Artificial Intelligence and Bluetooth Techniques in a Multiuser M-learning Domain

Shilpa Rana
P.G. Student, Department of MCA
VES Institute of Technology
Mumbai, Maharashtra, India

Mona Deshmukh
Asst. Professor, Department of MCA
VES Institute of Technology
Mumbai, Maharashtra, India

Abstract
This paper present implementation of mlearning that combines Artificial Intelligence (AI) and Bluetooth (BT) techniques. The objective is to build an m-learning environment where students can work in a customized way also the system provides teachers with real-time feedback about individual and group learners and how mobile learning can aid in learning, its strengths and current challenges. Applying BT capabilities on this domain can be isolated into a classroom and used by several learners simultaneously. The student activities can be supervised by means of AI strategies (planning, scheduling and expert systems). Integrating these technologies like the whole system will be able to recognize each of the users, organize his/her work and evaluate his/her results without or little educator intervention. Developing of this technology contains an empirical analysis of students performance, perceptions, and achievements when using ALAS on mobile devices.

Keywords: M-learning, AI Planning and Scheduling, Expert systems, Bluetooth, Adaptive learning and assessment system (ALAS).

1. INTRODUCTION

Traditional education, where a teacher transmits to their students some knowledge in the classroom, is a very well known communicative process. The rapid proliferation of mobility devices has resulted in a situation in which nearly all school students have mobile phone. And hence teaching and learning are being highly affected by the development of the new technologies of information and communication (TIC). This influence h as given rise to the creation of the e-learning concept as the capabilities of small mobile devices such as mobile phones and tablets have advanced, with an explosion in the number and types of devices that can access the Worldwide Web.

Two of the most relevant advantages of this new educational framework are the flexibility and the context adaptation. It is evident that these features are greatly improved if the potential offered by the wireless communication systems is added (and then the term m-learning is used).It is possible to integrate artificial intelligence techniques to automate and to personalize the learning experience offered to each of the students. With this type of technology, students may also add their e-learning in schools with m-learning at home. Schools that cater to all students in a lower socio-economic bracket are unable to afford traditional computer labs, but their students can benefit from the lower cost m-learning alternative.

This article focuses on the problem of management within a group of students arriving into a laboratory, making practices, getting real time results, asking questions, interacting with the educator -if needed- and leaving at any time and result graph. There are many adaptive learning systems that are designed for either personal computers or for mobile devices, but very few are designed for both devices. In this paper we present the flexible, extensible architecture of ALAS, a system that supports personalized assessment-for-learning on both e-learning and mobile devices.

The m-learning environment presented here offers a real time solution to this particular challenge. It uses a Bluetooth scheme and takes advantage of this particular huge potential. The obtained wireless system is agile, trustworthy, dynamic and characterization and monitoring of its users. ALAS supports formative adaptive evaluations with scaffolds. These provide individualized intervention: that is, real-time

individualized feedback to teachers and learners. ALAS also automatically detects end-user device types so as to appropriately adapt the content based on the device, allowing students to continue their adaptive assessment and learning process in almost any environment.

The paper discussed is structured as follows. First, the architecture of the current ALAS design for one of the personal computers then we provide an all overview of the current e-learning and m-learning related technologies, in order to settle each particular the context of the work presented and also provides the opportunity for ‘‘anytime, anywhere’’ learning for each students. Some of the basic information about AI techniques and Bluetooth that are the methodologies supporting the m-learning architecture are proposed. In order to show the particular architecture's behavior, first we describe the educational environment where we are going to implement it: a technical laboratory. Then, the particular main modules of the architecture are described and we discuss the specific architectural extensions for the mobile environment, and the challenges that we faced in seeking to maintain the same standard of personalized learning functionality. Finally, we here summarize the main concepts and the main propose some challenges for future works.

2. OBJECTIVES OF THE STUDY

1. The main objective of this paper is to provide an m-learning environment where students can work in a customized way.
2. To highlight the learning or formation that is wanted to be reached for the students and the resources susceptible to support them.
3. To explore the solution of the work presented and also provides the opportunity for ‘‘anytime, anywhere’’ learning for students.

