

# Preface

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This is the 6th and final issue of JAISE in 2014. With this issue, JAISE completes its 6th year of publication, marking another productive year in dissemination of research in AmI and SmE. We thank our advisory and editorial board members as well as the reviewers and all authors for their valuable contributions to this volume of JAISE. Moving forward to 2015, JAISE will keep the tradition of alternating Thematic Issues with Regular Issues. The list of issues for the coming year is included at the end of this article.

This issue of JAISE is a regular issue consisting of eight articles. Review of these articles were supervised by our associate editors Ah-Hwee Tan, Somya Ben Allouch, Carlos Gomez, Aki Harma, Andrea Prati, Fabio Paterno, Jesus Favela, James Dooley, Hans Guesgen, and Victor Zamudio, whom we thank for their work. The back pages of this issue contain information about upcoming events and other related material, including PhD thesis reports. The list of reviewers who have contributed to JAISE in the past year is also included in this issue.

## 1. This issue

The use of smartphones to collect data about mobility and other life attributes of users has recently witnessed significant attention. Systems based on the use of local communication links between sensors carried by a user and the smartphone acting as a hub have been reported in academic as well as industry prototypes. The advantage that smartphones possess over other sensory and interface devices is the relative familiarity of users with them as an everyday gadget. Hence, unlike dedicated systems, smartphone-based technology can help reduce the stigma associated with elderly care applications. The paper **“Personalizable**

**smartphone-based system adapted to assist dependent people”** by Igual et al. introduces a system composed of a smartphone application for helping dependent people and a Web management application for caregivers. The paper first provides the results of user studies focused on learning the needs of two groups of dependent users: patients with mental disability and older adults with loss of memory. The paper describes the result of interviews and field studies with focus groups of users, families, and caregivers. The paper also reports the results of a four-month field trial with real users.

Ambient Assisted Living (AAL) has emerged as an important application of Ambient Intelligence (AmI) as a framework for addressing issues related to aging. Considerable amount of research effort has been devoted to the design of tools and techniques for a variety of AAL applications and scenarios. Researchers involved in the AAL research have been increasingly realizing that an AAL solution needs to employ tools and technologies from multiple fields in order to be of any practical use. Hence, a synergy between a multitude of technology areas such as wireless sensor networks (WSN), computer vision, robotics, human-centric interfaces (HCI), and smartphone applications is deemed required for designing effective AAL solutions. The paper **“A service robot for monitoring elderly people in the context of Ambient Assisted Living”** by Nieves et al. proposes a system composed of a service robot, a wireless sensor network, a smartphone, a tactile tablet and a personal computer acting as a server. A distributed software architecture allows interaction between these components, and the system offers several services to the elderly such as surveillance, telepresence, localization, and lighting control.

Automatic behavior understanding, or the generation of situation descriptions from multimodal ma-

chine perception observing multiple objects is an unsolved problem, and the encompassing research field of high-level reasoning still contains many challenges. Reasoning methods suffer from problems stemming from the machine perception they depend on, but as machine perception progresses and the perceived world gets more complex, e.g. in research areas such as smart homes, smart work environments, smart cities, and the internet of things, the need for powerful reasoning methods becomes apparent. The paper “**Automatic understanding of group behavior using fuzzy temporal logic**” by IJsselmuiden et al. proposes an approach towards developing general purpose, domain independent reasoning methods for automatic behavior understanding. In order to keep the focus on high-level reasoning, the paper assumes machine perception outputs are available via annotations. This is done to avoid evaluating both the reasoning and perception modules as a single analysis. The paper offers improvements to the knowledge base that models group constellations and interaction patterns, and provides a quantitative evaluation of the system and its results based on a set of real and annotated data.

