A Novel Approach for Interactive Mobile Augmented Reality System

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Abstract: - Mobile augmented reality is growing rapidly because of the growth of smartphones. Due to the portable nature of smartphones, mobile augmented reality devices have become the most widely deployed consumer augmented reality display device and show promise for becoming the first commercial success for augmented reality technologies. The role of the user is identified and forwarded to the respective module. Cognitive engagement and interactivity are the main two factors of influenced learning where the engagements are focused in Learnability identification module. When a common, single optical tracking platform is available the reachability and performance can also be increased without affecting the efficiency, which will be done in AllinoneAR Module. An integrated framework consisting of three above stated modules is proposed in this paper.

Keyword: - Augmented reality, Learnability, usability, authoring, Role

1 Introduction
While AR technology is steadily maturing, application and content development for those systems is still taking place mostly at source code level. Besides limiting developer productivity, this also prevents professionals from other domains such as writers, designers or artists from taking an active role in development of AR applications and presentations. However, the need for authoring (creating and manipulating objects and their representation) was not addressed is so thorough a manner as navigation and exploration of the environment. Moreover, combining the learner also is an added advantage in the proposed system. The learnability identification module play a very important role. The combination of Learnability module, Authoring module and AllinoneAR module will sure make the whole framework a successful one. The paper is organized as follows Section1 gives introduction about mobile augmented reality, section 2 explains about role identification module, Learnability factor identification module and AllinoneAR module and followed by the proposed integrated framework for learnability factor based interactive mobile augmented reality system in section 3, finally Concluded in section 4.

2 Mobile Augmented Reality
Augmented reality and mobile computing are often mentioned together, as many mobile computing platforms rely on some kind of head-up or head-mounted display to provide continuous access to information, often coupled with hands-free operation. Augmented reality as a user interface for mobile computing is particularly powerful when the computer has access to information on location and situation, so it can provide contextual information.

Fig.1, Mobile mixed reality: Interaction of mobile device with backend AR server with wireless connectivity
Compared to the desktop computer, the mobile devices have small memory, small screen, limited computing capability, limited input options (no mouse/keyboard), while the servers have powerful computing and storage capacity [2] but still mobile augmented reality is more advantageous because of its portability, easily accessible, have photo/video capabilities and they are getting powerful enough to perform complex tasks. Using client/server system architecture can make full use of the advantages of both hardware environments, to allocate tasks reasonably, and it can effectively reduce the system overhead [3]. Figure 1 shows the Mobile mixed reality. Interaction of mobile device with backend AR server with wireless connectivity is shown clearly in the figure. AR software’s in mobile phone based on android, iOS etc. enables the augmented reality learning Platform to the students in any subject and make a mind blowing presentation about the concept [4]. New interaction approaches should be considered to effectively use augmented reality mobile applications.

3 Role Identification Module:
After the user Authentication module, an evaluation test is conducted to identify the role of the user. Three roles altogether will be offered. The learner and the author are the main two roles and further the author will be sub divided into the programmer and non-programmer module. The programmer module will be more technical and will not be available for all the types of AR. whereas when considering non-programmer module it is a tool based process (in many cases) but still, they can explore and create content for all types of augmented reality.

4 Learnability Factor Identification Module
Although many factors like efficiency, Effectiveness, Satisfaction, Learnability, Memorability, Errors and Cognitive load are the basic attributes of PACMAD usability model. Learnability is considered as the main attribute of the usability engineering. Learnability is the ease with which a user can gain proficiency with an application. It typically reflects how long it takes a person to be able to use the application effectively, in order to measure learnability, researchers may look at the performance of participants during a series of tasks, and measure how long it takes these participants to reach a pre-specified level of proficiency [6].

Learnability can be determined based on various factors such as interest, motivation, active learning, exploring attitude, time, space, learning environment, content, Technology, mental models, methods are the default attributes used in mobile learning technology[1]. Cognitive engagement and interactivity are the main two factors of influenced learning where the engagements are focused [1]. The birth of AR in education took place in 2002 in which hitlab make an augmented reality method for storytelling. This research focuses on tactile or kinetic learner who learns based on experiment based learning or active learning and therefore can also be called as tactile technology based learning. The relevant augmented reality model will be suggested based on the evaluation of the learnability.

5 AllinoneAr Module
Tracking methods differs from each other based on their types and usage. The main issue in the tracking methods is, they are isolated and not under one common platform. But as a learner or beginner wants to know about augmented reality or create an application using augmented reality coordinating with all the types of AR is the main issue. When a common platform is available the reachability and performance can also be increased without affecting the efficiency. All the popular applications and browsers will also be linked. Figure 1 shows the block diagram of AllinoneAR module as shown in figure 2, in which all the common tracking methods are integrated together as one module and it is available under one framework.
In order to develop authoring tools that genuinely support AR content creation, we have to look some of the unique properties of the AR paradigm. A successful AR authoring solution must provide more than an attractive graphical user interface for either an existing or new AR application framework. It must provide conceptual models and corresponding workflow tool which are appropriate and useful specifically within the domain of AR. Augmented reality content, on the other hand, is usually registered in 3D, which requires tools that allows the creation of content in 3D space, usually separate from the actual application itself. Furthermore, compatibility is still a big concern considering that the content is created outside the application and that importing of the content to the application is necessary. Furthermore, most mobile devices don’t recognize file format for 3D objects, ad thus, accessibility is another concern in terms of the content. A simulation environment for AR development has additional advantages, such as full control over time and events.

The application framework proposed will provide a higher level of abstraction such that even non-programmer can implement mobile AR applications and games. Programmers will also be given further options to implement more functions. The basic idea will be in a simple cross platform which will allow programmers to implement more advanced AR applications without low level system programming [7].

7 Learnability Based Interactive Mobile Augmented Reality System

The proposed framework as shown in figure 3 will be an integration of all the above specified three different modules. The user with first enter into the user authentication module followed by the role identification module where we can easily identify the role of the user (either the learner or the Author). If the user belongs to the learner group then, he/ she will undergo various learnability factor identification evaluation method which will determine which level of AR they exactly belong to and thereby they will be forwarded to the AllinoneAR module. If the role of the user is Author, they are forwarded to the Authoring module which will be further divided into programmer and non-programmer module. The final output will be compared with the ICT, Virtual reality and our proposed interactive mobile augmented reality system.

8 Conclusion and Framework

Thus researchers have to face the challenge of designing usable interfaces for device screens with limited dimensions and invent new interaction modalities. All in all, the smart phone ecosystem provides all ingredients to deploy AR as a software-only solution to a mass audience. However, one should not overlook that despite all technical and logistic improvements, there are still major obstacles such as Camera quality and handling, Energy consumption, Network dependency, Localization as
an image recognition problem, Texture, Lighting and weather conditions, Large and volatile databases for a large scale deployment of AR applications[5]. Also, by implementing a successful authoring system, it can serve as a foundation for future improvement onto the system, and can be encourage more researchers and developers to delve into developing more powerful applications that can eventually overcome the obstacles of bring augmented reality to the learning system. Our system is suitable for all application which is an added advantage. Surely, the proposed learnability based interactive mobile augmented reality system will take usability of augmented reality to the next level. The research can also be further extended by introducing user based registration algorithm, rendering algorithm and convergence of AR and cloud computing.

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