



‘i-Campus’: Internet of Things Based Learning Technologies for E-Learning

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Abstract. E-learning application is growing rapidly to adopt on every learning platform. I-campus is about the modern campus with IoT infrastructure set up for learning environments. Classroom Notes in an effectual way of making use of IoT technology with E-learning platform. The learning system is built for the benefit of the students with a smart system for handwritten notes sharing. The problems, objectives are to create a medium which easily shares notes through the platform. Applications which can collect notes from classroom teaching and is used for sharing through the Internet of Things-enabled, medium for students accessing within the network limit. This helps to figure out limitation issues and improving individual’s personalization, learning profile and outcomes of learning platform.

Keywords: Internet of Things · i-campus · E-learning

1 Introduction

Internet of Things can influence the every e-learning application usage. It discusses specific examples of how “IoT is an enriching, interactive platform for learning and on-demand based learning for improving the user learning experience” [1]. We will study today’s demand in the industry for the e-learning market and users are progressing level. Existing application basis of old methodologies many are not in use. Move on as per the demand of social learning and collaborative blended model, and impact using the Internet of Things. I-campus tells about the need of modern learning campus with enhanced infrastructure. The fundamental components which make the internet of things are Hardware, Software, Communication Infrastructure [2].

E-Learning business is not only mounting upwards by size also on the basis of potential and variety domain application brought into usage for advancements in technological factors, higher bandwidth speed and more innovative learning platforms. As per Fig. 1 the smartphone penetration too high in number by comparing the year 2012 and 2017 mobile unit, which helps to bring M-learning platform to every user.

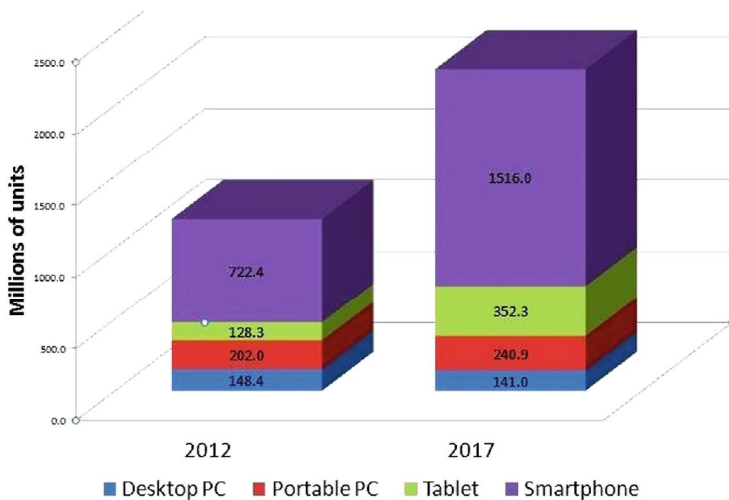


Fig. 1. Smart device penetration comparison [3]

Literature Survey: The project basically focuses on improving E-learning concept by utilizing IoT technology. There are various techniques in E-learning like note sharing using Google Drive, E-mails, online lectures, watching stored videos of previous lectures, etc. but they have their own disadvantages also. In IoT also there are various technologies, widely using technologies are collecting the data using sensors or by RFID tags and process it for further use [4].

Adapt-SUR is the context-aware environment and culture concerned feature of an adaptability model. This model integrated into two distinct E-learning environments Adapt Web [5]. The trainer can able to choose and upload the course materials as per the need of students. Students can learn the course according to their convenient learning pace and capability [6]. A great research and efforts have been placed in the expansion of modern E-learning systems. Many E-learning systems are existing are proposed model so far & many are implemented practically [7, 8].

Individual students learning on own competence could support teachers to impart students learning according to their skill set. Identifying smart objects among many interconnects with each other object node, and also with “end users or any other entities in the network model. In the digital era of IoT, the use of small, chip and flexible computer hardware that allows end-user programming to become present [9, 10].

There is various E-learning system is being practised and used in slow phase only. But the completion rate is low because of lack of study desire and motivation. So the

use of IoT may bring a great change in the E-learning systems. Students can learn about their own capabilities and at their own pace. The sharing of notes will become very fast. Country’s national infrastructure has to build with smart cities methods, so sensors monitoring is an important feature of a future city’s operational [11]. Personalized assessments can be achieved using personalized performance prediction models to enhance their skills for improving their own for upcoming assessments and focused towards achieving higher grades -can be used a neural network approach to propose a new method to accomplish [12].

The future of e-learning in terms of market trends and technological advancements listed on the various factors learning the platform and yearly based trends as listed in Fig. 2.

