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Introduction to the thematic issue on Ambient and Smart Component Technologies for Human Centric Computing

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1. Introduction

Human-Centric Computing is the discipline that studies the way humans and artificial systems interact reciprocally and exchange information. It is strictly related to other disciplines such as sociology, psychology, cognitive sciences, graphic design and partially overlaps with other ICT technologies such as Human-Computer Interaction, Affective Computing, Persuasive Computing, and others.

A strong relationship exists also between Human-Centric Computing and Intelligent Environments such as Ambient Intelligence and Ambient Assisted Living applications, Smart Environments and Smart Cities. From one hand, indeed, the design of Intelligent Environments aimed at supporting actively their inhabitants cannot leave out any aspect concerning the way the user may/want interact with artificial entities and receive support from them.

On the other hand, Intelligent Environments may provide technologies such as, for example, those for context and situation awareness, that can enable new ways of designing and realizing more effective interaction systems and mechanisms between humans and artificial entities.

In this thematic issue both points of view are considered taking carefully into account that several technical challenges remain to be solved before effective, intelligent, secure, and reliable solutions – that fully exploit potentials of both AmI and HCC – can be deployed trustfully into real environments.

2. In this thematic issue

The paper **"Knowledge-enabled Decision Making for Robotic System Utilizing Ambient Service Components"** concerns the need of knowledge of robots in ambient intelligent environments. Indeed, a skilled robot performs human-scale manipulation tasks, interacts with a variety of objects, understands instructions given by humans and most importantly, requires the capability of interpreting ubiquitous resources and assembling them into a complex plan. In the paper, a novel Knowledge-enable Decision Making Framework is proposed for Component-Based Robotic System.

The article titled **"An unsupervised recommender system for smart homes"** proposes a smart home recommender system that is aimed at reducing the complexity of interactions in smart environments by continuously interpreting the user's current situation and recommending services that fit the user's habits. Authors show that with these recommendations it is possible to build much simpler user interfaces.

In **"Latent-Dynamic Conditional Random Fields for Recognizing Activities in Smart Homes"**, the focus is on assistive technologies at home for elderly people. In particular, the authors present an activity recognition model – namely Latent-Dynamic Conditional Random Field – to detect the goals of the monitored user. An extensive validation has been performed against datasets collected from real applications.

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The contribution of **"Ambient Intelligence for Quality of Life Assessment"** consists in a model and tools for the evaluation of quality of life of people with disabilities in monitored environments. The environment continuously obtains data from different sources such as sensors, household appliances, and interactions between the user and system's interfaces. The model adopts an artificial neural network to monitor how the user carries out different activities of daily living. Such information are improved by statistical analysis and reported to show trends in user behavior that might allow the detection of a person's cognitive, physical or sensory deterioration.

In **"An Advanced Location-Aware Physical Annotation System: from Models to Implementation"**, the authors provide a formal model and theoretical concepts for Physical Annotation Systems. A new location model, called DPVW-model for annotated entities, is described. Such a model includes aspects of the annotatable physical world as well as the virtual domain.

The author of the paper titled **"Hand shape classification using depth data for unconstrained 3D interaction"** introduces a novel method for view-independent hand pose recognition from depth data. The approach provides an estimation of the shape and orientation of the user's hand without constraining her to maintain a fixed position in the 3D space.

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