

A MULTI-AGENT ARCHITECTURE FOR DISTRIBUTED SERVICES AND APPLICATIONS

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ABSTRACT. *Ambient Intelligence has acquired great importance in recent years and requires the development of new innovative solutions. This paper presents a novel architecture which facilitates the integration of multi-agent systems, distributed services and applications to optimize the construction of Ambient Intelligence environments. The architecture proposes a new and easier method to develop distributed intelligent ubiquitous systems, where applications and services can communicate in a distributed way with intelligent agents, even from mobile devices, independent of location restrictions. The core of the architecture is a group of deliberative agents acting as controllers and administrators for all applications and services. This approach provides the systems with a higher ability to recover from errors and a better flexibility to change their behavior at execution time. The architecture is founded on the Ambient Intelligence paradigm. A distributed multi-agent system has been developed to test this architecture. This system is aimed to improve health care and assistance to dependent persons in geriatric residences, and the preliminary results are presented in this paper.*

Keywords: Ambient intelligence, Multi-agent architecture, Distributed services, Services oriented architectures, Case-based reasoning, Case-based planning

1. **Introduction.** People are currently surrounded by technology which tries to increase our quality of life and facilitate our daily activities. However, there are situations where technology is difficult to handle or people lack knowledge to use it. For these reasons, Ambient Intelligence tries to adapt the technology to the people's needs by proposing three basic concepts: ubiquitous computing, ubiquitous communication and intelligent user interfaces [55]. To reach this objective, it is necessary to develop new functional architectures capable of providing adaptable and compatible frameworks, allowing access to services and applications regardless of location restrictions. A functional architecture defines the physical and logical structure of the components that make up a system, as well as the interactions between those components [19]. There are SOA [11, 18] and agents' frameworks and platforms which provide tools for developing distributed systems and multi-agent systems [23, 43, 48]. However, these tools do not solve by themselves the Ambient Intelligence based systems needs. For this reason, it is necessary to develop innovative solutions that integrate different approaches in order to create flexible and adaptable systems, especially for achieving higher levels of interaction with people in a ubiquitous and intelligent way.