3. LITERATURE OVERVIEW

Implementing innovative approaches like personalized learning on mobile devices requires
us to remind students of the pedagogical justification for this new way of doing things which requires five conditions of innovation adoption—relative advantage, compatibility, complexity, trial ability, and Observability.

3.1 E-learning and M-learning

Current e-learning and Virtual Educations technologies have experienced an increasing research interest thanks to the use of information technologies and Internet [13][20]. The use of these technologies has generated a new kind of tools and frameworks that can be used by educators to design, deploy and control courses. In this article we present a possibility of incorporating the benefits of the wireless communication technologies to e-learning. This idea is not totally new. For a long time, its implantation has been giving rise to a new concept: m-learning (mobile-learning).M-Learning involves using handheld devices such as mobile phones, iPods and Personal Digital assistants (PDAs) to facilitate and enhance the learning process . m-Learning provides flexible access to learning and if carefully designed can overcome some of the limits of the Human–Computer Interaction community.

3.2 Artificial Intelligence Techniques

The main aim of Artificial Intelligence (AI) [16] is to study how to build artificial systems that perform tasks normally performed by human beings. AI is a very important discipline and it includes a number of well-recognized and mature areas: Expert Systems, Fuzzy Logic, Genetic Algorithms, Language Pro-cessing, Logic Programming, Planning and Scheduling, Neural Networks and Robotics. Our work focuses should be on *AI planning and scheduling (AI P& S)* and *expert systems* techniques.

3.2.1 AI Planning Techniques

These techniques have been applied to solve particular complex problems in domains such as robotics, logistics or satellites. In this domain they can experiment with their automatic problem solving algorithms, or develop and design new techniques in this discipline. Then, the educational investigators can use this new kind of tools and methods that could aid them to detect, reason, and solve (automatically) deficiencies observed in their initial learning designs. A *planner* solves a concrete problem by finding a sequence of actions that transform an initial state into a final state. There are several planning techniques, among them we have chosen a total order planner. This generates solutions that are sequences of total ordered actions. The basic structure is a tree where nodes are plans or states, and edges can be actions or state transactions.

3.2.2 AI Scheduling Techniques.

A *scheduler* organises activities along the time line by taking into account the resources available. Many procedures used in this area of scheduling systems come from the Operational Research (OP) and the Constraint Programming. (CP). This last discipline has been applied to the different scheduling problems with very good results, i.e. the Job Shop Scheduling Problem (JSSP) [9]. These JSSP methods can be easily generalized and applied into a learning environment. In this case, instead of machines and jobs, there are students, teachers and learning units in courses.

3 Expert Systems.

An expert system is a particular computer program that employs human knowledge to solve these kind of particular problems that usually would require human intelligence. This kind of particular programs represents the expertise knowledge, about a specific class of problems, as data or rules that can be called upon when needed. They can also provide some analysis of the particular problems and they can even

recommend user actions in order to perform improvements and rectifications. Expert systems seem to arrive at conclusions using this particular reasoning capabilities. Expert systems can afford many tasks: monitoring, design, control, simulation, learning support and information retrieval, among all particular others. In this article one expert system is used as a particular instruction system to monitoring the learning process of a group of students. The system detects mistakes and identifies the suitable solutions. In this particular way, the system facilitates the student's education and the correction of errors.

3.3 Bluetooth

Bluetooth used as a standard for exchanging data over a particular short distances as it is a wireless technology used in a particular mobile devices, and building personal area networks and also represented as a short-range communications system that represent to be intended to replace the cables connecting to a particular fixed electronic devices. Bluetooth mainly represented as a widely used as a vast radio-based technology after GSM(Global System for Mobile Communications).Bluetooth communications in a multi-user environment is like a classroom, school or a library while maintaining a particular short connection times with measuring good performance behavior. Using this particular artificial intelligence planning techniques, it is also possible to handle the particular communication needs to be fully maintained in particular m-learning environment in a very efficient manner. Of Bluetooth technology described in an m-learning environment is particularly its short range of operation performed on most portable devices having a coverage area of 10 m, rapidly decreasing when obstacles like walls are present is one of the most interesting features of Bluetooth technology. Bluetooth supports both one-way as well as two-way authentication by using a particular challenge-response scheme based on shared secret keys, though not all Bluetooth devices are required to support this particular feature. In addition, to protect the particular privacy of the communication medium, the Bluetooth base-band protocol implements a particular stream cipher using an encryption algorithm.

