

# Implementation of E-Learning using Internet of Things

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**Abstract** - Web of Things is another idea in which question, creature, and individuals is recognized remarkably as per their identifier in the system. In Internet of Things information are exchanges over Network without having a human to human or human to machine cooperation. IOT is utilized as a part of the Education framework for Online Learning. In it, four noteworthy columns are cooperating these are People, Process, Data and Things. The Project is concerned with change in instruction framework i.e. more communication with educator and understudy through online courses. Folks need to instruct their kids with strength in life. Understudy desires are impacted by innovation uses and their guardian's fulfillment is encircled as far as employability. Give reasonable instruction to understudies and in addition alternate additional classes like aptitudes, dialect specialists, delicate abilities which are drawn out and cash consumed on that. Innovation based showing gives for better correspondence in the middle of understudy and educator. It additionally gives moderate instruction with fulfilling understudies and selection representative desire for understudy. This framework gives a standard configuration structure for the instructive framework, which are time intensive and cash used on that. Innovation based showing gives for better correspondence in the middle of understudy and educator. This framework gives a standard configuration structure for the instructive framework.

**Index Terms** - Aptitude, Internet of Things, Online Learning, Potable Device, Wireless Sensor Network.

## I. INTRODUCTION

Today's days Web accepts a paramount part in the general population enclosure. As indicated by Cisco predication 50 billion devices will join with the Web in 2020. The web is creating for granting people through physical inquiries, for instance, sound, component, substance, photos using wired or remote medium. The Internet of Things permits individuals and things to be associated Anytime, Anyplace, with anything and anyone, preferably utilizing Anyway/system and any administration [6]. As per [5] distinctive components of IoT are accessible to diverse applications. As the prominence of remote systems administration builds, the industry and scholarly have amassed a colossal interest for individuals with the vital aptitudes to plan and make handy systems administration offices [7]. Digitization and frameworks organization progressions are used to make E-Learning application. E-Learning is understood because of two basic reasons: To overcome degree of understudies in a lone range or course and clear inaccessible particular subject isn't by provincial principles available. Globalization is affecting the advanced education in different courses by benefiting the educational program universally [1].

As shown by past investigation E-Learning will grow the adequacy of scholastics. It incorporates Internet Technology as a medium of distinctive employments of an instructional structure which join into a singular system. The framework base accessible to get to and offer the administrations for understudy and educators are mobiles, computerized help, tabs, portable workstations and so on [2]. The propose framework has confronted some specialized difficulties; these are under study inspiration, Course plan, information stockpiling and security. In Student's inspiration, E-Learning framework has less vis-à-vis correspondence in the middle of understudy and educator so to take care of and investigate the issue of understudy is a troublesome errand for instructors. Outline course material which fulfills and enhances understudy aptitude in particular time is another test of E-Learning. Every use of E-Learning has a colossal measure of information. The issues happen while putting away and examinations of information. Give security to information likewise another test of E-Learning. To conquer these disadvantages and explanations behind growing great e-learning framework is clarified in the following segment.

## II. MOTIVATION

The percent of graduate's understudies are expanding step by step. By this thinking of it as a profession open door does not increment in the extent of it. Understudies face numerous troubles amid begin their vocation. As of late training framework has concentrated on scholarly components, yet selected representatives from association need some additional elements from understudy instead of scholastics these are discriminating considering, business insight, hard working attitudes, relational abilities, delicate aptitudes [1]. An understudy needs training, as well as a vocation in the association to stay in the opposition. The financial development influences the instructive establishments and family pay does not increment in extent of expenses. E-Learning offers instructors clear, target data about understudies' execution. These key variables are supplicant to scholarly training.

### III. LITERATURE SURVEY

The IoT's is the potential effect of making instruction more significant, drawing in and inspiring learners. In any case, to understand the advantages of associating individuals, procedures, information, and things, dependable network and consistent access must be ensured. In the educational system, it requires training and disseminations of education, learner support, social mobilization, support services, quality assessment, planning and delivery oversight, inclusive education and curriculum policy, support and monitoring [1].

