Disability centered approach in smart space management" (Rachid Kadouche, et al.) presents an approach to enhance environmental services to peoples with special needs. It highlights, in particular, a framework based on the use of a Web Ontology Language for data representation and implementation. The feasibility of the proposed framework is demonstrated through an implemented prototype integrated in a smart home demonstrator and tested with users under a laboratory conditions.

The second and third paper are both concerned with the issue of "security" -- an important aspect in the development of a SH environment. The second paper, which is titled "A Sudoku Based Wet Paper Hiding Scheme" (The Duc Kieu et al.) proposes an information hiding scheme for grayscale images by using a secret key to randomly select a subset of pixels as dry pixels, and applies toral automorphism to maximize the number of dry pixel pairs of the cover image. The results show that this information hiding scheme could achieve good image quality and flexible hiding capacity so that unauthorized users without knowledge of the secret key and the secret parameters are not able to extract embedded messages.

The third paper, which is titled "Enforcing Security in Smart Homes using Security Patterns" (Paul El Khoury et al.) addresses the issue of providing context-dependent security services in the implementation of remote healthcare in smart homes. It proposes to use validated security techniques and mechanisms to capture security properties to be implemented in what is called security patterns which can satisfy security requirements in a real smart home healthcare scenario. The approach is implemented in a prototype in such a scenario.

The fourth paper, entitled "Personal Privacy Management for Common Users" by Susana A. Bagüés et al., tackles the privacy issues in pervasive computing environments. It introduces a user-centric privacy management framework and six applications to enable the common users to manage their privacy easily. The privacy manager, a tool containing the six applications, is elaborated in terms of design principle as well as the feel and look of the user interface.

The fifth paper, which is titled "Improving Reusability of Hazard Analysis Model with Hazard Template for Deriving Safety Properties of Home Network System" (Ben Yan et al.) is concerned with the safety issues operating a home network system of appliances. It presents a model that can derive verifiable safety properties from a given home network system model and some hazard contexts using a goal-oriented analysis. This approach of analysis yields cause-and-effect chains from abstract hazard contexts to the concrete attributes of various appliances

and services. The safety properties and their responsible operations give the strong rationale of the safety of an HNS. To save the analysis cost and make the approach more practical, a reusable hazard template is also proposed.

The sixth paper, which is titled “Flexible Smart Home Architecture using Device Profile for Web Services: a Peer-to-Peer Approach” (Jorge Parra et al.) proposes the design and development of a flexible smart home architecture using a peer-to-peer (P2P) approach. Based on it, different home devices and services are represented as individual peers in a distributed system and application workflow logic among the peers can then be distributed for a flexible home architecture with autonomous behavior of the peers. The proposed approach can be shown to provide the flexibility and autonomy needed in the overall architecture of a desirable smart home.

A very important aspect of the future smart home environment is that they have to be usable. The seventh paper which is titled is “Sociable Kitchen: Interactive Recipe System in Kitchen Island” (Tsai-Yun Mou et al.) addresses the usability aspects of a smart home. It presents the design of a system to increase social interactions and communications among people. A tangible interactive recipe system embedded in a Kitchen Island was introduced and evaluated. The results indicate that visual representation of dishes could facilitate the sharing of experiences and positive responses among people. How this is expected to have further implications on sociable design is also discussed in the paper.

These contributed papers, seven in this special issue, have presented the latest research results in the use of pervasive technologies in SH environments. We believe that readers will find new insights to stimulate further research and development of innovative services and solutions in future smart homes.

Enjoy reading!

May 2009

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Keith C.C. Chan obtained his B.Math. (Hons.) degree in Computer Science and Statistics and M.A.Sc. and Ph.D. degrees in Systems Design Engineering from the University of Waterloo, Waterloo, Ontario, Canada in 1984, 1985 and 1989 respectively. He joined the IBM Canada Laboratory as a senior analyst soon after graduation and was involved in the design and development of image and multimedia and software engineering tools. In 1994, he joined The Hong Kong Polytechnic University where he is currently a Professor in the Department of Computing. Prof. Chan's research interests are in Pervasive Computing, Data Mining, and Software Engineering. He is the author and co-author of three books and over 150 publications in refereed journals and conference proceedings. Prof. Chan is on the editorial board of four journals and is on the program committee of numerous conferences. He is currently also a Guest Professor of the Graduate University of the Chinese Academy of Sciences.

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Journal Topics

The Journal invites new and original submissions addressing theoretical and practical topics in information technology and intelligent computing fields including (but not limited to these topics):

SH Applications:

- Smart home (Building) applications and services
- Smart home network middleware and protocols
- Commercial and industrial application for SH
- Context awareness model for smart home services
- Wireless sensor networks (WSN) / RFID application for SH
- Semantic Technologies for SH
- Semantic Knowledge Management and Services in SH

SH Security:

- Multimedia Security and Services in SH

- Smart home security issues and model
- Access control and privacy protection in SH
- Forensics and Security Policy in SH
- WSN / RFID Security in SH
- Security Protocol for smart home service

SH Embedded Hardware and Software:

- Embedded Hardware Support for SH
- Embedded Software for SH
- Embedded System Architecture for SH
- Real-time OS for SH
- Smart and Personal Devices for SH
- Power-Aware Computing for SH
- Middleware for SH
- Specification, Validation and Verification of Embedded Software

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