3.3 Adaptive learning and assessment system (ALAS)

ALAS was designed as a research-based solution to provide each particular individualized education and
Feedback to each students using this system. Its computer-based Adaptive Assessment that particularly identify skills that individual students have mastered during this process, diagnose instructional needs, monitor academic growth over time, make data-driven decisions at the classroom, school, and district levels, and place students into appropriate instructional programs that further held at higher level organisation. It contains the major modules listed as follows :

1. The student module primarily includes the learner's knowledge levels like items mastered,misconceptions, time to master. These are particularly maintained as a separately for every independent track. Additional factors like preferences and pace of learning are particularly added to the model.
2. The Pedagogical module is represented as the intelligent decision-maker in the system. It consists of mainly the Continuous Evaluation for Learning and also the Initial Adaptive Assessment functions. Based on the student model, it particularly determines the skill area from which is to present and the pace at which learning concepts and required particular questions are presented.
3. The Expert module particularly provides adaptive feedback to the student's response to an item that is selected. This feedback takes the form of scaffolds, answers to questions, hints, and so on which is required for database purpose.
4. The Context Adaptation Module further explains as the modifies of the content selected by the pedagogical module based on the particular user preferences and end-devices. This has been extensively enhanced to support this particular context adaptation to mobile devices.
5. The Authoring Module defines as a particular methodology to create educational content organized in a structured way that mainly supports the authoring process with an editing tool.
6. Feedback Loops: These reports provide a particular insight into the student's ''attendance'',performance, improvement over time, and weak areas respectively. This support can be particularly useful in situations like if a student encounters a difficult concept, seeks clarification on a particular question, or needs outside intervention. It also provides classroom and group intervention reports particularly for instructors and administrators.

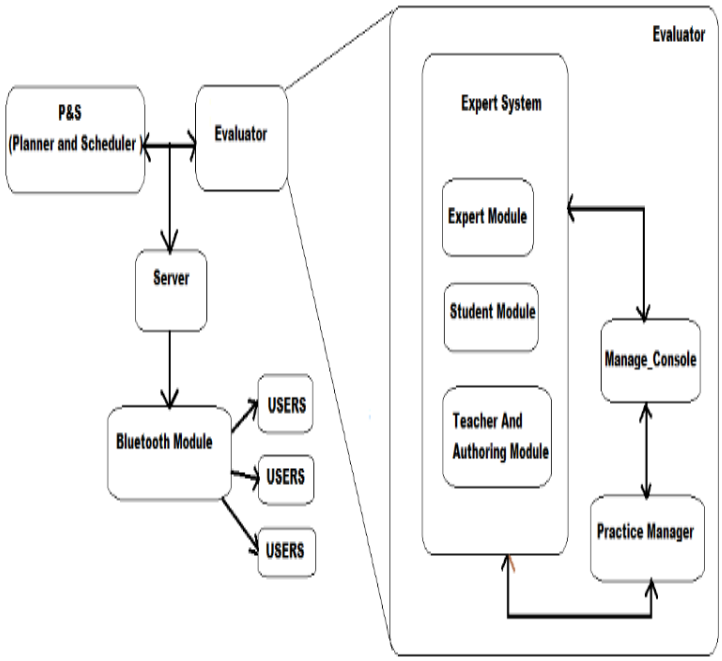

Fig. 1. M-learning environment architecture.

The **Server** will interact with the client application in the user's interface it can be a laptop using the Bluetooth module.

It is responsible for the interaction with the students, performing all the tasks. It will manage all the requests placed by the students, sending to the P&S module or the Evaluator.The Server will be responsible for detecting users leaving the m-learning cell and will update the active users database timely.

