Chapter 116

Advances of the Location Based Context–Aware Mobile Services in the Transport Sector

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ABSTRACT

The present chapter focuses on the Location Based Context-aware Mobile Services (LBCAMS) in the context of the most recent technological advances in Decision Support Systems for the transport sector. The chapter demonstrates the rationale for the introduction of the Location Based Context-aware Mobile Services and the state of the art of the location-based services in the field of transport. In addition, a typology of market orientations is developed, including the demand side of context-ware mobile services in the field of transport. The chapter also introduces the theoretical outline of a five-layer model, studying the Location Based Context-aware Mobile Services, in a Decision Support System context, for applications in the transport sector. In order to advance understanding, some indicative applications are presented, on road safety and urban parking management and finally conclusions are drawn and future research orientations are explored.

INTRODUCTION

As computing becomes increasingly mobile today, applications and services need to be able to adapt to dynamic environments. Within a suitable framework, context-aware mobile services constitute a

market-oriented technological development that could potentially meet end-user needs.

In this framework a *"context"* can be defined as any set of information and/or status of elements, obtained either explicitly or implicitly, that can be used to characterise a certain aspect of an *entity* or an *event* involved in a specific application or network service. The term "*entity*" can be

defined as a person, a place, or an object that is considered relevant to the interaction between a user and an application, including user and application themselves. Similarly, the term "*event*" is denoted as any happening produced by or related to an application, which takes place under certain assumptions. A context-aware service is one that uses such a context for the provision of value to its user.

Context-aware services automatically adapt to the environment of a user, for instance to the location, time, or physical condition of a person (e.g. heart rhythm and blood pressure). The social context of the users is an important determinant in the creation of the information requirements and well being of people. An essential function of these services is the Context-aware computing, which deals with the ability of computer systems to take advantage of information in a dynamic environment in order to provide added-value services in a "best-fit" way for each particular user and time, or to execute more complex tasks. Context-awareness has received attention, in recent years, with the development of mobile computing and the appearance of a new generation of mobile devices as well as in application domains such as e-learning where the term "adaptive" is more relevant. With most cars of the future likely to be equipped with multiple embedded computing platforms, we shall witness the development of a variety of context-aware mobile services and applications with significant commercial potential.

In recent years, vehicle manufacturers have been developing advanced technologies to improve the standards of driving, to make driving easier, safer, less stressful and more comfortable. Many of these technologies are also applied to facilitate public and freight transport in order to increase the efficiency of transport networks and maximise their utilisation. These technologies, when properly applied, can potentially make the transport system more sophisticated, safer, more efficient and with less environmental impacts. In a time when major infrastructure investments are reaching their limits, the use of technology and its applications can be seen as a viable solution to make the mobility of people and goods more efficient for all transport modes.

Various terms are used to describe, nowadays, existing technologies, services, systems and functions such as (Abele, 2005):

- **ITS:** Intelligent Transport Systems and Services,
- **ADAS:** Advanced Driver Assistance Systems,
- **AVG:** Automated Vehicle Guidance,
- **AVCSS:** Advanced Vehicle Control and Systems,
- **IVSS:** Intelligent Vehicle Safety Systems.

In a different way of clustering, these systems could be presented as follows:

- vehicle-based systems;
- infrastructure-based systems (primarily roadside sensors which collect information along with roadside equipment which issues warnings and advice);
- cooperative systems (utilise both infrastructure-based and vehicle-based systems with communication links between them).

The above-mentioned transport and vehicle oriented systems, can contribute to the minimisation of the negative effects of transport on society, mainly road traffic accidents, congestion and pollution. According to the European Commission (EC, 2006) there are around 300 million drivers in the EU Member States, wishing to have had easier driving with less trouble, less delay, and lower probability for accidents. Within the spectrum of transport problems, safety is the aspect with the most serious impacts on citizens' daily lives, with a high impact on most socio-economic indicators. Despite the continuous efforts of the past years there are still over 40.000 fatalities on the Euro 27 roads every year, with 1.4 million accidents at a

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