Mobile Learning Combined with RFID for Technical and Vocational Education and Training

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ABSTRACT
In this paper, we present a technique of mobile learning for relating paper maps and electronic information resources using radio frequency identification (RFID), mobile device and Wi-Fi technology. The system combining paper maps with electronic guide resources. Information about a training problem or region is accessed by waving a handheld computer equipped with an RFID reader above the region of interest on a paper map. Mobile device have been used as tools for navigation learning and mobile-learning information. It presents the prototyping efforts, including vocational education and training problems learned about using RFID for mixed media interfaces.

Keywords
Mobile learning, RFID, Wi-Fi, Vocational education and training

1. INTRODUCTION
Recently, Mobile learning is growing explosively. With the development of the internet, wireless communication technology and mobile device, mobile commerce becomes more and more popular. Mobile learning enables you to do study in any time, any place [1][2].

The mobile communication revolution has led to pervasive "connectedness"- as evidenced by the explosive growth of instant messaging in the home, and more recently, the enterprise- and, together with the convergence of mobile computing, provides a basis for extending collaborative environments toward truly ubiquitous "immersion." Leveraging the true anytime/anywhere access afforded by mobile computing. The application of 3G threaded discussion in m-learning is suggested by data that show the learner base to be increasingly invested in e-communication and mobility [3].

Radio frequency identification (RFID) is anticipated to be a core technology that will be used by various ubiquitous services. Mobile RFID is a new application to use mobile phone as RFID reader with a wireless technology and provides new valuable services to user by integrating RFID and ubiquitous sensor network infrastructure with mobile communication and wireless internet. With the help of mobile RFID technology, people could contract with goods attached RFID tag anywhere. Mobile RFID technology will greatly improve mobile leaning [10].

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2. SYSTEM INTEGRATION
The mobile devices of student via RFID reads are continuously sent to the server, which keeps track only of the most recent tag ID. The mobile devices user interface was accomplished using a standard web browser. Pressing a physical button on the handheld computer (or mobile devices) mapped to a request for the server's base URL causes the server to retrieve html-formatted information mapped to the most recently read tag ID, which is then displayed on the mobile devices screen. The mobile learning was developed to synchronise wireless with a user's personal web based portfolio from any remote location where a cellular telephone signal or wireless (Wi-Fi) connection could be obtained shown as Figure 1.

3. MOBILE RFID SERVICE
Mobile RFID loads a compact RFID reader in a cellular phone, providing diverse services through mobile telecommunications networks when reading RFID tags through a cellular phone [11]. The RFID technology provides a lot of information of goods to make-up convenient. Researchers have proposed utilizing RFID and PDA-size mobile device to improve Mobile learning. But the mobile device is separated from RFID reader. The RFID reader gathers data and sends them to the internet. The mobile device only receives or gets these data via Internet and wireless network. In this paper, the system will focus on how to use this technology to improve regular the mobile learning for common students.

In mobile RFID, we have to expand our concern into a reader-carrying user's privacy. We can easily expect that mobile RFID, that mobile RFID applications will be used for personal use, not for companies and organizations, because people have their own RFID reader. More over, mobile RFID reader can be moved everywhere by reader-carrying user like RFID tags. Therefore, the risk of privacy violation is expected to increase in mobile RFID shown as Figure 2.

4. MOBILE LEARNING
The convergence of mobile communications and handheld computers offers the opportunity to develop technology that will assist individuals and groups to learn anytime, anywhere [5]. Emerging mobile technologies provide a vehicle for evolving threaded discussion to a third generation (3G) that better emulates face-to-face discussions by delivering the discourse, in

device-scaled form, to the participants in real time wherever they are. Constructivist learning has taken on increasing attention in the popular shift of instructor/learner roles toward a learner-centric model. Constructivism emphasizes the ability of learners to build their own knowledge and understanding of a given topic. As mobile computing clients have evolved, they have incorporated the ability to access many different types of networks from centralized LANs and Wide Area Networks (WANs), to 802.11 hotspots, and peer-to-peer connectivity via infrared, Radio Frequency (RF), and Bluetooth. The presence of all these options in single devices opens up the possibility of extending ubiquitous access beyond the reach of current telecommunications build-outs. On the other hand, users can connect directly with other devices using peer-to-peer networks, bypassing the centralized networks and servers to share data directly with each other. Mobility is quickly being embraced by the learning community and promises to effect dramatic changes. Aside from providing true anytime, anywhere access to resources, mobile devices can be used as data collection tools for students conducting primary research, and in support of direct client interaction in professional disciplines like instrument marking, mechatronics and instrument testing and control [4].

