PDA MOBILE LEARNING USING INDOOR INTELLIGENT WIRELESS WHITEBOARD

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ABSTRACT

The information and the educational technologies has rapidly changed in recent years. The application of information technology typically Mobile has become as new technology that can enhance the quality of learning. More class time and assignments in introduction to information technology should be dedicated. This paper reports on the designing the interface of a mobile learning PDA based on wireless whiteboard classroom architecture. Developing an adaptive and context aware mobile learning system is presented. Therein, the proposed technique would definitely enhance the lecturer's hand written notes to integrate PDAs in classroom. Future development approaches for systems supporting learning environments is considered.

Keywords: **Educational; mobile; learning; whiteboard; interface; wireless.**

INTRODUCTION

The main issue concerned in education system is whether the typical way of teaching martial such as whiteboard in normal classroom is capable of deliver must of the new course martial (curriculum) with best result of learning. Mobile technology have a high potential for improved learning (T. Liu, 2003)(J. Massy ,2002). Mobile devices can enhance learning and it could be through Mobile Learning (M-Learning) which is an approach to electronic learning (E-Learning) (A. Kukulska-Hulme, 2005). This paper is focusing on the main problem exists in the classroom which is how a student can copy all the material written on the white board without losing the concentration of the lecturer's speech.

Also the paper is explores what factors and design requirements are needed for M-Learning environment and suggests how M-Learning application can be designed. The following section definition of the mobile network is given. In the section three, reviews the literature review and previous work for M-Learning applications. Section four designs and analysis of the M-Learning environment is described. The final section provide conclusion and future work.

MOBILE NETWORKS

An useful definition for the Mobile network types is necessary before given background on the ML applications. The most common networks used for mobile are CDMA and GSM, which were originally designed to transfer voices (Tsai C-S, 2005). Then the CDMA and GSM are used for transferring data such as SMS.

The technical advances on wireless networks have begun to use a more reliable connection beyond SMS such as GPRS (General Packet Radio Service) which permitting mobile to access the internet without requiring dial-up connection mechanism(Wood K. , 2003).

Second wireless network is Bluetooth, which is a short range communication used to transfer data between Bluetooth enabled devices, for example, PDA (Personal Digital Assistants) can receive up messages from the mobile (http://www.cwu.edu/~rawlinsd/Appendices.html) (Wigley A.,2003). The SMS has evolved into Multimedia Messages Service MMS, which means that a text message can now have graphics and images as well.

LITERATURE REVIEW

For some years researchers have been working in Mobile Learning and focusing on different perspectives among ML. The mobile application for the semantic web have investigated (Chang V., 2006), where mSpace, a software tool that has been developed for a few years, is under the comprehensive review of usability. The authors have listed all cases of using the mSpace, and advise the users the best practices for ML. A strong management is a key towards success while delivering ML (Wigley A., 2003). The security aspects focus on (Tsai C-S 2005), where multi-agent security service architecture is proposed but not implemented yet.

They also investigate the current Java and .NET Web Services for ML and also propose the Proxy architecture for all client-server interactions. Their results are indeed very comprehensive and up-todate. However, their discussions are purely based on the client-side usability, testing and server-side investigations for mobile devices and do not include any relation between the wireless white board in the classroom and Mobile Learning.

This is a critical research objective, and the results of which are discussed in Section Three of this paper. Summarizes the features for mobile devices, and also presents the advantages and disadvantages of using mobile devices for ML is given (Wood K., 2003). Out of many possible forms of mobile devices, only PDA/Pocket PC is selected for this investigation. PDA/Pocket PC

- **Cost not expansive.**
- **Prevalence more commonly found in education environment.**
- **Portability.**
- **Just about to fit into large pockets.**
- **Mobility One hand to hold and one to operate pen or keyboard.**
- **Weight 125 – 180 g.**
- **Power 8 hour battery life Functionality Scaled down version of desktop OS,**
- **with handwriting recognition.**
- **Memory (typical) 32-64 MB.**
- **Storage capacity (typical) 128 MB.**

The wireless client server required a robust desktop as main server information control and management provider. This is a reliable method for wireless communication and ML. However, this paper attempts to explain how PDA Pocket can be further customized as copier for all the materials that have been written on the whiteboard, so that student(s) can be easy follows the lecturer talk without any interruption cause by the student's handwriting on hard paper (notes). 4. PDA Mobile Using Wireless Whiteboard classroom

Wireless Whiteboard

For this part of the paper, a wireless whiteboard is used for usability and testing. The wireless whiteboard is a normal whiteboard but added to it two censers located at top left and bottom down corners respectively.

