

From Implicit to Touching Interaction by Identification Technologies: Towards Tagging Context

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Abstract. Intelligent environments need interactions capable of detecting users and providing them with good-quality contextual information. In this sense we adapt technologies, identifying and locating people for supporting their needs. However, it is necessary to analyze some important features in order to compare the implicit interaction, which is closer to the users and more natural, to a new interaction by contact. In this paper we present the adaptability of two technologies; Radiofrequency Identification (RFID) and Near Field Communication (NFC). In the first one, the interaction is more appropriate within intelligent environments but in the second one, the same RFID technology, placed in mobile phones, achieves some advantages that we consider to be an intermediate solution until the standardization of sensors arrives.

Keywords: Ambient Intelligence, NFC, Touching Interaction, Location-based Services.

1 Introduction

Ubiquitous Computing paradigm and, most recently, Ambient Intelligence (AmI), are the visions in which technology becomes invisible, embedded, present whenever we need it, enabled by simple interactions, attuned to all our senses and adaptive to users and contexts [1]. A further definition of AmI is as follow: “*Ambient Intelligence refers to an exciting new paradigm of information technology, in which people are empowered through a digital environment that is aware of their presence and context sensitive, adaptive and responsive to their needs, habits, gestures and emotions*”.

This vision and the three pillars concerned in it, Ubiquitous Computing, Ubiquitous Communications and Natural Interfaces, promote a shift in computing from the traditional desktop computer to a lot of devices placed around us, offering services. In this sense, it is essential to adapt technologies as inputs to the context, allowing the user not to ask the computer explicitly for what he/she needs. The idea of creating intelligent environments requires unobtrusive hardware, wireless communications,

massively distributed devices, natural interfaces and security. Thus, by introducing intrusiveness technologies into daily objects and by embedding interaction in daily actions, it is possible to feel in an intelligent environment.

To attain this vision, it is fundamental to analyze some definitions of context. In [2], A. Dey defines this concept as “any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and application themselves”. This author also defines context awareness as the “context to provide relevant information and/or services to the user, where relevancy depends on the user’s task”.

In order to design context-aware applications it is necessary to observe certain types of context-aware information as being more relevant than others: identity-awareness, location-awareness, time-awareness, activity-awareness and objective-awareness are essential. All these types of awareness answer the five basic questions (“Who”, “Where”, “What”, “When” and “Why”), which provide the guidelines for context modelling. This kind of information allows us to adapt or build the technology that needs to be dispersed throughout the environment and to model the human behavioural support.

Once the context and their important features are defined, it is time to study new interaction forms proposing the approach to the user by means of more natural interfaces. At this point we have to talk about Albrecht Schmidt and his concept of Implicit Human Computer Interaction (iHCI) [3][4]. It is defined as follows:

“iHCI is the interaction of a human with the environment and with artefacts, which is aimed to accomplish a goal. Within this process the system acquires implicit input from the user and may present implicit output to the user”

Schmidt defines implicit input as user perceptions interacting with the physical environment, allowing the system to anticipate the user by offering implicit outputs. In this sense the user can concentrate on the task, not on the tool as Ubiquitous Computing Paradigm proposes.

The next step that this author proposes is that of Embedded Interaction in two terms. The first one embeds technologies into artefacts, devices and environments. The second one, at a conceptual level, is the embedding of interactions in the user activities (task or actions) [5]. With these ideas in mind, our main goal is to achieve natural interaction, as the implicit interaction concept proposes.

Our idea of the adaptability of sensorial capabilities is through Identification technologies as specialized sensorial capabilities. With these, the idea of natural interfaces is possible and the implicit inputs and the proactive aspect could be guaranteed [6,7]. To achieve just that, we have adapted RFID technology. Users only have to wear RFID tags, embedding interaction into daily activities. At the moment, we perceive the context awareness by the “who”, “when” and “where” aspects, thereby obtaining “what”[8,9]. However, some disadvantages have to be addressed. For example, the cost of infrastructures is high. Moreover, the places for readers and antennas are fixed in the environment. Finally, the context responsibility identifying people, their profiles and the services allowed for everyone is an important factor to be considered when making intelligent environments.

For this reason we have adapted the recent NFC (Near Field Communications) technology, which is RFID combined with mobile phones. In NFC, the process,