The project empowers you to procure aptitudes in important zones of logical examination, innovative improvement, item plan and expert administration in the IOT field. In the area of computer science, the challenge is in developing new forms of scalable education that accommodate large numbers of students around the world, attract potential students with various interests, and deliver an innovative curriculum that reflects the radical changes in computing technology [4]. The Paper [7] discuss WeFiLab (Web based Wi-Fi Laboratory). It is a virtual laboratory where students can access it any time anywhere. Laboratories are important part of science and engineering student and developing cost of it is more. WeFiLab uses the structure of two-level operations to coordinate the communication between clients and wireless devices, allowing the students' experiment on real wireless devices [7].

### IV. PROPOSED SYSTEM

The Architecture of the proposed system is shown in diagram fig 1. The propose an E-Learning system is implemented to overcome drawbacks of the current education system. Professors and student both use system at the same time for communicating with each other. The System is work in three tiers which shown in diagram.

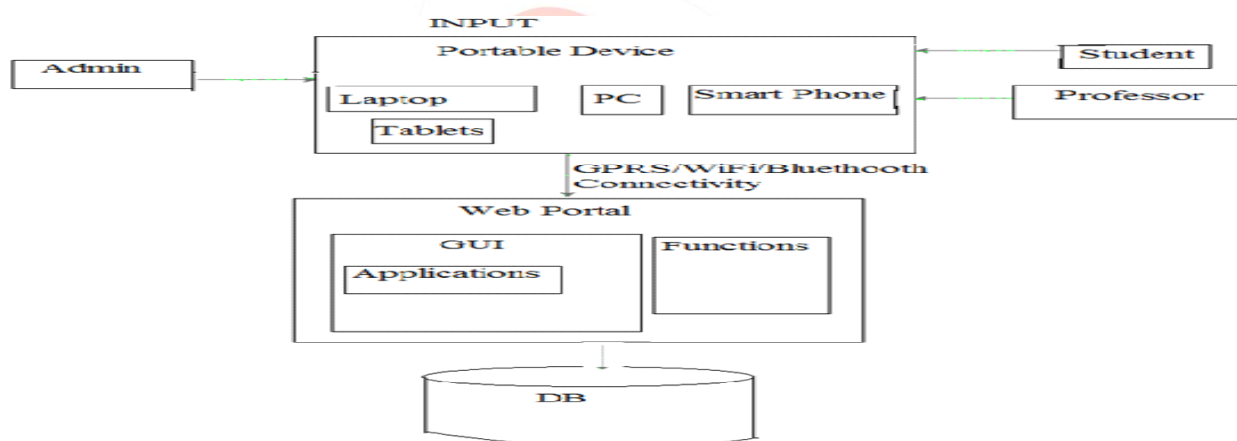


Fig 1 : Architecture for proposed system

- **Portable Device**

Input is given to system through portable devices. Personal computers, Tablets, Laptops, and Smartphone's are portable devices which connected to the web portal using GPRS, Bluetooth, Wi-Fi. The Application is accessible to Student through a portable device. Three main users are involved in the system. These users have different authority for applications. Student can only access application while professor has authority modification application at any time. Admin is responsible for the modification to the whole system at any time.

- **Web portal**

It is the heart of the system deals with process execution as per user input. The Graphical user interface provides detail description and functionalities of the system. Online exam, Video Conference, Distance Learning are different application present in Web portal. The User can access web portal application after login. Calendar View, Announcement Detail, Notice regarding examination schedule, Forum is mentioned on the web portal. Users have different credentials as per that he can access the application. Students are interacting with the teacher through a web portal. The Web portal is shown whole E-Learning system in simple format.

