Chapter 18
Integration of Wireless Technologies in Smart University Campus Environment:
Framework Architecture

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ABSTRACT

In this paper, the authors are particularly interested in enhancing the education process by integrating new tools to the teaching environments. This enhancement is part of an emerging concept, called smart campus. Smart University Campus will come up with a new ubiquitous computing and communication field and change people's lives radically by providing systems and devices supported with smart technologies that have the capabilities of rapid respond to changes and circumstances without human interference, and it will be able to learn from these circumstances. This paper presents framework architecture for integrating various types of wireless networks into a smart university campus to enhance communication among students, instructors, and administration. Moreover, the authors study two possible applications to utilize the proposed networking framework: smart identification and social collaboration applications. An essential part to achieve the main principles of smart university campus is the deployment and usage of smart card technologies for identification and payment. Nowadays, there are several

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types of smart identification cards that support wireless technologies such as RFIDs and NFC. In both types, a card reader can read the card information from a distance. Moreover, in NFC cards, the card is integrated with the user's cellular phone. Social networking services (such as Facebook) facilitate online communication and provide a suitable environment for collaboration among students. As a part of future work, the proposed framework is deployed in the authors' university campus to find out the end-end performance and system usability.

INTRODUCTION

The widespread of mobile devices with pervasive information appliances allows for the development of new information environments. Researchers and market needs realize a ubiquitous university campus information system by automatically combining mobile devices interaction with environment in an intelligent way.

Smart Campus will come up with a new ubiquitous computing and communication field and change people's life radically, by providing systems and devices supported with smart technologies that have the capabilities of rapid respond to changes and circumstances without human interference, and it will be able to learn from these circumstances. In this paper we propose a framework for integrating several emerging wireless technologies for smart campus. The proposed framework is intended to improve the social networking aspects among students, instructors, and administration. Several applications can be built to utilize the underlying proposed framework.

Social networking is an emerging and important concept in young students' daily activities. Students shares their daily life experiences and thoughts with their colleagues and friends, they chat and communicate all the time. Students spend a great amount of time on social networking sites. This trend has several social challenges as it limits real life interaction among young generations and it limits such interaction to computers and other electronic devices. However, and despite its challenging nature, these social networks can be utilized as educational tools and expand the horizons for the new generations of student to access and share knowledge related to their studies. An example of such usage, currently, in software development disciplines, where students learn how to write computer codes, a new generation of developing environment called Collaborative Development Environments (CDV) (Booch & Brown, 2003) and Social Development Environment (SDE) (Lanubile, 2009) are implemented such that software developers can share their ideas and codes.

The rest of this paper is organized as follows: Section 2 reviews some of these technologies, namely, Bluetooth, and ZigBee. Section 3 discusses some of the recent works on smart campus. Section 4 proposes the networking framework; it presents the 4 tires of communications using emerging wireless technologies Section 5 describes two applications for smart campus initiative: smart identification and social collaboration. Finally the conclusions and future works are drawn in Section 6.