An Advanced System for Distance Learning using Modern Android & Web Technology: An Education Application

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***Abstract*:** Classroom teaching is mostly carried out by means of live lectures conducted in the physical classrooms. No doubt lectures are by far the most prevalent method of education going on from ages and will continue to be so in the foreseeable future. The process of implementation of mobile learning has been intense in recent years. Online learning is a natural extension of distance education. Emerging pedagogical learning model which requires new forms of mobile communication, teaching and learning, distance education becomes the essential for of student's knowledge and for their understanding. Developing a platform for distance learning is a platform for accessing the lectures anywhere anytime via devices such as mobile phones, smart phones, tablets and computers to increase the knowledge, add new insights, and provide a different learning experience and streaming media platform to the students without being limited by time and place. Beware of this situation we held a series of educational experiments utilizing mobile devices such as mobile phones to evaluate the implications of mobile technologies in individual and collaborative learning. Our system is not only solves the problem of distance learning but also provides many different functionalities such as automatically capturing the attendance of participants, providing a platform for conducting mock tests, teacher feedback option, providing a query box for students regarding their doubts. We also provide a feature by which students can upload their work or assignment and teachers/host may upload their notes or notices in the content box.

Keywords: Online Learning, Virtual classrooms, Android, Learning System, Mobile Communication, Streaming Media.

I. Introduction

Online learning is learning across multiple contexts, through social and content interactions, using personal electronic devices.Nowadays traditional classrooms are mostly replaced by online classroom using Android as well as web platforms.In the future most of the education system will be online due to its ease and efficiency.

Providing learning media accessible through online networks enables learning process beyond the classrooms. Mobile learning is a natural extension of distance education[1].

Developing a platform for distance learning is a platform for accessing the lectures anywhere anytime via devices such as mobile phones, smart phones, tablets and computers to increase the knowledge, add new insights, and provide a different learning experience to the students who were being limited by time and place. Traditional learning system is a system where teacher and students has to connect each other by face-to-face lectures. A teacher plays the role for delivering the content while students take notes about the content delivered by the teacher. This learning method is dominated by the teacher and results in students being passive, leading the students to become bored and less initiative. Along with the development of technology, virtual learning has been developed to help the teachers to deliver the knowledge and the study material through various delivery platforms such as web applications and Android applications. According to Smith and Ragan, learning media is message-conveying technology that can be utilized in learning [2]. The knowledge and the learning contents are provided by different types of devices such as Smart-phones, laptops, tablets and desktops. The contents that are delivered are mostly in the form of audios and videos that will affect the attitude of the students in their learning process. Research describes that test results are higher in virtual classes rather than the physical classes. As a result, virtual learning is on the rise, growing by 18.2%* a year around the globe. Virtual learning allows institutions and lecturers to offer students greater choice in how and when they learn, which has a direct impact on students' intrinsic motivation[3]. This method focuses at how you can use virtual learning to increase student motivation and results and also on tracking their performance real-time.

As part of our research on developing an educational applications, that supports students enrolled in virtual learning, we made an overview and comparison of the existing modern frameworks and technologies for development of web applications and android applications that addresses different kind of problems such as user's privacy, poor management of teaching sessions, connectivity problems, participants limitations, sessions timing limitations, monitoring student's attendance practically, low network bandwidth and security issues.

II. Architecture:

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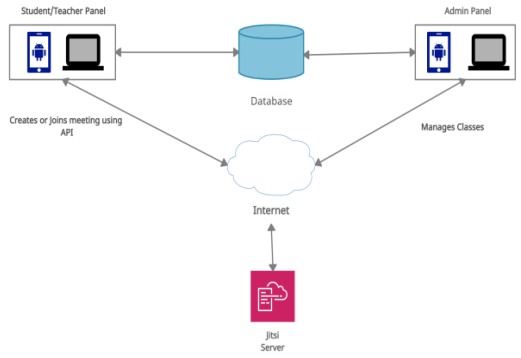

Fig.1.System Architecture diagram

Functional Architecture Mobile client contained student side and teacher side, including four main modules, shown in fig : The core functions of mobile learning platform are curriculum learning and curriculum activities, including the basic information, course content, teaching resources, discussion, coursework, online testing, investigation, and offline studying, shown as Fig. 2. It also provides multiple learning modes (course learning, video learning, and step-by-step learning)

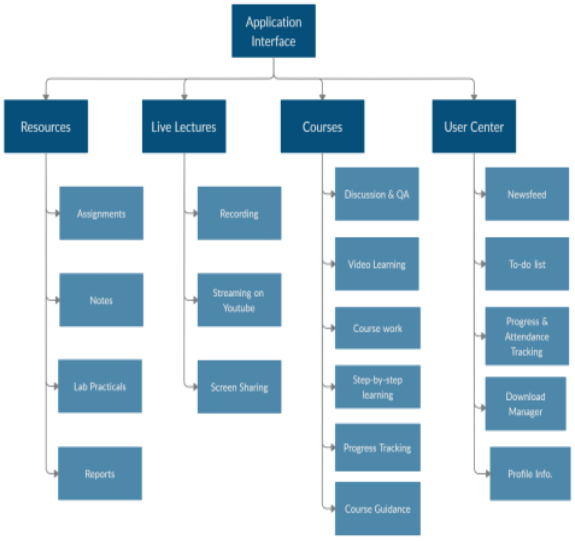

Fig.2.Functional Architecture of System

III. Methodology:

At present, mobile client development can be divided into two categories: the application development, the WEB development fitting for mobile explorer for development[4]. Mobile learning platform has developed into these categories to meet different user's requirements.