The promise of Ambient Intelligence (AmI) seeks to improve performance and quality of life of people in workplaces and homes. The key to a practical and helpful implementation of an AmI system is to understand and quantify the logical relationship among the enabling technologies involved on the one hand, and between the features and needs of the application vis-a-vis the functions or tasks performed in the target environment on the other hand. Such relationships are typically not well structured, and often remain subjective and vague at the design stage. The paper “**A Generalized Model for Quantifying the Impact of Ambient Intelligence on Smart Workplaces: Applications in Manufacturing**” by Pelikán et al. proposes a structure for these relationships and offers a generalized conceptual model as a foundation to understand and objectively quantify them. The paper uses fuzzy numbers as a means for expressing the vagueness that is inherent with the subjective nature of some of the AmI features and characteristics, and provides example applications from a manufacturing system workplace.

Smart buildings are finally finding their own place in the AmI research domain. At the intersection of the two paradigms of energy efficiency and productivity and comfort of the building occupants lies an opportunity to employ some of the existing learning techniques to provide an optimal solution constrained

by both paradigms. Modern building management systems (BMS) incorporate technologies and methods to register and even anticipate the needs of the occupants by learning their time-variant preferences and habits in an unobtrusive and transparent way. The paper “**Using Reinforcement Learning to Optimize Occupant Comfort and Energy Usage in HVAC Systems**” by Fazenda et al. proposes a system to control a building’s heating, ventilation and air conditioning (HVAC) system, aiming to minimize the energy waste without sacrificing discernible occupant comfort. The building management system learns how to explore the limits of the temperature set-points that are acceptable to the occupants.

In the smart homes of the future a network of heterogeneous devices may operate collectively to extract the contextual information for supporting various AmI services. One potential protocol which has been designed for smart home applications is the ZigBee protocol. However, the integration between the ZigBee devices and applications for IP-based networks is not a standard process. Such integration is often implemented within vertical solutions in an ad-hoc fashion, and hence is not flexible to be extended or customized. The paper “**A Service-Oriented ZigBee Gateway for Smart Environments**” by Furfari et al. presents an open-source platform that integrates ZigBee devices with applications running on smart phones and other connected devices available at home. The proposed platform can be deployed on low-cost devices, such as Plug PCs, and exploits the OSGi execution environment to discover devices and to notify the smart home of new available services.

Increasingly growing amounts of data streams are regularly generated in a large number of applications dealing with people and objects. In particular, RFID technology has recently gained significant popularity, especially for real-time people and goods tracking. However, the rather noisy, redundant and unreliable nature of RFID streams, coupled with their huge data size, can make their exploitation and management difficult. The paper “**RPDM: A System for RFID Probabilistic Data Management**” by Haider et al. proposes a real-time system for RFID probabilistic data management. The system is designed to transform unreliable and noisy raw RFID data into meaningful probabilistic data streams by means of a method based on a probabilistic Hidden Markov Model (HMM). The paper also presents an online summarization mechanism to handle the huge data volumes generated by RFID deployments in a small space representation.

The exponential growth of the mobile device market and the related emerging applications have created a large premise for location-based services (LBS). For many of these applications a seamless indoor/outdoor ubiquitous localisation system is necessary. The set of available techniques for localisation in today's smart phones includes wireless local area networks (WLAN), cellular networks, and global navigation satellite systems (GNSS). Many researchers have focused on the use of WLAN-based positioning systems (WPS) due to these systems' vast deployment and relative accuracy in indoor environments. Combination of the different available localisation methods can lead to seamless positioning in indoor/outdoor settings. The paper "**A survey of hybridisation methods of GNSS and wireless LAN based positioning system**" by Richter et al. reviews the latest data fusion approaches for seamless positioning by GNSS and WPS. The paper presents several approaches for data fusion

between different techniques and analyses the differences in the performance of these approaches.

## 2. Upcoming issues

The following is the list of upcoming issues of JAISE:

- Jan. 2015: Thematic Issue on *Affect Aware Ubiquitous Computing*
- March 2015: Regular Issue
- May 2015: Thematic Issue on *Evaluating Ambient Assisted Living Components and Systems*
- July 2015: Regular Issue
- Sept. 2015: Thematic Issue on *Mobility*
- Nov. 2015: Regular Issue

More information on the call for papers to the future thematic issues is available on the webpage of JAISE at: <http://jaise-journal.org/>.