The Figure 2 shows graphical user interface of system containing modules and user information on Dashboard. The three users can access system as per authority. The Figure 3 displays after Admin login. The Figure 4 displays student login.

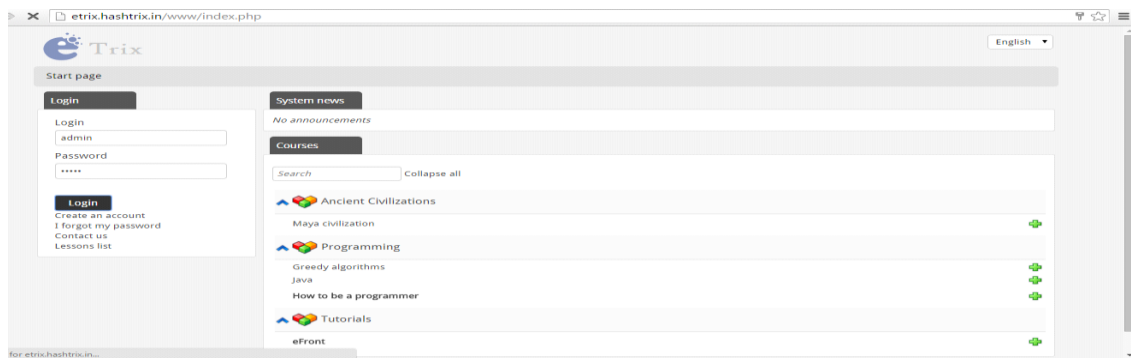


Fig. 2 Login Page

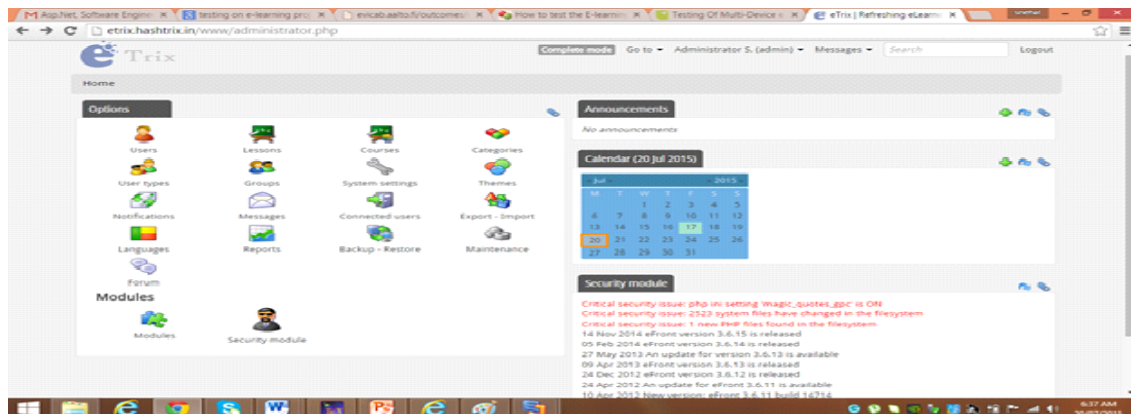


Fig. 3 Admin Login

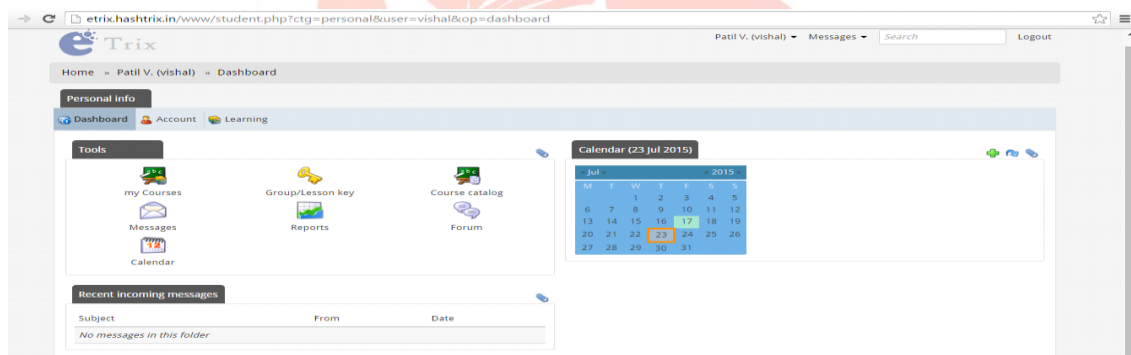


Fig. 4 Student Login.

### • End User

This is a controller of the system which can store, manage, and modify data as per user activity. All activity is recorded in the database. Central Database contains three databases of the system. Application database is storing all activity of application result. Student database is for storing student activity. Professor database manages professors acidity and store result.

## V. ALGORITHM

The proposed system uses two algorithms for result analysis.

### 1) Apriori Algorithm with Divide and Conquer

The apriori algorithm is used for calculating online exam result and Forum discussion. The Apriori algorithm is used to find all frequent items set and generate strong association rules. This algorithm is used to determine the online exam result of the student and result of discussion on the forum. If two or more students get less percentage in the same topic, then consider it as one rule. The rule is used to generate results.

For example, if more students fail in the same subjects than professor will arrange a session for them. In Forum discussion same questions, ask many students then professor solve them using different techniques like expert advice or upload lectures.

### ***Variables declaration***

$N$ =Total no of students,  $T$ =Test / question ask in the forum,  $F$ =frequent items,  $j$ = partitions,  $M$ =divide  $N$  into no of partitions.

Where the value of  $M$  depends upon  $N$

$M=N/2$  where  $1 > N \leq 10$ ,  $M= N/5$  where  $10 > N \leq 100$ ,  $M= N/10$  where  $100 > N \leq 1000$

### ***Determine frequent items F***

Scan whole data till last items.

for ( $F=1$ ;  $F < N$ ;  $F++$ )

Second for loop is decided, no of partitions.

for(  $j=1$ ;  $j < M$ ;  $j++$ )

