Chapter 18

Instrumenting the eHome and Preparing Elderly Pilots: The USEFIL Approach

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ABSTRACT

In this chapter the lessons learnt from the build-up and integration of the USEFIL are demonstrated. First an introduction to Ambient Assisted Living (AAL) platforms, the infrastructure for eHomes of any purpose eHome is presented, in the context of their emergence as a viable way for managing healthcare costs in an aging first world population. Then technical and sustainability issues that are present after several years of maturation are touched upon. The USEFIL project’s aim at an AAL platform that utilizes low cost “off-the-shelf” technologies in order to develop immediately applicable services, to assist elderly people in maintaining an independent, healthy lifestyle and program of daily activities is then briefly discussed. Afterwards, the methodological framework as well as principal results of the preparation and running of the pre-piloting phase of that platform are presented. Closing, current trends are explored in conjunction with future directions as triggered by this project in the context of cognitive impaired elderly support.

INTRODUCTION

Ambient Assisted Living (AAL) platforms are beginning to emerge as a viable way for managing healthcare costs in an ever aging first world population (Marin, Navarro, & Lawrence, 2011). AAL systems consist of medical sensors, wireless sensor and actuator networks (WSANs), computer hardware, computer-networks, software applications, and databases, in order to provide services in an Ambient Assisted environment.(Delicato, Fuentes, Gámez, & Pires, 2009),(Sliwa & Ben-
Table 1. USEFIL’s hardware infrastructure.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SPECS</th>
</tr>
</thead>
<tbody>
<tr>
<td>USEFIL Server 1</td>
<td>Standard Contemporary Server cluster</td>
</tr>
<tr>
<td>Home PC</td>
<td>Standard current laptop</td>
</tr>
<tr>
<td>Smart TV</td>
<td>Modified Commercial Smart TV from consortium partner</td>
</tr>
<tr>
<td>Tablet Device</td>
<td>Current off the shelf android tablet</td>
</tr>
<tr>
<td>Wrist Wearable Unit</td>
<td>Off the shelf Wrist wearable android communication device</td>
</tr>
<tr>
<td>Mirror Device</td>
<td>In project developed equipment integrating tablet, web camera and reflective surface as an unobtrusive integrated device for monitoring the user’s facial characteristics and extracting meaningful physiological and psychological markers for the user’s condition. This was the only manufactured piece of hardware in the project.</td>
</tr>
<tr>
<td>Medical measurement devices (Blood pressure meter, Scale, etc)</td>
<td>Blue tooth or Wi-Fi enabled devices.</td>
</tr>
<tr>
<td>Sensors/game controllers (Kinect, Wii, etc)</td>
<td>Off the shelf contemporary sensors and controllers.</td>
</tr>
</tbody>
</table>

After several years of maturation, still current AAL solutions are challenged with issues such as unacceptable installation and deployment complexity, cumbersome user interfaces, security threats, lack of quality-of-user-experience, and higher costs (Memon, Wagner, Pedersen, Beevi, & Hansen, 2014).

Having identified these issues several years ago, the USEFIL AAL system (Artikis et al., 2012) was conceived as a platform utilizing low cost “off-the-shelf” technologies in order to develop immediately applicable services, to assist elderly people in maintaining an independent, healthy lifestyle and program of daily activities (Billis, Papageorgiou, Frantzidis, Konstantinidis, & Bamidis, 2013). Its major, expressed, design specification during the design of the system was non-intrusive installation and Unobtrusive operation. This approach while not outright novel, it is a departure from a more industrialized, monolithic, approach in the development of elderly AAL environments. This chapter is a brief exposition of the means and methods of the USEFIL project towards an elderly support e-home. The focus of this work is on demonstrating the pitfalls and solutions of a modular, low cost approach that is not based on overwhelming development overhead but instead focuses on key optimizations of existing enabling technologies. Additionally, insights are presented on the pilot preparation and results that are validating this approach not only as effective, but also as an efficient, elderly support e-home.

INSTRUMENTING ELDERLY SUPPORT E-HOMES: THE USEFIL WAY

A Modular Approach to Elderly e-Homes

As was mentioned before, the direction which USEFIL took towards building an effective and efficient elderly support e-home was that of a modular enabling software infrastructure in order to optimize the efficacy and efficiency of off shelf components and sensors. Table 1 presents an outline of the hardware that was used for the USEFIL eHome demonstrating the heavy focus of hardware selections in off the shelf, readily available components.

A crucial part in the development of this platform is the integration, on these individual components, of the functional modules, inter-
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