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Pervasive Mobile Learning System in the New Millennium

Shili Mohamed[1,*], Moez Chebbi[2], Santosh Kumar Behera[3]

[1]Institute of Applied Science and Technology of Sousse, Tunisia
[2]ISET Kairoaun, University Tunisia
[3]Department of Education, Sidho-Kanho-Birsha University, Purulia
*Corresponding author: santoshbehera.skbu@gmail.com

Abstract This paper presents a new approach in the localization of student in the class. This paper reviews the evolution of learning technologies in general and recent advances in mobile learning and pervasive learning in particular. In this work, we aim to study, model and simulate an ambient mobile system based on intelligent agents for the Mobile learning (M- learning). The mobile agent concept is not based on the traditional client-server model, but on distributed executive models. The mobile agent concept is not based on the traditional client-server model, but on distributed executive models. In our work we proceed as follows: first, we introduce the scope and the genesis of our research, second, we hold out the related works, afterwards, we present our system model for the M-learning and an overview of the system implementation, and finally we conclude our work and give some perspectives.

Keywords: *agent, E-learning, M-learning, localization, mobile*

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1. Introduction

During the past decade, Mobile Learning (m-learning) and Pervasive Learning (p-learning) are attracting increasing worldwide, due to a number of technical and societal reasons [1]. The emergence of the knowledge society poses new requirements for education and training: the knowledge-based economy requires a flexible, well-trained workforce; and the citizens of the information society need to be continuously (re)trained in order to remain competitive within this workforce, and to fully exploit the knowledge society for their personal development [1]. There are several Application Development generic to the specific platform User: QCM system or vote, CHAT, viewing application deported customer BLOG etc. Often develop in Java. As mobile devices are becoming ubiquitous, there is an increasing interest in the educational applications of mobile technologies, a research area referred to as mobile learning. Mobile learning refers to the use of mobile or wireless devices for the purpose of learning while on the move [2]. The reasons for the use of mobile devices for learning: Students often find their informal learning more motivating than formal learning. An adult spends an average of 15 hours learning per week personally [3]. This system allows facilitating communication and the exchange of knowledge and data in a dynamic environment that can cope with the dynamic changes of devices, platforms, applications in a pervasive environment. These models use the technologies of web services, that is to say the exchange and communication of knowledge in the system are made by web services [4]. In the following sections, we will present: first the introduction. In the second section of this paper, we present the definition of m-learning. In the third section, we will study the similar works. Then, we present our proposed system in the fourth section. Section fifth presents system implementation, and after we will present our results. Finally, we present our conclusions and future work in the last section.

2. Definition M-learning

Mobile learning combines E-learning and mobile computing. Mobile learning is sometimes considered merely an extension of E-learning, but quality M-learning can only be delivered with an awareness of the special limitations and benefits of mobile devices. Mobile learning has the benefits of mobility and its supporting platform. M-learning is a means to enhance the broader learning experience. M-learning is a powerful method for engaging learners on their own terms. E-learning and M-learning diagrammatically mentioned below [5]:

Table 1. Functionality and mobility in a definition of mobile learning

Functionality		**Mobility**		
Computer	Laptop computers	PDA's handhelds palmtop	Smart phones	Mobile phone
E- Learning		**M-Learning**		

M- Learning means *"acquisition of any knowledge and skill through using mobile technology anytime, anywhere that result in alteration of behaviour*". M- Learning also brings strong portability by replacing books and notes with small RAM's filled with tailored learning contents.

M-learning implies different things to different people. Here there are some definitions of M-learning given below:

- According to Quinn (2000) "*Mobile learning is learning through mobile computational devices*" [6].
- Trifonova (2003) Any form of learning (studying) and teaching that occurs through a mobile device, or in a mobile environment [7].
- Parsons & Ryu (2006) M-learning is broadly defined as the delivery of learning content to learners utilizing mobile computing devices [8].
- Peters (2007) also stated that it was a subset of E-learning, a step toward making the educational process "*just in time, just enough and just for me*" [9].

3. Related Works

In this section we will present some existing architectures, which are modulated for mobile learning (M-learning) using ambient mobile agent approach, then we will finish with a summary.