The **Evaluator** represented as a platform for automatic evaluation of the practices performed by the students. It briefly comprises of the three main functional blocks:

1. **Practice manager.** It implements an automatic service for delivery and collection of practices without physical intervention performed by the students. Periodically it performs the functions like checking the registered student database, maintaining it by the server, seeking for new users in the m-learning cell. For any particular new user, it looks at the student's personalized performed program and sends him the scheduled practices, along with a practice management agent.

2. **Expert system.** Once the students who finished the practice, the report is sent for evaluation. After this particular step the practice management agent delivers the information selected by the students to the expert system which, accordingly give set of rules like (implementing the evaluation criteria), analyzing the information and reporting the qualification secured. However, it also notifies student the particular list of errors found, as well as the required guidelines series for improvement of the student's experience. All the events performed are collected by the particular trouble-tracking system and saved in a database and the teacher will manage it through the management console.

The **student module** stores all the particular history and progress of the student interacting with the expert system. It comprises all the data and information about the student, helping in the diagnosis of the tutorial process. It is possible to use that information in order to choose the next lesson to be taught and the appropriate methodology and strategy.

The **tutorial module** is responsible for solving the problems while the development of the particular content program and the way it is taught. It selects that particular teaching material and describes the sequence follow. It has the authority to control the progress made, to answer each particular questions posed by the students, and to detect the type and level of help to be offered.

The **interface** is a set of communication channels between the student and the system, and the only physical way to interact with the student's development. It should be particularly dynamic, flexible, easy to accessible and with multimedia capabilities.

3. **Management console.** The teacher has at his or her disposal a complete set of tools for performing on-line administrative tasks and track the activities accomplished by all and every student in real time this is done by ALAS tracks all input by the student, including answers, hints requested, and time spent on

an item, tutorials viewed and so on. Among them, it is worth mentioning that a database compiler incorporate the expert system of that particular database to the report manager and provide an interactive graphical interface for real-time event monitoring and dialog with the students like a query tool, for definition and incorporation of tasks and evaluation rules for that particular event-reporting module for interaction with the Planner and a report generator and hence based on its analysis of student data, intervention in the form of thinking clues, tutorials or reviews is provided.

Finally, the **P&S module** detects the characteristics of the different students (observing how they use the system) it includes Learning Objects (LO) consist of the question bank, related audio, text, image, and media tutorials which include animation, simulation, and video. The question bank includes a particular wide range of curriculum-mapped questions of various difficulty levels and particular types. These include higher-order thinking skill (HOTS), inference, computation, word problems, comprehension, and questions that represented to a particular tutorials. Within each related track, these LO are organized in an particular ascending order of difficulty, such that the prerequisites for any given particular LO are at a lower level LO.

4.Discussion and conclusion

In this paper, we discussed the architecture of an adaptive learning system that personalizes

Assessment and learning on mobile devices(m-learning) and allow students to learn these different forms of learning. Our current strategy of providing individualized assessment having different type of features to individual student needs was maintained across both forms of learning with the particular additional flexibility given by mobile devices. The majority of m-learning case studies compare m-learning with the particular traditional classroom learning using the characteristics specific to mobile devices. Moreover, in this study the goal was to ensure the particular functionality offered by the integrated system available in the m-learning one and to understand the performance differences between the students and the user experience with the m-learning system.Hence this study was limited and restricted so as to maintain the same parameters in mlearning environments.

5.REFERENCES

1 Bluetooth Interest Group. *www.bluetooth.com.* The Bluetooth technology web site.

2 D. Camacho, A. Ortigosa, E. Pulido, and M. D. R-Moreno. *Advances in E-Learning: Experiences and Methodologies*, chapter: AI techniques for Monitoring Student Learning Process,(in press).

3 Gay, G., Stefanone, M., Grace-Martin, M., & Hembrooke, H. (2001). The effects of wireless computing in collaborative learning environments. International Journal of Human-Computer Interaction, 13(2),
257–276.

4 Quillen, I. (2011). Mobile apps for education evolving. Retrieved in Sept, 2011, from http://www.edweek.org/dd/articles/2011/02/09/02apps.h04.html.