# Preface

Carles Gomez [a], Andrea Prati [b], Hamid Aghajan [c,d] and Juan Carlos Augusto [e]

[a] *Wireless Networks Group, Department of Network Engineering, Universitat Politecnica de Catalunya, Fundacio i2cat, Spain*
[b] *Department of Information Engineering, University of Parma, Italy*
[c] *iMinds, Gent University, Belgium*
[d] *Ambient Intelligence Research (AIR) Lab, Stanford University, USA*
[e] *Department of Computer Science and Research Group on Development of Intelligent Environments, Middlesex University, UK*

This issue of JAISE is a regular issue consisting of 8 articles. Review of these articles was supervised by our editorial board members Michael Lew, Vincent Tam, Ramón López-Cózar Delgado, Aki Harma, Carles Gomez, Juan Augusto, and Evan Magill, whom we thank for their work. The back pages of this issue contain information about the 12th International Conference on Intelligent Environments (IE'16) which was recently held in London (UK), and a PhD thesis report.

## 1. This issue

Energy management is one of the main application domains in smart homes and buildings. The paper **"A user behaviour-driven smart-home gateway for energy management"** by Vastardis et al. provides a novel system architecture and describes the implementation of a user-centric smart-home gateway that manages energy usage. A centralised user-centric component extracts behavioural patterns of the users (by applying machine learning algorithms) and feeds them back to the gateway. The system is validated experimentally in terms of both performance and learning capabilities.

Smart homes and other indoor scenarios are witnessing the benefits of advances in automating tasks that typically had been performed manually, requiring significant time and effort. The paper **"The complete coverage for the vacuum cleaner robot using pulse-coupled neural network in dynamic environments"** by Yakoubi et al. proposes the use of a pulse coupled neural networks (PCNN) model to solve the problem of complete region coverage navigation. Simulation results prove some advantages of their approach,

such as reducing path length, CPU time, and number of turns.

Ambient Assisted Living (AAL) leverages intelligent systems in order to enhance life quality of people in their living environment. While relevance of this area is increasing as a result of an ageing population, challenges arise in the area of privacy. The paper **"Privacy challenges in Ambient Intelligence systems: Lessons learned, gaps and perspectives from the AAL domain and applications"** by Caire et al. highlights the specific privacy issues raised in AAL. The paper also reviews and discusses current approaches for privacy preservation, and provides insight on future challenges and opportunities. Authors illustrate the work with AAL scenarios studied in cooperation with the city of Luxembourg.

Smart environments generally require information provided by sensors as an input. The paper **"Benchmarking sensors in smart environments – Method and use cases"** by Braun et al. presents how benchmarking can allow the determination of the most suitable sensor systems for a given application by calculating a single benchmarking score. The benchmarking model used is based on nine selected features that cover aspects of performance, the environment and the pervasiveness of the application. Authors discuss how this model can be applied to capacitive proximity sensors. An expert consensus is required to overcome a limitation of the presented model: its subjective selection of feature categories and weights.

Health is one of the main areas motivating the deployment of sensors. The paper **"Noise robust footstep location estimation using a wireless acoustic sensor network"** by Van Den Broeck et al. provides a method to estimate footstep locations based on audio

measurements in a wireless acoustic sensor network, with the aim of studying the parameters of a person's gait, which relate to the person's health. However, such a system usually faces significant challenges in noisy environments. The paper proposes different modifications in order to improve robustness in the presence of noise, including average subtraction, multichannel Wiener filter and a noise robust footstep detector. By applying these techniques, error reduction has been obtained on the basis of simulated and real life datasets.

The data collected by sensors may be used to detect and classify activities performed by a user. In fact, activity classification may be a fundamental component in smart environments. The paper **"A low-complexity activity classification algorithm with optimized selection of accelerometric features"** by Giuberti et al. uses machine learning techniques to detect meaningful patterns from data without explicitly defining classification rules. Authors present a Body Sensor Network (BSN)-based activity classification algorithm, which can detect activities performed by the user on the basis of accelerometric signals generated by the BSN. Experiments are performed with users executing daily activities naturally.

Many intelligent systems benefit from context-aware applications, which provide service adaptation depending on the specific environment of the user. The paper **"A measure of semantic similarity between a reference context and a current context"** by Guessoum et al. tackles semantic similarity as a tool to evaluate the similarity of a specific context with that of other contexts. Case-based reasoning (CBR) is used to compare a currently experienced situation with past situations in order to select the most similar experience and to provide the user with the corresponding services. The tool is evaluated on a dataset obtained in recording sessions from daily life human activities.

Exciting advances are also happening in the human-computer interaction field. The paper **"The role of personality characteristics in informing our preference for visual presentation: An eye movement study"** by Al-Samarraie et al. exploits user preferences concerning displayed information as indicators of certain behavioral aspects. In this regard, eye-movement behavior of 50 participants was studied by engaging them in visual design experiments. The results showed that high conscientiousness and agreeableness tended to influence eye-movement behavior. There is a possibility that these two traits can be used to guide the preferences of the user for designing user interfaces.

## 2. Upcoming issues

The following is the list of upcoming issues of JAISE:

More information on the call for papers to the future thematic issues is available on the webpage of JAISE at: http://www.iospress.nl/journal/journal-of-ambient-intelligence-and-smart-environments/.