Much electronic tour guide research has grappled with the tension between context-driven information 'push' and user-driven information 'pull'. Integrating an electronic resource like a guide with a paper map provides a clear way to achieve information pull, recognizing that information needs while touring or way-finding are not always dictated by current location [1].

5. RFID TECHNOLOGY

RFID stands for radio frequency identification. It is an automatic identification technology whereby digital data encoded in a RFID tag or smart label is captured by a reader using radio waves. Mobile RFID loads a compact RFID reader in a cellular phone, providing diverse services through mobile telecommunication networks when reading RFID tags through a cellular phone. It uses a mobile phone as RFID reader with wireless technology and provides new valuable services to users by integrating RFID and wireless mesh network infrastructure with mobile communication and wireless internet [6].

RFID systems using a contact-less IC card or IC tag are being used as automatic ticket checkers used in the railway stations, security systems checking people going entering or exiting from buildings, and electronic-money systems. New fabrication techniques and algorithms providing better security have been developed so mobile systems using RFID communication systems are now possible. 13.56MHz-RFID systems have realized near-field communication by adopting electromagnetic induction. An electromagnetic field radiated from a loop antenna provided in the reader/writer is coupled by electromagnetic induction to a loop antenna in the IC card. However, if the loop antenna is installed on a metallic housing such as that of a PDA (personal digital assistant) or a mobile phone, the loop antenna for the reader/writer cannot efficiently radiate an electromagnetic field to the IC card: due to eddy current loss, the communication range between the IC card and reader/writer is narrow. Current non-portable products apply magnetic sheets to minimize the influence of metallic housing, however a small, thin magnetic sheet for mobile systems is not effective in allowing communication with a reader/writer at some distance [8].

6. WI-FI AND MOBILE CELL PHONE

The emergence of VoIP will also affect the Wi-Fi and mobile markets. A Wi-Fi enabled phone might use the WLAN data infrastructure for mobile service within a building, providing an alternative to more costly cellular service [7]. Other examples include laptop computers/PDAs (or mobile cell phones with built-in 802.11b). With the appropriate software, these platforms can use public Wi-Fi hotspots or emerging 3G data service for VoIP-based toll bypasses. An alternative would be 3G functionality for laptops/PDAs. 3G offers enterprise workers the best of both worlds with mobility and enterprise connections.

7. SECURITY OF MOBILE RFID

Encrypting a tag identifier seem to be a good solution to address the problems of privacy, but is does not solve all problems because encrypted identifier is itself just another identifier. In addition to this problem, there is the problem of key management in encryption scheme. But the most important problem above all, is the problem of cost. There are an increasing number of researches related to encryption, but it would be difficult to apply them to low-cost tags because of the cost problem [6].

There are a wide variety of security concerns with RFID tags. One concern of interest is the ability to track the location of a person or asset by an unintended actor. While the RFID specifications generally deal with short ranges (a few inches to a few feet) between the readers and the tags, specialized equipment can pick up a signal from an RFID tag much farther away.

This is a similar problem to that with wireless LAN's. Normally a WLAN is only effective for a user within 100m or so. But an attacker with powerful antennas can be more than 10km away and still access the network. RFID tags fall prey to the same problem; an attacker can be two orders of magnitude farther away than intended and still read data. For instance, if an RFID tag is designed to be read at 1 foot, an attacker may be able to be 100 ft away and still interact with it. RFID tags typically only contain a unique number that is useless on its own. The idea is that the reader interfaces with some backend system and database for all transactions. The database stores the information that ties the unique ID to something of interest. For instance, the database knows that ID 1234 is attached to a bar of soap. An attacker reading RFID's would not know, without access to the database, what ID 1234 is.

Unfortunately, we cannot always assume that an attacker will not have access to the backend database. As the last decades of network security have demonstrated, backend systems are often all too easy a target for an attacker. And

once the database tying the unique ID's to physical items has been compromised, it would be nearly impossible to retag all items in response.

The vast majority of RFID tags on the market require no authentication to read the information on them. This allows anyone, an attacker or even just a competitor, to read the data on an RFID chip. Further, many tags have the capability to write information to the chip without authentication. This is especially troubling for enterprises relying on RFID for things like supply chain management. An attacker could theoretically overwrite values on the RFID tags used by the enterprise, thereby wreaking havoc with their RFID system [12].