3.1. Butterfly-Watching

Offer students to learn natural science, and more specifically the different types of butter flies region [10]. (Figure 1).

3.2. MyArtSpace

Is a project developed within the Culture Media and Sport department? It provides students with distributed learning service between schools and museums using mobile phones connected to a personal Web space [11]. (Figure 2).

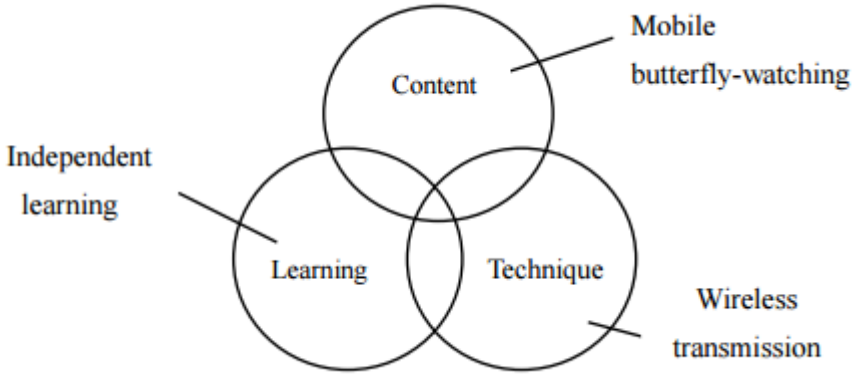

Figure 1. The butterfly-watching learning system

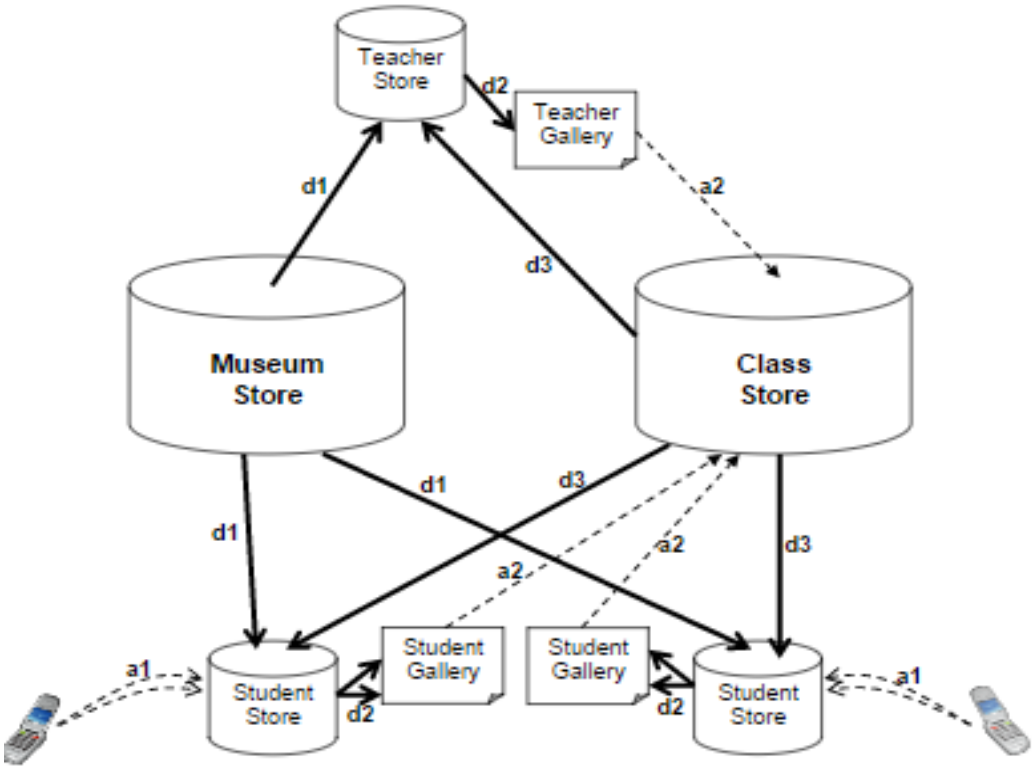

Figure 2. System MyArtSpace

Figure 3. Ambiant Wood

Figure 4. Indoor group generating content for the received picture (AMULETS)

3.3. Ambiant Wood

It was part of a project for 6 years, supported by the EPSRC. This project is based on an integration of physical and digital interaction in learning [12]. (Figure 3).

