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## PREFACE

**A Special Issue on “Ubiquitous Intelligence in Real Worlds”**

*Hani Hagraas, Victor Callaghan, and Martin Colley*

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## ***A Special Issue on*** **“Ubiquitous Intelligence in Real Worlds”**

The idea of environments with pervasive and ubiquitous computing was first conceived by Weiser. In this vision he envisaged systems that allowed the non traditional orchestration of devices in the environment to provide more natural interactions with the user. These systems would take into account the spaces in which people lived and worked and would use information provided by the person's position and context to provide an interactive medium which extended on the traditional keyboard and mouse interactions. The use of embedded computational artefacts and wireless networks was an important requirement for facilitating invisible connectivity in which the physical hardware as well as the conscious notion of the computer would effectively disappear into the environmental space.

The rapid growth of mobile embedded devices such as mobile phones, PDAs, and palm computers as well as the merging of these technologies has partly contributed towards achieving Weiser's vision. Wireless short range connectivity standards such as Bluetooth and InfraRed Data Association have allowed these portable embedded devices to locally interact and exchange information. Advances in wireless WANs such as the IEEE 802.11a standard and the digital cellular networks such as 3G as well as advances in GPS systems can allow local communities of these devices to be interconnected as part of a global infrastructure. The reduction in size of embedded computational artefacts has been facilitated by integrating more components and functionality onto a given area of silicon. Smaller transistors and reduced capacitance has lead to faster processors and the development of cheaper high performance embedded processors that also require lower power consumption.

Ubiquitous computing has enabled the development of personal mobile and wearable systems together with device rich pervasive environments. The user therefore has a host of interconnected devices and subsystems at their disposal which can be configured and controlled according to their particular needs.

This special issue will present novel work on how ubiquitous computing and intelligence can be realised in real worlds.

The first paper is entitled “An Ontology-based Hierarchical Peer-to-Peer Global Service Discovery System” by Knarig Arabshian and Henning Schulzrinne. This paper addresses an important aspect in realising ubiquitous intelligence in real worlds which is related to system discovery.

The paper presents a global service discovery system, GloServ, that uses the Web Ontology Language (OWL) for service classification and the dynamic formation of the network architecture. The GloServ maps knowledge obtained by the service classification ontology to a structured peer-to-peer network such as a Content Addressable Network. GloServ also performs automated and intelligent registration and querying by exploiting the logical relationships within the service ontologies.

The second paper is entitled “Design and Implementation of Adaptive Dialogue Strategies for Speech-based Interfaces” by Johannes Pittermann, Angela Pittermann, and Wolfgang Minker. This paper addresses another important component in realising ubiquitous intelligence in real worlds which is related to intelligent dialogue systems as there is a large number of different approaches to characterize emotions and thus there is a need for a dialogue system which enable a more natural human-machine interaction. This paper presents a spoken language dialogue manager based on VoiceXML technology which can handle multiple control parameters characterizing emotions for dialogue control.

The third paper is entitled “Data-Driven Methods for the Off-Line Generation of Fuzzy Logic Based Agents for an Intelligent Building Environment” by Antonio López, Diego Álvarez, Faiyaz Doctor, Hani Hagraas, and Victor Callaghan. This paper addresses a core issue in realising ubiquitous intelligence in real worlds which is related to intelligent embedded agents. The paper has focused on fuzzy logic controllers (FLC) for realizing the internal structure of the agent. The paper has presented and compared different alternatives in order to select a suitable method for the off-line data driven automatic generation of FLC for the agent. The paper has presented experiments that were performed with real data gathered from the Essex Intelligent Dormitory.

The fourth paper is entitled “A Component-Based Platform for Accessing Context in Ubiquitous Computing Applications” by Christophe Jacquet, Yolaine Bourda, and Yacine Bellik. This paper addresses another important aspect in realising ubiquitous intelligence in real worlds which is related to context awareness platforms. This paper presents a component-based platform for building context-aware applications. This platform introduces a high-level service to abstract context and to allow the rapid construction of dynamically reconfigurable applications. Moreover,

the inputs and outputs of context components benefit from a strong typing, which permits design-time checks that can detect specification mistakes.

The fifth paper is entitled “A Conceptual Model and the Supporting Middleware for Composing Ubiquitous Computing Applications” by Nicolas Drossos, Christos Goumopoulos, and Achilles Kameas. This paper addresses another important issue in realizing ubiquitous intelligence in real worlds which is related to middleware architectures. This paper presents the Plug/Synapse abstraction, which provides a conceptual model for building ubiquitous computing applications in a high-level programming manner. GAS-OS is the software layer that implements the Plug/Synapse model and the concepts encapsulated in GAS, which can be used to describe everyday environments populated with computational artifacts. The paper examines also the design and architecture of GAS-OS, which is the minimum set of modules and functionalities that every device must afford, in order to be a ubiquitous computing artifact and participate in artifact collections.

The sixth paper is entitled “Using a Wireless Sensor Network to Enhance Video Surveillance” by Rita Cucchiara, Andrea Prati, Roberto Vezzani, Luca Benini, Elisabetta Farella, and Piero Zappi. This paper addresses another important issue in realizing ubiquitous intelligence in real worlds which is related to wireless sensors networks

and video surveillance. In this paper, a computer vision system able to detect and track people from multiple cameras is integrated with a wireless sensor network mounting Passive InfraRed sensors. The two subsystems are briefly described and possible cases in which computer vision algorithms are likely to fail are discussed.

We hope that this special issue will help to reinforce and to increase the research level in the area of ubiquitous intelligence in real worlds. The Guest Editors would like to thank the contributors and the reviewers of this special issue for their time and effort in making it possible. They would also like to express their sincere gratitude to the *Journal of Ubiquitous Computing and Intelligence*.

We will leave the reader with one final thought, if mankind is to be able to leave the confine of this earth and settle on distant planetary habitats, it will be thanks to ubiquitous computing environments. These environments will change our lives and those of our children; we hope you enjoy these papers which provide a fascinating insight into current research in ubiquitous intelligence in real worlds.

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