Context Cookies

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Abstract. In an ambient intelligence world, devices work in order to support people carrying out their everyday life activities in a natural way. Therefore, it is necessary to know the entities in the environment and to consider new interaction schemas with them. This paper proposes an autonomous and lively mechanism to refresh the context information while users interact with the environment using Near Field Communication technology. Context Cookies is the name of the mechanism that captures situation changes and provides awareness dynamically.

Keywords: Context Aware, Ambient Intelligence, NFC, Touching Interaction.

1 Introduction

Intelligent environments are responsive and sensitive to the presence of people that are integrated into a digital atmosphere which is adaptative to their needs, habits and emotions. In general, 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].

Only by understanding the world around us, the applications can be developed to achieve the Ambient Intelligence goals. Specifically, information that can be used to characterize the situation of significant users, places, or objects is considered C*ontext* and should be caught [2]. We need to know not only the object and people in the environment but also interact with them. Therefore, the traditional human-computer interaction is not appropriated for Ambient Intelligence.

In the upcoming years, we are going to think about Human-AmI interaction instead of Human-Computer interaction as a new perspective closer to human-human interaction [3]. Regarding human communication, there are three key issues: (a) Shared Knowledge between humans as an essential component to understand each other, but too extensive and not explicitly mentioned, (b) communication errors and recovery, including short term misunderstanding and ambiguities, and (c) situation and context [4]. We focus on

the last one; the physical environment, the situation, the role of the user, their relationship with others and the environment. Whenever a system is designed, we can change the current schemas of interaction using the above-mentioned information.

Some proposals regarding the interaction styles have to be considered. Spontaneous interaction is introduced in the Digital Aura project [5]. It is a model in which things interact with others within physical proximity. A similar approach is persistent interaction, "providing continuous interaction moves computing from a localized tool to a constant presence" [6]. Also, we can emphasize the embedded interaction. Within it, sensors and actuators are embedded into devices, tools, everyday objects and, also, interaction is embedded in the users' tasks [7]. Another related work is the Vazquez approaches; in [8] a model for knowledge sharing between devices in order to promote context-aware reactivity is proposed.

Most related works tackles the challenge of provide intelligence to digital object and interaction mechanisms between entities in the environment. We present a proposal for achieving a more natural interaction with the intelligent environment (with digital and non-digital objects, for example, a door, a table, etc.). Moreover this proposal provides an autonomous and dynamic mechanism in order to update the context information while users make their everyday task, in an implicit way. The mechanism is called "Context Cookies".

Section 2 of the paper analyzes innovative approaches to context modeling, looking for a simple way to identify objects in the environment and represent their behavior. Key issues of the Context Cookies, implementation details and applications, are shown in the section 3. Finally we provide the conclusions of our proposal.

2   Tagging the Context

Our mainly context source is the identification process, as an implicit and embedded input to the system, perceiving the entity identity, his profile and other kinds of dynamic data. Using NFC technology we can obtain awareness features in order to maintain a dynamic context model.

2.1   NFC: Technology and Architecture

It is obvious that we need a great variety of devices placed in the environment around us with wireless connection capabilities. Therefore, a new short-range wireless connectivity technology "Near Field Communications" (NFC), has appeared.

NFC systems consist of two elements: (a) The Initiator- as its name indicates it begins and controls the information exchange (called reader in RFID); and (b) The Target-the device that responds to the requirement of the initiator (called tag in RFID). In an NFC system, there are two modes of operation: Active and Passive. In the active mode, both devices generate their own field of radio frequency to transmit data (peer to peer). In the passive one, only one of these devices generates the radiofrequency field, while the other is used in order to load modulation for data transfers. It is important to mention that, although the NFC protocol can be installed in any electronic device, our interest will be centered on NFC-enabled cell phones. In [9] we analyze