3.4. AMULETS

It (Advanced Mobile and Ubiquitous Learning Environments for Teachers and Students) aims to develop a system for teachers to develop and implement new teaching scenarios combining indoor and outdoor activities to promote situated learning using mobile and pervasive technologies [13]. (Figure 4).

3.5. eBag

It is part of iSchool project for mobile and nomadic learning (whose mobility and context are two main elements.In short, the vision of iSchool project is to develop a software infrastructure, graphical interfaces and spatial concepts in an interactive environment [14].

The eBag idea is to create a "virtual school satchel" for each student. The idea is to create a EBAG "satchel virtual school" for each student to enable it to learn through moving contexts in specific locations (classrooms, laboratories, workshops, libraries, museums, cities, clubs and at home). (Figure 5).

3.6. Mobilearn

It is a European research and development project that aims to explore the use of mobile environments to promote informal learning, learning by problem solving and learning at work [15]. (Figure 6)

Figure 5. Trine's eBag opened.

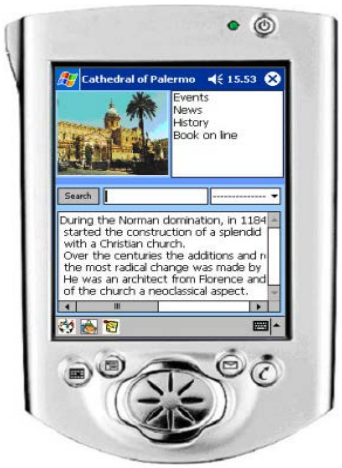

Figure 6. Mobilearn

3.7. MoULe (Mobile and Ubiquitous Learning)

Arrigo aims to offer students use mobile devices for collaborative knowledge construction. It also aims the use of mobile devices integrating learning activities in the classroom and in the laboratory to a learning situation [16]. (Figure 7).

4. The Proposed System

4.1. Mobile Agent

Mobile agent able of moving in the network or in the system architecture [17]. (Figure 8)

Figure 7. MoULe

Figure 8. Mobile Agent

Figure 9. The agents used in our system

Figure 10. the global architecture of system

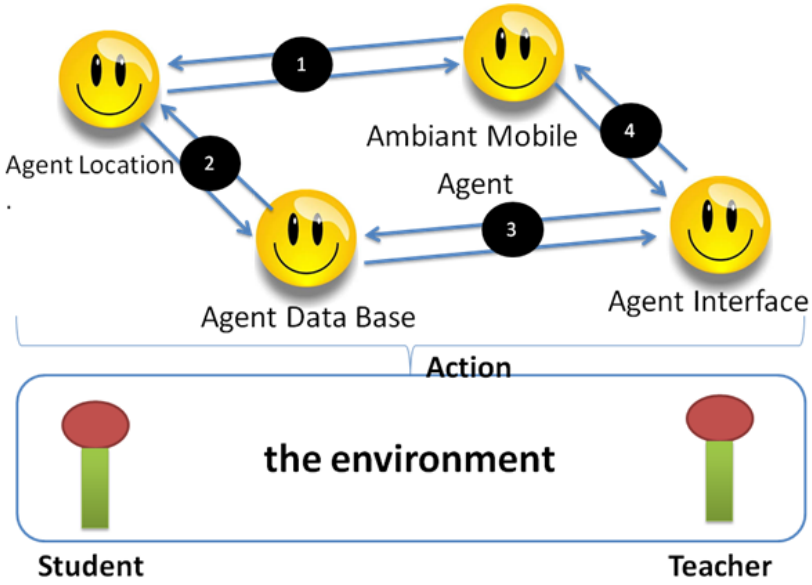

Figure 11. An overview of the proposed framework: Some possible communication actions among mobile devices

4.2. Different Types of Agents in Our System

The main agents that constitute our system are Figure 9 and Figure 10.

