

Presence and Sensor Platform

An integrated platform that manages user presence and interacts with sensors and actuators for services, access, security and energy efficiency purposes

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Extended Abstract

I. INTRODUCTION

The quantity of internetworking devices and systems that can be remotely configured, controlled and managed through an IP interface have experienced a great increase during the last years. Every system has its own programming and controlling interface, which usually offers external APIs to be integrated with other systems; however very interesting results can be obtained with a framework that connects the different systems and that exposes such information and capabilities to the application layer.

The aim of our research and development is therefore the creation of a system that offers a layer that intermediates the interconnection of different sensing and service systems, thus offering to the application layer above an abstraction of the Presence and Sensor systems that can be used to create automation and futuristic applications

II. THE FRAMEWORK

The envisioned framework is based on two elements: the Presence system and the Sensors (that include both sensing and actuator devices).

A. Presence System

The Presence system keeps track of the status of the users of the system, by keeping a state machine for each user. In fact the occurrence of events, which are detected by the various sensors connected to the Platform, trigger status changes for the involved users.

The Presence system makes the state machine of every user available for the applications that run on the Platform, so that they can trigger actions through the various actuators connected to the Platform.

The Presence categories will be declined into several subcategories, since the Presence can be either a geographical attribute or an availability-type attribute, and the status of every

user can have a combination of such attributes, in order to get a higher level information. Different information coming from the sensors will contribute to the Presence status: data such as the badging at the entrance of a building or the physical presence of a person in a room will be coupled with networking information such as the association to the building's wireless network and with information regarding the login made on the PC or the IM, in order to have a very powerful and complete status information about every user.

B. Sensors

The Sensor system is the ensemble of the sensing and actuating devices that are connected to the Platform. The definition of sensor is very broad in scope; in fact the Platform will support traditional sensor systems (light sensors, acceleration sensors, alarm sensors, smoke sensors, etc), traditional actuators (power interrupters, electric locks, etc) but also more networking-oriented devices such as switches, routers, IP PBX, etc. This approach ensures that the envisioned Platform goes beyond the traditional sensor platforms and can be general enough to enable real automation applications, applied to the different scenarios that may occur.

III. SCENARIOS

The application scenarios of such a system may be various. The main categories that we have envisioned are three: services, energy efficiency and security.

The Services scenarios employ the Presence information to create policies to enable or disable services such as UC&C and networking. We envision scenarios in which and User that enters an Office building through a badging system will be recognized, authenticated and his services such as the VoIP client on the mobile device and on the table telephone, his email and file server access from the PC, his capability of accessing the wireless network in the building and so on will be activated.

These scenarios are tightly connected to Security scenarios; in fact the concept of Presence can be easily exploited in order to grant access to services only if the Presence status is compatible with the requests made to the system. For example,

a telephone call from a table VoIP telephone can be possible only if the owner of the VoIP account is physically present in the building, and if his mobile devices' association to the wireless network is compatible (i.e. it's not associated to a wireless AP located in a different and maybe far away floor); this will prevent unwanted uses of the telephone resources by external or internal but not authorized people.

The power saving application scenarios are very easy to envision: a precise and proper Presence information can help to save a lot of power, by switching off devices which will not be used. For example once an user gets out of a building, the PoE switch that powers his telephone and PC can be switched off, and the light in his office can be switched off unless the security sensors detect that other (authorized) people are using it.

IV. APPLICATIONS

The core of the system resides in the applications that will be made on the Platform. In fact the Platform will provide a framework that abstracts the interaction with the sensors through an event-presence-action model, while the application will have to employ such information and capacity of actuation to create use models and automations.

The application design will be critical, since applications will be made able to interact with important services such as UC&C or power plugs; therefore much effort will be put into defining the required automations and the possible overriding of the system, to prevent for example an unwanted power off of a building or unwanted alarms activations in case of people late at work.