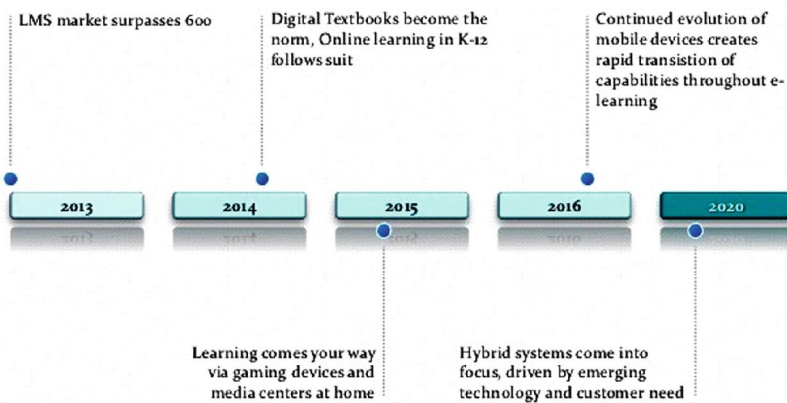


Fig. 2. E-learning future comparison by year-wise [13]

Five major trend factors for eLearning platform

- Mobile – penetration, Pervasive and Embedded Learning, Gamification, Informal based learning and bite-sized learning, Video demand and their domination in eLearning content [3].

2 Architecture Model

In this system given real-time notes from scribble, inputs are collected and shared using Raspberry Pi and local campus network, concept flow displayed in Fig. 3. Applications will display course contents which are uploaded by the teacher. Students can able to access every session lecture notes. Major parts are, the project concerned about constructing efficient sharing medium to use teaching and learning note’s content by digitalized mode. The accessibility for learners by using IoT limited delay to access at the user level.

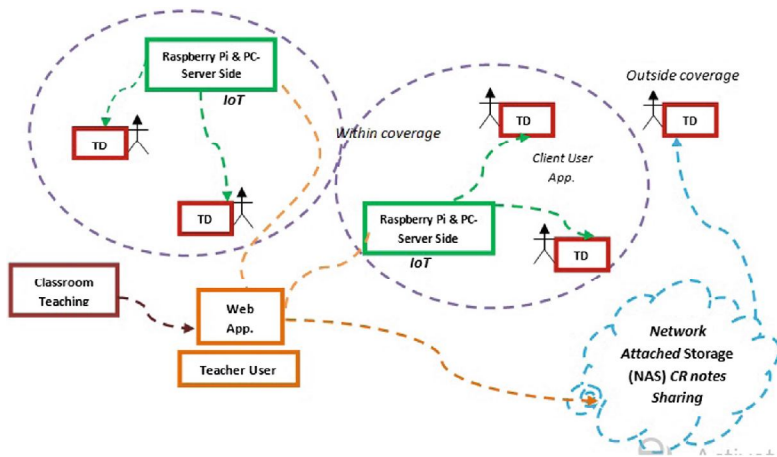


Fig. 3. Smart E-learning architecture [4] (TD-Target Device, CR-classroom)

The main objectives are focused on sharing teacher notes to the users with help of e-learning application which being part of IoT platform and local campus network as a sharing medium and listed features such as

- Subject course content delivery, Sharing notes, Course updates Expectation level of users,

Hence, smart campus physical space brings integrated, connected device from classroom learning to the student's handheld Smartphone devices. The listed sequences flow of Smart classroom in campus space, such as

- Notes data capturing & storage, Data Manipulation, Assessment exam, Timely delivery of notes, Frequency level... Etc. [4].

The research problem is about the importance of IoT platform in the classroom and campus learning. Utilizing the campus infrastructure for improving learning outcome by means of Classroom notes sharing web application using the local network.

- (1) Whether the e-learning platform is being integrated with the IoT domain?
- (2) Is it an academic campus utilizing their infrastructure to the fullest level in e-learning model?
- (3) Whether classroom teaching notes are stored in a digital medium to share with every student's user?

3 Methodology

Modules explain about overall functionality of the system. The concept flow, which is as follows:

- Web Application initiation
- Integrating sharing medium and Scribble Pad application using the web platform
- Deploying using Internet/FTP Server
- Case-Based Reasoning for a difficult exam
- Improve user learning using personalization by using assessment results

CBR is case-based reasoning module. This CBR module is used as an algorithm in this proposed system for online results analysis technique. With the help of this CBR module, the grades could be assigned to the students which help in the assessment of the overall progress of the students. The CBR module also provides the corrective mechanism capabilities which mean if a student fails to reach passing grades in some test, then a new learner case is automatically gets created to predict the probability of that case failed. The CBR module also saves solutions for solving tests so that in the case of any student fail in some test so they can refer these solutions for reference. Retrieve these solutions from the database for a particular problem is the major task of the CBR system.

4 Results and Discussion

Web Application Initiation

The aim of creating this module is to create a UI with the help of which user can access the whole system. A teacher can do uploading by the teacher is direct without admin approval) through this UI whereas the Admin can do all above things in addition admin can approve the notes that are uploaded by students after verifying the contents.

Following are the screenshots of the web app.

Integrating Sharing Medium and Scribble Pad Application Using the Web Platform

The scribble pad is used for data collection that a teacher wants to store and share in the notes format. The contents of the scribble screen are detected by using coordinate points and later stored in the database. Then integrate notes content to web application accessibility (Fig. 4).