A. Android APP

There are two methods to develop APP, one is native development, and the other is mixed with Vue.js development. The process of development is as following: the user operation is input into the equipment through the front-end; later, the device processes data and sends request to the server, then, the server processes request and sends back data, finally, after getting received data, equipment process switches to adapt to the display interface or do personalized processing accordingly. Mobile device can be devised into Android and Web development.

The front-end of Android is written in XML while the interaction of data processing and equipment is coded in Java. The advantages of native development consist of fast response and good user experience. So far, the market share of native development app remains a large proportion. But it presents the disadvantage of long developing term, because it requests a re-development for different system. The other development which mixed with Vue.js is suitable for cross platform development. The code of pages doesn't have to be re-written, and only the part of interaction need to redeveloped. Consequently, the user experience and response speed are worse than native developed APP. However, following the development and standardization of Vue.js, more and more developers prefer to combine native development and Vue.js. There are many open source framework which can increase efficiency. Following the upgrade of mobile devise hardware and the perfection of some lightweight framework, the user experience and response speed of mixed developed APP are more and more close to native APP.

B. Modern Web Technology as Framework:

Along with defining SPA and PWA, we would also be highlighting the differences in comparison to the traditional approach. We would skip the techniques when it comes to developing native applications and/or universal applications, mainly because throughout the paper we mention the possibilities to easily migrate and extend the functionalities of existing modern web frameworks and libraries towards that, but also because we would introduce the concepts of PWA, considered a hybrid application.

Vue.js

Vue.js is one of the most rapidly growing and trending JavaScript framework since 2016.Basically Vue.js was inspired by AngularJS and known as an intuitive, performant and compos-able JavaScript library. It is an Model-View-View-Model(MVVM pattern) for developing interactive web interfaces[5].Vue.js was firstly introduced in 2014 by ex-Google-employee Evan You as a progressive framework for building web user interfaces. Despite of the other monolithic web frameworks, Vue is designed from the ground up to be incrementally adoptable. The main core library is focused on the view layer only and is easily adaptable to pick up and integrate with other libraries or

existing projects[6].Vue is also perfectly capable of powering sophisticated Single-Page Web Applications when used in combination with modern tooling and supporting libraries of JavaScript. Ever since it has been released, Vue has been quite a successful, especially given the fact that it's developed and maintained by a team of dozen core developers. Vue is used by Alibaba, Baidu, Expedia, Nintendo, GitLab and others popular organizations world widely.

C. Google Authentication:

Now a day's almost all of the applications needs to know the identity of the application users. Different types of the applications use different types of authentication methods. It is very hard for the user to remember every account and its respected password. This method is very frustrating and tedious job for the users. By using the user's identity it is possible to save the user data securely into the cloud and deliver the same personalized user experience across all of the user's devices.

Firebase database provides authentication using passwords, phone numbers, Google, Twitter and many more. Firebase provides ready-made UI libraries for user authentication. It provides authentication for both android as well as web platforms. Firebase authentication leverages different industry standards such as OAuth 2.0 and OpenID Connect, so that it can be easily integrated with our different platforms with custom backend[7].

D. Create and join class:

Now a days maintaining security and privacy became an essential issue during any online platform. So as in online learning there is need to have a security mechanism for privacy and access.Create and Join class functionality for data privacy and to prevent unauthorized access to the contents of the classes or the live lectures. Here, Admin can create their own classes and share its class id to the other authorized participants so that they can join the respected class belonging to the class id. The admin has also the privileges to provide different types of permission for read/write the data according to the roles assigned as per the character. There are two different roles provided to the character, one is as a lecturer and other is as a student.It also helps to maintain class from other students by restricting their access to other class.

For example, admin provides the permission for creating a class of data mining to the teacher. After creating the class a unique class id is generated and this class id will be shared with other participants so that they can join data mining class by using the unique class id.

E. **Live Lectures:**

In the recent years development in education trend, evolution such as digital videos and online video streaming stimulated the further development of live lecture videos as base for various learning scenarios in modern higher education[8].Live lectures or distance learning via computers and Android devices by creating virtual classes is inherently efficient and flexible[9].Live lectures is extremely ideal for working professionals, students across the global who can't join the lectures because of the limitation of different places, and people who have to take care of their family, and also moms who are trying their hand in the corporate world again and need to brush up their skills and enhance their educational qualification.Using live lectures they can get offer for way to study on their own pace of learning.