4.3. Communication Schemes

The multi-agent architecture shown in Figure 11 includes both static and mobile agents.

In our study, we are interested in the problem the geographical position of the student which to study a course. (Table 2).

Table 2. Communication between the agents

Number	Communication
1	Find the geographic location of the student
2	Look for the geographical position of the student in the database
3	The agent interface to connect to the database
4	Show the result

5. System Implementation and Result (Interface)

We have implemented a simple prototype to evaluate the concepts proposed in our architecture, using the Java programming language.

Development tools

5.1. jQuery Mobile

HTML5 User interface component library. Provides suite of UI controls rendered in HTML5. Provides mechanisms for event handling, as well as look and feel [18].

5.2. Aglet Platform

Aglets Software Development Kit is an environment for programming Internet agents in Java, developed by a team of researchers of the research laboratory of IBM Tokyo, Japan. The name was created from the words and Agent

Applet, which expresses quite clearly what Aglet. Aglet distribution comes with a server called Tahiti [19].

System Interface

Interface Home

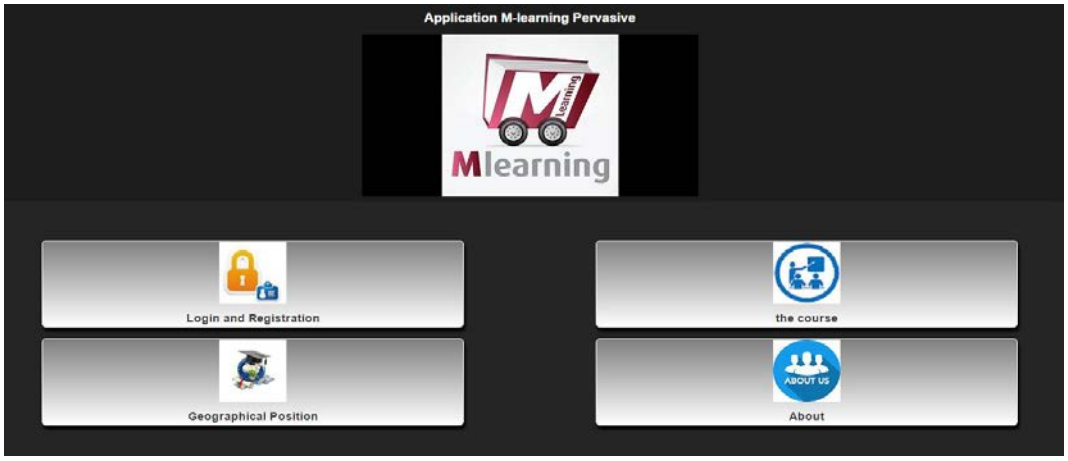

Figure 12. the Home page print screen

Interface Login/ Registration

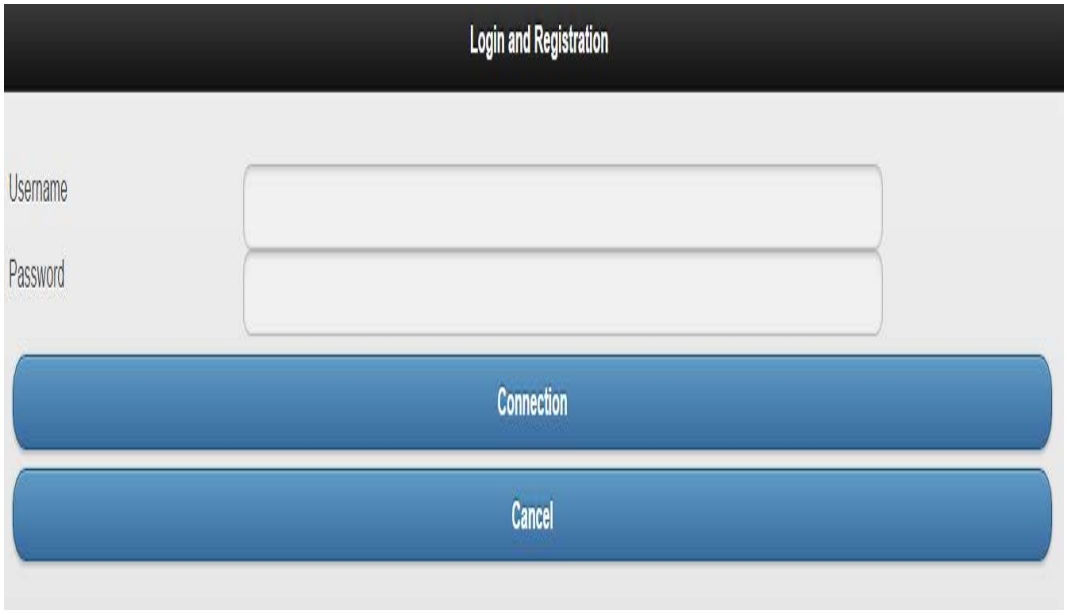

Figure 13. the authentication and Registration page print screen

Interface Location (GPS)

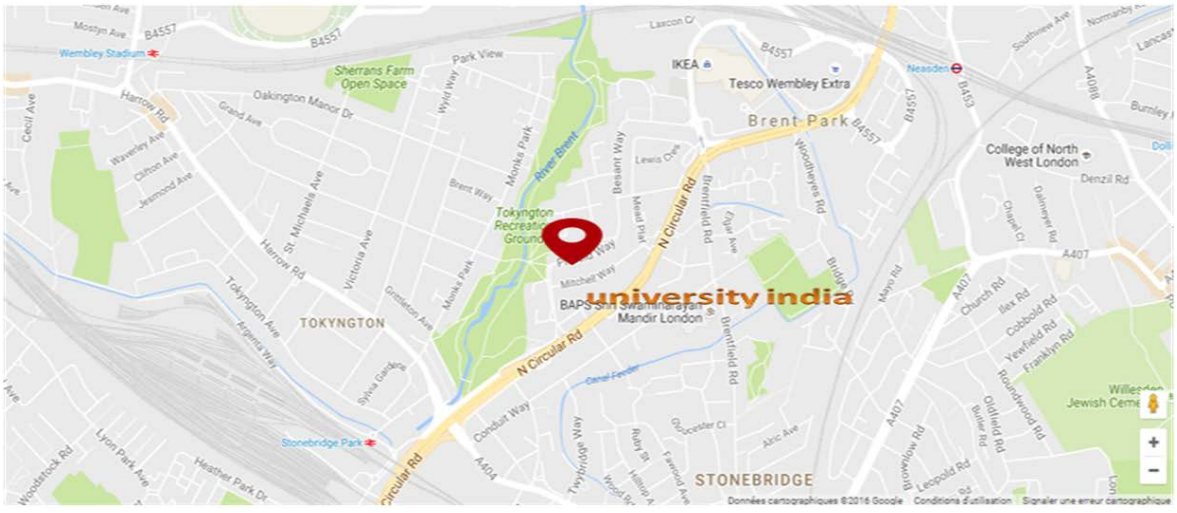

Figure 14. the location page print screen

Interface About

Mobile agent

Then we run an aglet application known as Tahiti. We can run multiple servers (Tahiti) on a single computer by assigning them different ports.

In our study, we used Aglets in the server part and the websites part, because Aglets is more specified in mobility than the other platforms, wherein the mobile agents offer several advantages improving the performance of distributed applications. The improvement can be resumed in:

- The reduction of the network traffic;
- The dynamic distribution of charge;
- Surmount the latency of the network;
- Encapsulation of the protocols;
- Asynchronous and autonomous execution;
- Heterogeneous remote models;
- Robust and tolerant with the failures and;
- The ability to continue the interaction with a user on a disconnected network [20].

