

Early infrastructure of an internet of things in spaces for learning

Tejal Rachh, Priti Rumao, Bhavnaarora, Nida Parkar

Computer Department, Atharva College Of Engineering, Mumbai University India

Abstract The deployment of mobile and ubiquitous computing in smart objects introduces the concept of an internet of things which will offer new scenarios for Learning processes. This paper presents this concept in Relation with some other new alternatives of spaces for Learning. A basic architecture for interaction is Proposed and a set of prototypes that we have Developed are also explained as part of an early Infrastructure.

I. Introduction

The new concept of an internet of things (IoT) brings a new opportunity for the creation of innovative options for learning; this concept is possible due to the evolution of concepts from ubiquitous computing and technologies as mobile, RFID and others. This paper focuses on a specific technology for the deployment of an IoT known as near field communication (NFC) and explores some early scenarios and implementations to be applied in spaces for learning. The structure of the paper is as follows. First a background on IoT related concepts and technologies will be exposed. In section 3 we capture our proposal for the infrastructure and prototypes of an IoT in spaces for learning. Finally some relevant conclusions and future considerations are captured at the end of the paper.

II. Internet of thing technologies

The new field of "Ubiquitous computing" [1] or "Ambient intelligence" [2] has brought computing capabilities to the physical context and has expanded the intelligence of objects surrounding us. Actually we have gone from smart places to smart objects in which objects can interact with each other and with people. In

2005 the international telecommunication union (ITU) published a report named "ITU internet reports 2005: The internet of things" [3]. This publication is part of the series of "ITU internet reports". It looks at the following stage in which novel global technologies (such as radio frequency identification and sensors) promise a world of networked and interconnected devices that provide relevant content to users. This publication covered a review of enabling technologies, business opportunities, public policy challenges, and implications for the developing world.

2.1 Near field communications

Near Field Communication (NFC) is one of the latest wireless networking technologies based on RFID. As a short-range wireless connectivity technology, NFC provides intuitive, simple, and safe communication between electronic devices. NFC [4] is distinguished by its intuitive interface. An ABI Research forecast that by 2012, some 292 million handsets (over 20 percent of the global mobile handset market) will ship with built-in NFC capabilities [5]. In this paper we will describe a proposal using NFC mobile phones from Nokia as a personal device in spaces for learning.

III. Infrastructure

3.1 general architecture

A previous version of the general architecture can be found in [6]. As an evolution, part of the architecture interacts directly with tags and other interacts with other devices. In this version, the communication is implemented only for Bluetooth. It helps to interact with NFC interactive panels as described later.

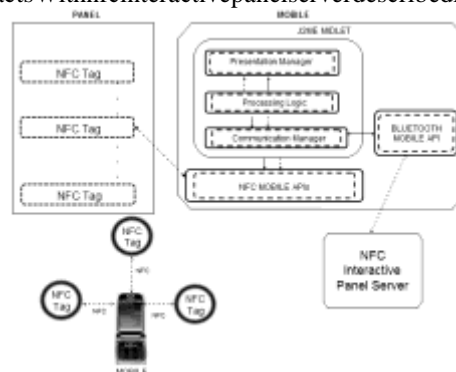


Figure 1. General architecture

3.2 Prototypes

The following prototypes have been developed in the context of the mosaic project [7], using a NOKIA 6131 NFC mobile phone and some RFID tags. More data almost related to the touching note, touching cabinet and touching campus can be found in earlier works [8]. As part of most recent effort about these prototypes, the NFC interactive panel will be explained in detail.

Touching Note

The "Touching note" makes use of an NFC tag with the information of a text note; this is placed in the door of the teacher's office to give relevant information while a person is not present. In figure 2, there is an office door with a tag.

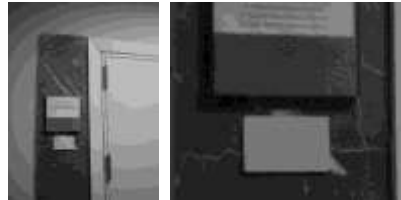


Figure 2. Scenario of "Touching Note". Touching cabinet

A place or object in a space can be tagged to give some basic information to the student only by touching. In this prototype, the object will have a tag with textual information. In figure 3, there is a tagged cabinet.



Figure 3. Scenario of "Touching cabinet". Touching campus

The application proposed for this prototype is a campus recommender, which basically gives indication to new students and other people who don't know much about the campus and need to know more about the places of interest to be found or found their actual location.

NFC interactive panel

In this prototype, a mobile phone is used to touch a surface and interact with information only by touching with a phone. On figure 5, you could see the front and back of the panel, and some pictures of its function. To enable this, the NFC interactive panel uses a phone with Bluetooth and NFC. NFC provides the touch and Bluetooth the communication. NFC tags are set in the surface and via a 2m it connects to a server that displays the action. A difference with other technologies for display is the cost of implementation. The cost is reduced to tags and a PC with Bluetooth. Another important difference is the possibility to be resized. Some videos of the NFC interactive panel are available in [9].



Figure 5.F interactive panel.

IV. Conclusions

This Paper Proposes An Early Infrastructure Of An Internet Of Things To Be Introduced In Spaces For Learning. This Infrastructure Makes Use Of NFC As The Technology To Enable Mobility And Interaction With Physical Spaces.

It Also Proposes Four Prototypes. The “Touching

Note” Captures The Basic Need Of Communication Between Students And Teachers And The Space To Cover Is A Teacher’s Office. The “Touching Cabinet” Represents The Need For Searching Physical Objects In The Real World And The Space To Cover Is The Laboratory. The "Touching Campus" Is An Early Approximation Of The Interaction Between Campus Buildings With Students; This Represents A Large Scale Of Space Interaction. The NFC Interactive Panel Represents A Basic Interaction Of Students With The Most Representative Icon Of A Classroom.

Mobile Phones Are A Probable Tool Which In The Near Future Will Be Able To Support The Different Types Of Processes Needed In Learning Scenarios. Every New Technological Featured Embedded In Mobile Phones Facilitates Their Successful Use For Learning Experiences. Many Of These Technological Features Will Be Part Of The Next Generation In Educational Environments. This Implies Different Analysis And Future Research About Student Behaviour In Relation With Mobile Phones.

References

- [1] Weiser, M. The computer for the twenty-first century. *Scientific American* 265(3), Pp.94-104, September 1991.
- [2] Aholaj (2001) Ambient intelligence, *Ercim news*, No47, October 2001. Available in: http://www.ercim.org/publication/ercim_news/enw47/intro.html
- [3] International telecommunication union “ITU Internet reports 2005: The internet of things”. 2005 Nfc forum. Whitepaper. The key to truly
- [4] Interoperable communications. 2006
- [5] Abiresearch press release. Twenty percent of mobile handsets will include near field communication by 2012. <http://www.abiresearch.com/april11,2007>
- [6] Ramírezg, Muñozmandelgadoc. Exploring nfc for supporting mobility in learning scenarios. IADIS International conference on mobile learning 2008. Algarve, Portugal. April 11–13. 2008.
- [7] Mosaic project <http://Mosaic.Gast.It.Uc3m.Es/>
- [8] Ramírezg, Muñozmandelgadoc. Iot early possibilities in learning scenarios. Workshop on designing the internet of things for workplace realities: Social and cultural aspects in design and organization (Social-Iot). Zurich, Switzerland. March 26. 2008
- [9] Nfc interactive panel. Available video in. <http://www.youtube.com/user/Gusramir>