Currently there are multiple platforms which provides live lecture facilities. But as we analyzed that there are many limitations as well as issues are faced by users during the live lectures. During the process of online learning process there is always some kind of problems are raised such as authentication,connectivity problem, session time limit as well as participant limits.

Students today are time-starved as many parties or things try to get hold of their attention at any given point in time. Perhaps for scheduling and administrative convenience, classes at many institutions last up to 2 or 3 hours. For the teaching staff, holding fast the full attention of students in a long lecture is an uphill battle. Based on anecdotes, many students have their eyes affixed to smart phones or notebook computers apparently not paying full attention to the lecture. Before students were distracted, we switched the student activity to do programming exercises[10]. The revised approach of online learning that makes students switch between passive listening and active practicing has been found to be beneficial in our current study to students' acquisition of programming skills and learning motivation.

F. Real-time Attendance:

The management of the attendance can be a great burden on the teachers if it is done by the traditional manual handwritten system. To resolve this problem, smart and auto attendance management system is being utilized to reduce the efforts and mistakes of the teachers[11].While building a real-time attendance system authentication is a very critical issue in this system.We already have seen that a smart attendance system is generally executed with the help of bio-metrics. Face recognition method is one of the biometric methods to improve attendance monitoring system. Being a prime feature of biometric verification, facial recognition is being used enormously across the globe in several such applications, like video monitoring and CCTV footage system, a real-time interaction happens between computer & humans and access systems present indoors and network security[12]. By utilizing such a framework, the problem of proxies and students being marked present even though they are not physically present can easily be resolved. The main implementation steps used in this type of attendance monitoring system are face detection and recognizing the detected face.

Teachers had to do a lot of paper work and calculation for evaluating student's attendance. This gives

us less accuracy and more frustrating work to the teachers. As we know there is no currently a system available for teachers to evaluate student's attendance, teachers have to calculate student's attendance on their own manually and update their attendance manually on the data sheet or spreadsheet records.On the contrary, we are proposing functionality for teachers to directly update student's attendance digitally by using their mobile devices by simply clicking on their roll number provided via their interface.This will ultimately reduce their time and effort for evaluating student's attendance and also no need to do any kind of paper work as attendance is directly submitted into the database for the further record.We can provide two different options for the attendance accessing criteria. Students have only right to read their respected attendance while teachers have the rights to read as well as write to the database.At the end of the month a notification will automatically send to the teachers, HODs and students regarding the attendance. Here, students need to go for notice board about their attendance.

G. Online Test:

As a results of the event of Internet technology, online examination has become an efficient complement to traditional examination[13]. It is a standard knowledge that students are extremely susceptible to cheating under the normal method, which could affect the fairness of examination. The pen and paper method of writing examination, which has been ongoing for many years , might not be pleasing for use due to the issues usually associated including examination venue capacity constraints,absence of comfort for examination candidates, delay for the release of results, examination malpractices,cost required of printing examination materials and human fault[14]. The shift of examination as well as examination administration procedures from paper-based to computerize exams based processes necessitates substantial reorganization processes at universities,institutes and also in business companies. In the whole process, Administrative staff, IT support staff, lecturers and examiners also as students need to adapt to and familiarize themselves with new examination practices referred to as online examination for their own comfort and ease.An online examination system is an application that permits an establishment conduct examination via the Internet (or intranet). Across the globe many companies, institutions and organizations have adopted this method of conducting examinations, because it is quicker, easier and convenient. This system makes it easier for examiners to conduct exams for students to give the exam by maintaining their own mindset at anyplace and any instance of time and collate results. The application provides facility to conduct as well as give online examination anywhere and at any time for their ease. Today, almost every institution or university is conducting their exams online to eliminate the bottlenecks related to pen and paper sort of examination.Both Android as well as Web Technology has supported as well as adopted online examinations successfully from many years, and has incrementally enhanced the process over the years to possess room for adaption of more students and ensure a smoother online examination. However, one among the most important challenges to online examination is cheating using technology

Several researches exist that are associated with the work reported during this paper. The study in developed an online examination system that permits for creating a test from the question bank of the system and conducting Academic and Non-Academic examinations in English also as in many subjects. Similarly, developed an Android and web-based online examination system to deal with some drawbacks related to pen and paper method of writing examinations. The study in explored the event of Multiple Choice Examination System and Online Quizzes for General Aptitude and reasoning. This research presents the main aspects and implementation of a web multiple choice examination system with general issues for student evaluation[15]. Security issues were also examined by some studies.By analyzing these situations we have overcome the several advantages of traditional system with its issues. We provide test series for students using MCQs which will ultimately reduce the efforts of administrating exams as well as saves a lot of paper printing work without any security issues.

IV. Conclusion

In this paper, we have conducted research and analysis on different existing mobile learning platforms as our primary objective were to analyze the existing mobile learning platform and to develop a suitable mobile learning platform that can support both the android as well as web applications. We provide different types of functionalities in project such as online tests, real-time attendance monitoring, assignments uploading, study material downloading etc. Also based on the traditional teaching method, we have eliminated many limitations of learning such as time and place. Students can attend the lectures at any instance of time and place according to their need.

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