Mobile agents in our system in aglet

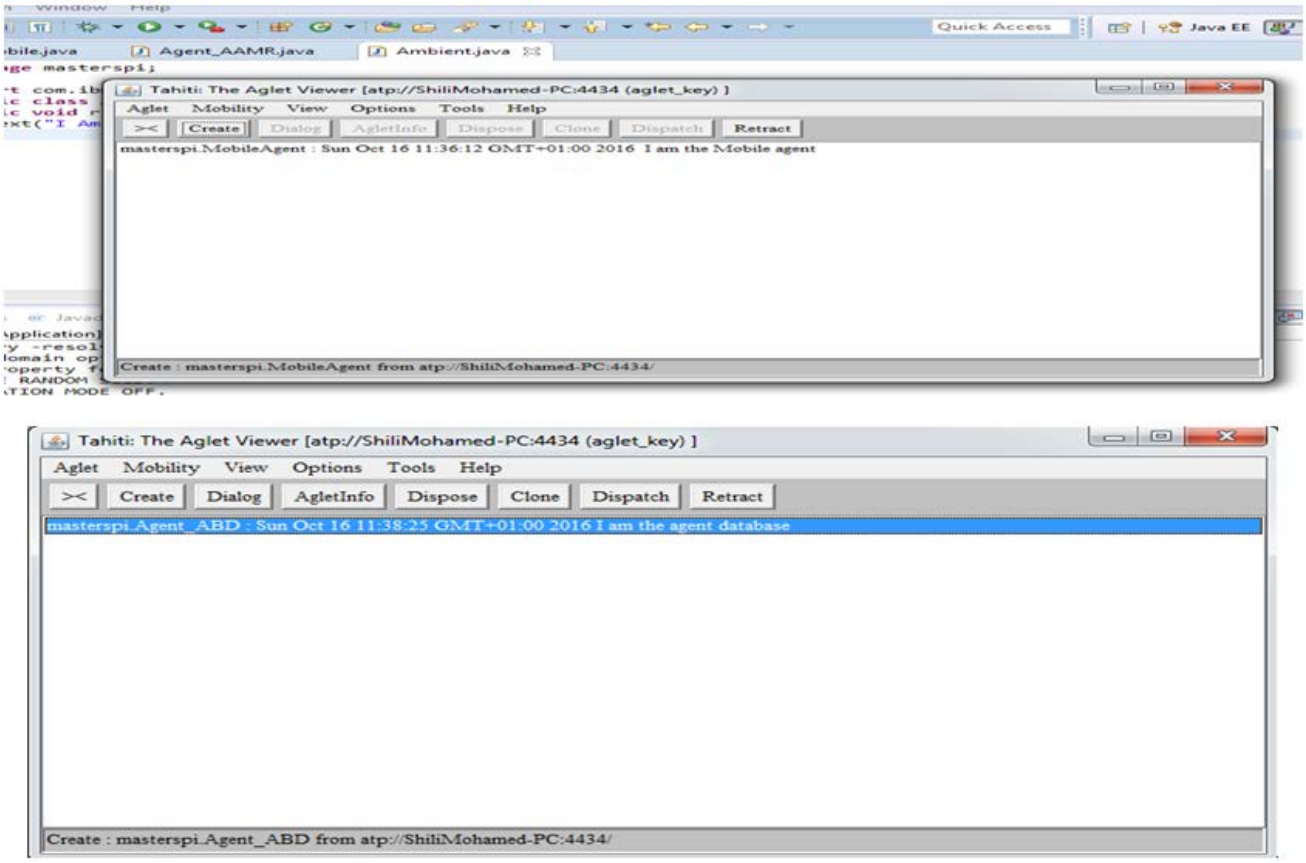

Figure 15. Aglet application Tahiti running at port 4434

6. Conclusion

In this paper we have presented architecture for the M-learning, We propose in this article an M- learning pervasive architecture which allows students to online courses is seeking the university's geography position in remote locations through intelligent mobile agents; the agents of our system are implemented using the JAVA language and the Aglets platform. The advantage of the proposed approach is the use of ambient mobile agents as a communication entity to satisfy dynamically the users' preferences changes. These allow the reducing of the network traffic and the amount of exchanged information. In this case, the agent moves to the information source and performs local exchanges. The highlight of this architecture is to enable the user to manage courses and geographic position University using smart phones (laptops, PDA, etc ...) at any time and everywhere. Thus, the proposed system firstly minimizes customer wait time, and secondly the amount of information transferred. In Perspective, we have to integrate the security issue in the system learning platform to protect mobile agents from external attacks, also we can execute mobile agent on remote computers using ontology and semantic web.

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