***F is increment by 1 as per frequent items found in T.***

For integrating frequent items by following a formula:

$$F(T) = \sum F(j)$$

Where  $j=1$  to  $n$

### ***2) C4.5 with sub tree replacement***

The Algorithm uses sub tree replacement C4.5 allows two or more outcomes depend upon information-based criteria. The Decision tree is too long, so that managing it becomes a difficult task. In that case cut or remove some branches of decision tree known as pruning. Pruning is the key to dealing with noisy data. In c4.5 branches are removed from the bottom up to a certain limit is known as post pruning. The process is done after the construction of the tree.

This algorithm is the use of data analysis of video conference. For example, calculate percentage of student contact for group discussion, queries. The fig shows the output of c4.5 algorithm as below:

### ***Check for base cases.***

In this step determine all the cases which are performing. All conditions are defined in it.

$B=b_1, b_2, b_3, \dots, b_n$

No of students choose a video conference application, No of professors select video conference application, No of experts available for video conferencing, No of subjects.

### ***For each attribute is calculated:***

In this step normalized information gain from splitting on attribute  $A$ . Evaluate each condition and analyze results of it.

For:- No of students choose a video conference application

Record video conference time, how many time student contact same experts, student contact with English experts, student contact with Communication skill experts, student contact with Programing experts, student contact with Aptitude experts, student contact with Mathematic experts, student contact with other experts, student give feedback.

### ***Select the best a, attribute that has highest information gain. From above conditions***

No of students choose a video conference application, Gives information about percentage of student contact for group discussion queries.

***Create a decision node that splits on best of A, as root node.***

A=No of Student choose video conference, o=options, Cs= sub options in communication skills.