The sensors are transmitted signals of the sequences position in of the electronic pen (WEI GAO, 2004) that used for writing over the whiteboard by the lecturer (trainer) wirelessly to server. The electrical pen has ability to detect the x-, y-and z-direction of component of writing force.

Figure: 1 shown the wireless whiteboard and its located sensors. The lecturer is using the electrical pen button at the top of it to skip the next empty page of the PC server screen page and the students then will save the current PDA page to receive the next one.

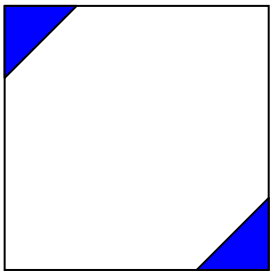

Figure: 1
Wireless Whiteboard with two sensors (blue corners)

PDA Mobile: Client Cide (student)

A PDA/Pocket PC with Windows Mobile 2003 operating system was used as a client (student) for the Testing and Usability. The specifications were matched to a particular make and model of PDA that could accomplish the proposed method and performance objectives is the Dell Axim 30 (312 Mhz) PDA. The PDA is able to or can be used for note taking, data collection, digital imaging, email, connect to the internet and finally browse dynamic .NET pages of the 64-bit .NET . However, there is one disadvantage while doing so. The speed is slow because the limitations of the PDA memory, which is 32-64MB. From the student's point of view, PDA is suitable in only mini-desktop functions and that is an advantage supporting the basic work of this research.

Wireless Classroom Networking

As a core aspect for Mobile Learner, wireless communications must be set up. The common technique is to set up a server, a wireless ADSL router with the broadband/LAN internet access, so that any students can be connected to the wireless network with the use of wireless PC cards or PCI adaptors.

Wireless network is also known as Wi-Fi (wireless Fidelity), which is a term used to describe various standards of wireless networks. The purpose for setting up a classroom networking is to allow more than ten PDAs connecting to the internet simultaneously and wirelessly without slowing down the broadband connections. The network protocols require Wi-Fi, Ethernet, Bluetooth and broadband.

Recognition Lecturer's Notes

The handwriting recognition will be the key solution for the PDA wireless copies, edit and taking notes that received from the wireless whiteboard to help the students save a corrected and clear version of the notes. This is an advantage for some students, particularly those with disabilities in writing.

CONCLUSION

In this paper proposed new copying whiteboard written notes wirelessly has been introduced. The student ability to focus and concentrate on the lecturer's explanation without any interruption using Mobile and all the lecturer's notes been saved individual in correct form for future reviewing by the students. The limitation of the lecturer's notes saved on PDA Mobile is subject to the memory capacity of the Mobile. Shorter battery life time (compared to laptop computer) and lack of large amounts of non-volatile storage is also limit the use of PDAs. Future work could be done based on the proposed method using web-side application for mobile devices.

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REFERENCES

A. Kukulska-Hulme and J. Traxler. (2005). *Mobile teaching and learning*, A handbook for educators and Trainers, London Routledge.

Chang V. (2006). *The Three Elements in the 64-bit .NETMobile Service: Mobile Framework: Web Service Testing and Interoperability between .NET/Windows and Java/Linux*, the 15th WWW 2006 Conference.

J. Massy (2002). *Quality of eLearning in Europe*, London, Proceedings of the International Conference on e-Learning, PP10-18

SHIMIZU Hiroki ; KIYONO Satoshi ; MOTOKI Takenori ; WEI GAO ; (2004). *An electrical pen for signature verification using a two-dimensional optical angle sensor*, Journal Sensors and actuators, vol. 111, pp 216-221.

T. Liu, H. Wang, J. Liang, T. Chan, H. Ko and Y. J. (2003). *Wireless and Mobile Technologies to enhance teaching and learning*, Journal of Computer Assisted Learning, PP 371-382.

Tsai C-S, Shen B-F, (2005). *Hand off Design For SIP Based Wireless Local Area Network*, Proceeding IADAT- Conference, UK.

Wigley A., Roxburgh P.,(2003). *Building .NET Applications for Mobile Devices*, Microsoft Press, ISBN 0-7356-1532-2, Publisher: Redmond, Wash

Wood K. (2003). *Introduction to Mobile Learning*, Ferl British Educational Communications and Technology, Published 2006 Jessica Kingsley Publishers