Chapter 9

IPML: Structuring Distributed Multimedia Presentations in Ambient Intelligent Environments

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ABSTRACT

This paper addresses issues of distributing multimedia presentations in an ambient intelligent environment, examines the existing technologies and proposes IPML, a markup language that extends SMIL for distributed settings. It uses a metaphor of play, with which the timing and mapping issues in distributed presentations are covered in a natural way. A generic architecture for playback systems is also presented, which covers the timing and mapping issues of presenting an IPML script in heterogeneous ambient intelligent environments.

INTRODUCTION

Ambient Intelligence (AmI) is introduced by Philips Research as a new paradigm in how people interact with technology. It envisions digital environments to be sensitive, adaptive, and responsive to the presence of people, and AmI environments to change the way people use multimedia services (Aarts, 2004). The environments, which include many devices, will play interactive multimedia to engage people in a more immersive experience than just watching television shows. People will interact not only with the environment itself, but also with the interactive multimedia through the environment.

For many years, the research and development of multimedia technologies have increasingly
focused on models for distributed applications, but the focus was mainly on the distribution of the media sources. Within the context of AmI, not only are the media sources distributed, the presentation of and the interaction with the media will also be distributed across interface devices. This paper focuses on the design of the structure of multimedia content, believing that the user experience of multimedia in a distributed environment can be enriched by structuring both the media content at the production side and the playback system architecture at the user side in a proper way. We refer to the adaptation at the user side as the mapping problem. One important aspect of the mapping problem is sketched in Figure 1. The content source and the script should be independent from the question which specific devices are available at the user’s side. This may vary from a sophisticated home theater with interactive robots (left) to a simple family home with a television-like device and a lamp (right). There is no a priori limit to the type of devices, for example PDAs and controllable lights are possible as well. The playback environment need not even be a home; it could be a professional theater or a dedicated installation. The structure should enable both the media presentation and the user interaction to be distributed and synchronized over the networked devices in the user environment. The presentation and interaction should be adaptive to the profiles and preferences of the users, and the dynamic configurations of the environment.

As El-Nasr and Vasilakos (2006) point out, there is very little work that allows the adaptation of the real environment configuration to the cognitive spaces of the artists, in our example, the authors of the content and the script. The area of Cognitive Informatics (Wang, 2006, 2007) provides interesting insights into this issue. In particular this is a field studies the mechanisms and process of natural processing and intelligence, including emotions, cognition, decision making, and its application to entertainment, engineering, educational, and other applications. On the one hand, the users and the authors should not be bothered by the complexity hidden behind the surface of the ambient intelligence; on the other hand the ambient intelligent environment should be able to interpret the user’s needs in interaction and to adapt to the author’s requirements in presentation. The common part that the users and the authors share is not a particular user’s environment, but only the media content. The media content should be structured in such a way, that the requirements from the both sides can meet. To structure the media content, the following issues need to be addressed:

1. By what means will the authors compose the content for many different environments?
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