8. CONCLUSION

This system given the advantages of handheld technologies, the exponential growth of its use in vocational training and the computing and data management capabilities of the PDA it would seem a logical and powerful tool to support the mobile use of portfolios in the training program learning environment. A multifunctional computing and communications platform it appears that the wireless PDA can support and it improve vocational training learning, and this point the reference and the communication tools seem to provide optimum value to the student's learning shown as Figure 3,4. Wireless networked PDA resources can help prevent the isolation of students whilst engaged in major practicum.

9. REFERENCES

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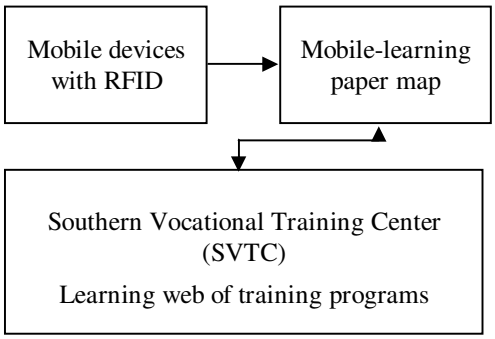

Figure 1. Mobile-learning combined with RFID system

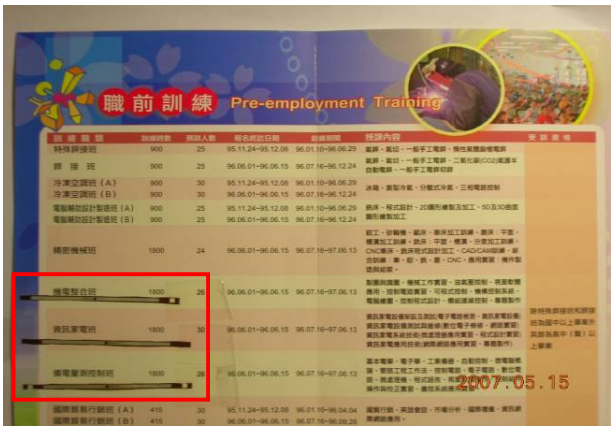

Figure 2. Vocational training paper map with RFID

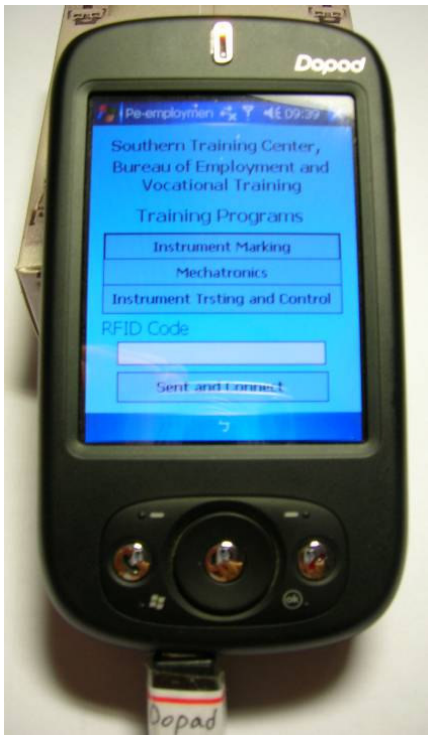

Figure 3. Mobile learning of training programs

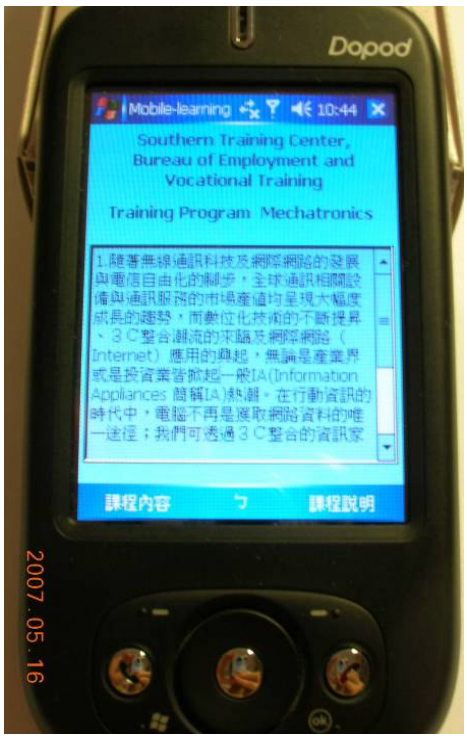

Figure 4. Training programs information