An Architectural Approach to Building Ambient Intelligent Travel Companions

Sule Yildirim Yayilgan, Gjøvik University College, Norway
Bernd Blobel, Universitätssklinikum Regensburg, Germany
Françoise Petersen, Apica, France
Asbjørn Hovstø, Its-Norway, Norway
Peter Pharow, Fraunhofer Institute for Digital Media Technology IDMT, Germany
Dag Waaler, Gjøvik University College, Norway
Younis Hijazi, Gie Luxinnovation, Luxembourg

ABSTRACT

In theory, persons with impairments including elderly have the same rights of taking part in everyday life activities and society. However in practice, they are at risk of being excluded because of the great number of ICT solutions not addressing the needs of people with impairments. This paper describes a system which provides personalized services supporting people with impairments and patients travelling for medical reasons, work, social contacts, daily outdoor life activities, etc. In this paper, the authors focus on the scenarios, requirements, architecture, integration, requirements fulfillment, and conclusions of building an ambient intelligent travel companions.

Keywords: Activities, Ambient Assisted Outdoor Living, Ambient Intelligent Travel Companion, Information Communication Technologies (ICT), Personalized Services

1. INTRODUCTION

Ambient intelligence can be described as intelligent environments embedded in distributed, networked computing elements, providing a more natural and smart human-computer interaction. Examples for ambient intelligence can be the fusion of audio, visual data for driver assistance, fusion of various sensors in vehicles for driver behavior modeling, driver safety improvement and driver identification, intelligent man-machine interaction: such as handwritten mathematical expression recognition.

In this paper, an architectural approach to building ambient intelligent travel companions is explained and some specifications are given.
The personalized travel companions are aimed at people with impairments and elderly people who wish to be actively involved in social life and hence they need to be able to be on the move or travelling. Thus they need to be able to access a range of public transportation areas such as bus stops, car parks, train and bus stations, airports. In order to get the necessary support while planning their travel and while travelling, they will be supported by the personalized travel companion. The travel companion is part of the ambient intelligence environment because:

1. The services provided to the end-users are based on information provided from various sensors which are fused together.
2. The interaction between the end-users and the mobile devices which they carry with them is intelligent and personalized.

Smart spaces are considered to be environments equipped with ICT-based visual and audio sensing systems that can perceive and react to people without requiring them to wear any special devices, but instead using “of the shelf” devices such as smart mobile phones and smart pads. Usually the terms “intelligent spaces” or “smart space” are linked to an intelligent home. The Ambient Intelligence Companion Technology (AICT) system we are describing uses the intelligent/smart spaces term in a slightly different way including also outdoor environments like for example railway stations, supermarkets, and airports.

In order to make the services personalized for the target group of end-users, some private information needs to be kept about them and be reasoned upon. The privacy of the information which will be kept about the end-users is at most importance. Other important issues include storing of this information, and who will have access to the information.

As people in the society grow older, an increasing amount of people with health conditions and disabilities risk restrictions in their mobility. As a consequence, they risk suffering from a negative impact on their active and social life and being excluded from the society. Therefore, personalized mobility and travelling for all becomes a motto.

According to the European strategy in e-Inclusion and ICT for Ageing Well document (European Union, 2008), 21% of the 50+ population have severe vision/hearing/dexterity problems. For that reason, it is important to provide the impaired and ageing citizens with the support they need to keep them included in the society in the best possibly way.

Figure 1 provides as examples two persons’ residual ability profile including important physical and mental abilities/conditions that travellers would need in order to be able to complete a journey successfully (along the vertical axis). The figure also provides the percentage of existing residual abilities together with the potential augmented travel abilities offered by an intelligent travel companion (along the horizontal axis). It should be stressed that an ambient intelligent travel companion certainly does not provide enhanced physical and mental abilities as such. However, it provides relevant support such as information presented in a personalized way that compensates for the reduced abilities. For example, a person with reduced vision ability will be provided with information in the form of audio message with the feature to repeat the message as often as necessary.

An increasing number of people are using their mobile devices to connect to the web as a complement or instead of more ‘classical’ devices such as desktops and laptops. It is expected that around 2012, there will be an inflexion point leading to more mobile devices than PCs (InTrend 10). Therefore, Ambient Intelligence Companion Technology (AICT) systems have to take this tendency into consideration while taking technical decisions for the front-end design and implementation. Also, other web supports which are rapidly emerging include TVs, e.g., Google TV. Therefore, researchers and developers of AICT systems need to address these in order to be as complete as possible in the front-end offer, to emphasize them in the developed scenarios. Looking at
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