Chapter XX
Mobile Virtual Blackboard as Multimodal User Interface

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ABSTRACT
Multimodal mobile virtual blackboard system is made for consultation among students and professors. It is made to improve availability and communication using mobile handheld devices. Our system enables different forms of communication: chat, VoIP, draw, file exchange. Providing greater usability on small screens of mobile devices can be done by adaptation of the features in an application according to the specific user preferences and to the current utilization of the application. In this chapter, we describe our mobile virtual table consultation system with special attention to the multimodal solution of the user interface by using XML agents and fuzzy logic. The general opinion among the participants of the consultations lead on this mobile system is positive. Participants mark this system as user friendly, which points out that our efforts in development of adaptable user interface can serve as good practice in designing interfaces for mobile devices.

INTRODUCTION
The emerging advancement of various technologies (computers, handheld devices, cell phones, communication networks) is going in the direction to provide same services to be available from many different interfaces. Today, it is expected television to provide dynamic and interactive content, laptops to access the Internet through various network connections, and the cell phones do not provide voice telephony solely, but they also begin to provide greater interaction with services and
information sharing using the Internet. In very near future, it is expected all these three types of communication to be able to provide the same services, using different ways to accomplish this task. Obviously, the carriers of the communication will be different. Television, as immovable device, uses fixed infrastructure as cable and fiber optics. Mobile devices use various types of networks, such as wireless networks for mobile telephony, GPRS, Wi-Fi, 3G. Laptops use communication through fixed and wireless networks (PSTN, ADSL, Wi-Fi, WiMax, LANs, WANs, cable networks). The convergence of the utilization of different devices, such as TV, computer and cell phone, produces many variations of devices, as well as many variations of the way how the communication is carried. Besides providing same services through different forms of the communications, new, modern utilizations emerge from this multi-connected information world. Some of the modern utilizations of the multi-connected world are: e-Commerce, teleconference, e-Learning, online banking, personal communication through messengers, various communities, gaming etc. A slightly different, new way of providing various kinds of services is the mobile environment. A new, logical requirement imposes in front of the human development: everything should be available everywhere, at any moment. Mobile devices are developed to provide more and more services, previously available only through personal computers and television. So, m-Commerce is becoming reality, websites are customized and displayed through mobile web browsers. Personal communication and businesses are advanced through mobility and availability of the person at any moment. A person can call, send SMS, MMS, IM, e-mail, voice and video calls through his/her mobile device, and in that way he/she can stay available even when out of the office, on a journey or else. Besides the existing services that are being mapped from the desktop to the mobile environment, new kinds of services are being developed. Navigation and global positioning have become widely available. Location Based Services (LBS) are in their rising phase of development and discovering new usages. They will advance the enterprise, entertainment, public and other sectors.

In this pool of new services that are emerging through the mobile technology, one of the most honorable utilizations of the mobile environment is mobile learning [Luchini, Quintana, & Soloway, 2004]. Mobile learning is a new way of acquiring knowledge, which is highly adaptable [Glavinic, Rosic, & Zelic, 2007], [Jeong & Lee, 2007] to different kinds of student profiles [Misfud & Morch, 2007], from people that do not have time to attend normal courses to a practical enhancement of ordinary courses with additional access to the knowledge. Mobile learning is appropriate for acquiring small pieces of knowledge at a time. Persistent use of this source of learning contents can lead to a great amount of acquired knowledge. Everybody can use it to fulfill his/her knowledge in this world of fast changes where success depends on information. Besides the static contents that are provided by books and different digital multimedia [Gang & Zongkai, 2005] that just reside passively on servers, very important aspect of learning is exchange of knowledge and consultation process among student participants and available expert authority (professor/instructor) [Chang & Ishii, 2006].

Our project, Mobile Virtual Blackboard is developed for student - professor communication, for achieving availability in any situation. Besides the development of the various means of communication, such as VoIP, text messages, drawing on the dashboard, we had to take into the consideration the intuitiveness of the user interface and make the interface behave in the manner the user expects and interacts with it. For the purpose of achieving usable interface on small screens, we have made improvements in layout adaptation of the most frequently used features at the time within our application. We have developed a multimodal user interface that can automatically...