Chapter LXV
Context Awareness for Pervasive Assistive Environment

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ABSTRACT

This chapter will describe our experience concerning a model-based method for environment design in the field of smart homes dedicated to people with disabilities. An overview of related and similar works and domains will be presented in regards to our approach: adaptive user interface according to environment impact. This approach introduces two constraints in a context aware environment: the control of different types of assistive devices (environmental control system) and the presence of the user with disabilities (user profile). We have designed a service-oriented approach to make it easier the management of services life cycle, and we are designing a semantic specification language based on XML to allow dynamic generation of user interface and environment representation. With the new design of context representation, context framework, and context rule specification, we will demonstrate how changes in contexts adapts supervisor task model which in turn configure the whole system. This chapter is dedicated to researchers having strong interest in developing context aware applications based on existing framework. The application to assistive technology for dependant people is the most suitable since the demand of such pervasive environment is clearly identified.

INTRODUCTION

The **smart home** dedicated to the **dependent people** includes a whole of techniques to make home environment accessible, and provide dedicated services. In smart home concept for **people with special needs**, the design of smart system is based on the use of standard and specific devices to build an **assistive environment** in which many features are provided.

This chapter describes our experience on a model-based method for environment design in the field of smart homes dedicated to **people with disabilities**. An overview of related and similar works and domains will be presented in regards to our approach: adaptive **user interface** according to environment impact. This approach introduces two constraints in a **context aware** environment: the control of different types of **assistive devices** (environmental control system) and the presence of the user with disabilities (user profile).

The key idea of this chapter is the consideration of context awareness in order to ensure the presentation of services to end-user, to process associated features and to handle context history log file.

We have designed a service-oriented approach to improve services life cycle handling. The current development consists on designing a semantic specification language based on XML to allow dynamic generation of user interface and environment representation. Consequently, the design of a context representation, based on a context framework, and coupled with context rule specification, will demonstrate the impact on supervisor task model which in turn will configure the whole system.

In this chapter, we will focus mainly on the design of a new **context assistive framework** than on the semantic specification rules, which will be described in a future publication. This chapter is dedicated to researchers having strong interest in developing context aware applications based on existing framework. The application to **assistive technology** for dependant people is the most suitable since the demand of such **pervasive environment** is clearly identified.

WHAT IS AN ASSISTIVE ENVIRONMENT?

Dependant people, due to **disability** or **aging**, compose a significant segment of the population that would profit from usage of such technologies with the crucial condition that it is physically and economically accessible. This should be possible only if accessibility barriers are detected and considered in a global solution based on a "design for all" concept. The challenge is to consider standardization aspects from the physical low level (i.e., sensors) to application level (i.e., user interface) of any system design.

Autonomy and quality of life of people with disabilities and elderly people in daily living would benefit from smart homes designed under the "**assistive environment**" paradigm and can experience significant enhancements due to the increased support received from the environment (Sumi helal, 2003). This support includes facilities for environmental control, information access, communication, monitoring, etc., and built over various existing and emerging technologies. Nevertheless, users are usually confronted to accessibility barriers located at the level of **human-machine interface** due to heterogeneous devices, features and communication protocols involved. These problems include both, physical difficulties to handle input devices, and cognitive barriers to understand and reach suitable functionalities. Consequently, accessible unified interfaces to control all the appliances and services are needed. This is only possible if the network, devices, and mobile technologies used for smart homes are able to support interoperability and systems integration (Abascal, 2003).

FROM COMPUTING TO PERVASIVE COMPUTING

Assistive environment presented above includes smart homes technologies which are of primary importance in enhancing quality of life of people with disabilities. In such environment, the user needs to use handheld devices in order to increase his or her mobility. Besides, user would like to profit from wireless mobile technologies to ensure