Deploying Using FTP Server

In this module, the web application is deployed using an FTP server. All registered users can able to access it. Notes are uploaded by teachers (Fig. 5).

Flow concepts for application usage by sharing notes from teacher to users

- Scribble Pad inputs
- Sharing medium
- Data storage
- Sharing e-notes
- User accessing e-notes

Case-Based Reasoning for a Difficult Exam

An online assessment is conducted on the basis of difficulty test results. The question pattern for selective weak learning students varied from the others. The web application is deployed for CBR test assessments. Students can learn for their exams using scribble data notes which are uploaded from classroom teaching (Fig. 6).

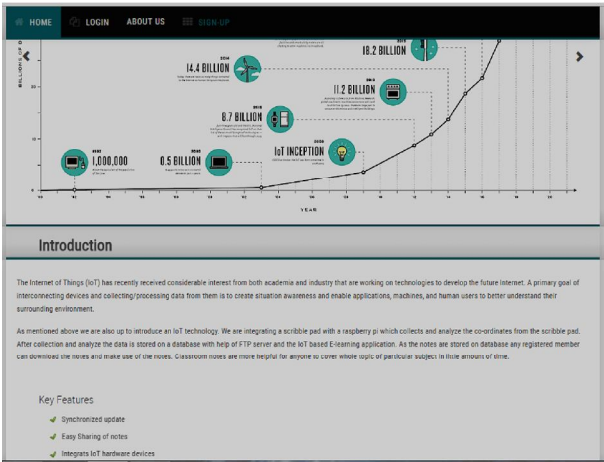


Fig. 4. Notes sharing apps. -Users homepage

IoT Based E-Learning

HOME UPLOAD DOWNLOAD PROFILE LOGOUT

Upload Notes

Notes ID: 753

Name: amit

User Name: amit123

Subject: IoT

Upload File: Choose File activity.png

Upload Reset

Fig. 5. Uploading notes page

Improve User Learning Using Personalization by Using Assessment Results

As students personalized assessments are concerned to improve every individual student learning capability by comparing using CBR case by case technique. In CBR assessment technique as the new case is initialized, it is assigned to a “case no:” which can be used as a tracking parameter for the assessment result of a particular student in future. CBR will evaluate the learning ability of the particular student also the CBR module provides the corrective mechanism for the student to achieve a good score in the assessment if he/she failed to pass the assessment.

The results will be stored in the library and the similarity of results has been checked by the CBR as per the flow of Fig. 7 and suggests the adaptation ways for the student. Application of Artificial neural network influenced so many industrial

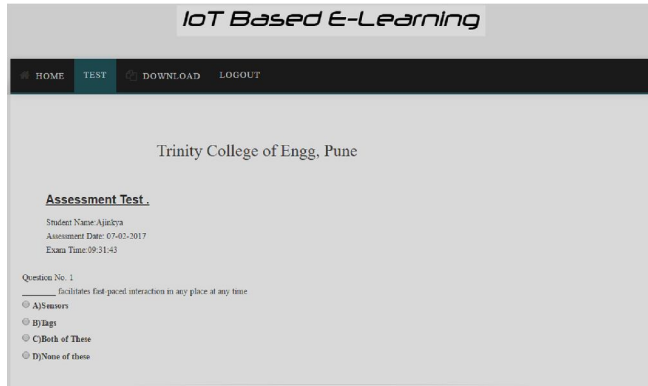


Fig. 6. Test questions

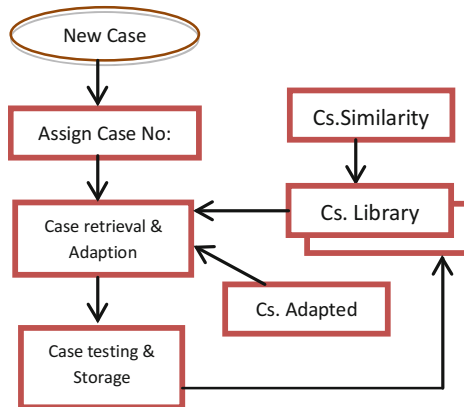


Fig. 7. CBR technique (Cs-Case)

applications and now e-learning platform utilizes this prediction model helps to improve personalized learning outcomes for every user.

A Cumulative Dragonfly algorithm is used in for marks prediction model for analysis e-learning application data to improve, personalize learning better outcome for users [14].

5 Conclusion

The IoT-based E-learning system is the need of the hour. Subject notes delivery at a lower cost and quick to reach every user with the help of the implemented system. More effective learning using e-learning platforms and also improve learning outcomes for students on the basis of personalized smart eLearning system using Case-Based Reasoning. Personalized learning helps to improve students' learning by achieving

results using differentiating learner capability depends on their learning pace by using CBR. The IoT-based E-learning system nowadays future due to IoT platform integrated into the existing eLearning system. Moreover, the effectiveness of learner outcomes purely depends on their performance metric; especially we can personalize learner outcomes using CBR.

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