**Subtree Replacement**

The Figure 5 shows Red portion indicates sub tree which gives require result. This sub tree is replacing Video conference root by No of student interaction. Then decide a child node:

Group Discussion, Presentation is children node of Communication skills.

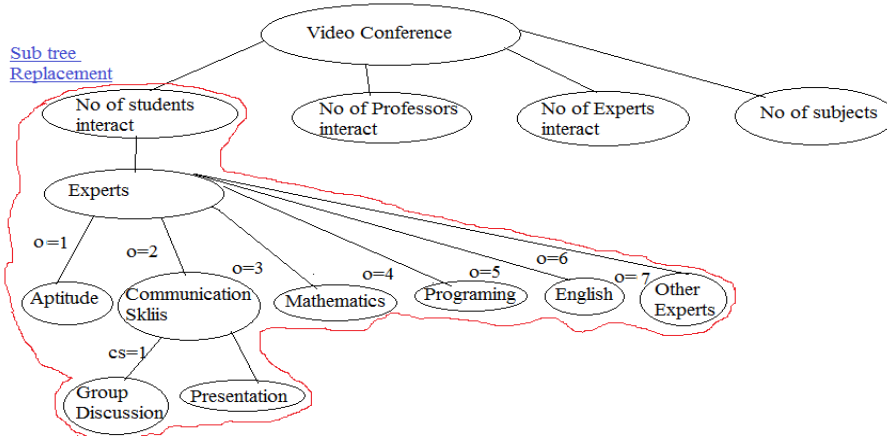


Fig. 5 sub tree replacement

Formula:- for generating a tree as per base case and attribute:

$$F(x) = B (A)^n$$

Where B=base case, A=Attributes, N= no of attributes which gives results.

Time Complexity:-

Apriori Algorithm=  $O(N)^2$ , c4.5 algorithm=  $o(m, n \log n) + o(n)$ .

**VI. RESULT**

Propose system is used to enhance feature in current education system. The system will use to analyze student improvement in aptitudes, communication and critical thinking skill from initial test to final test. The graph of online exam result is shown in Figure 6. Score and Unit is two factors are used for graph generation. After reading course material in Distance learning application student is appearing for the test. The test is based upon Time. The result is student in percentage.

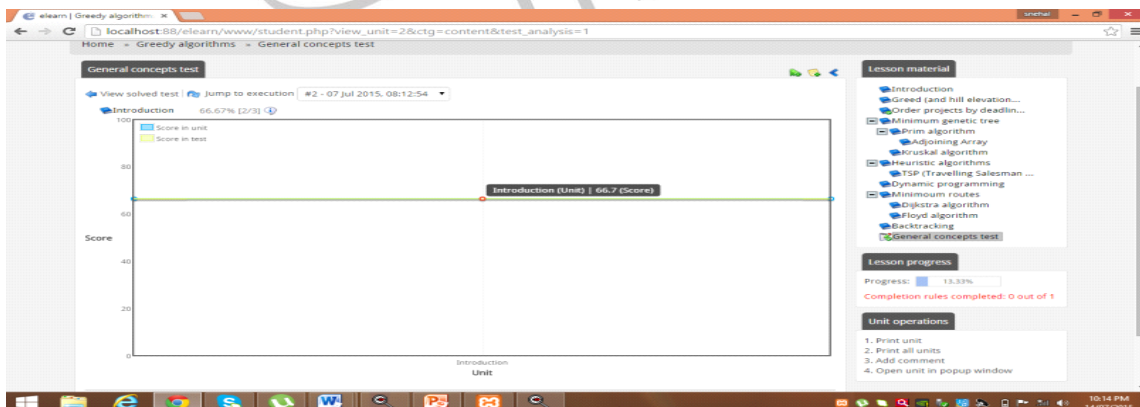


Fig. 6 Attendance Chart

The Table 1 is classification matrix used for calculating accuracy of system.

Recall Or Sensitivity(True positive rate) =  $TP/(TP+FN) = 0.875$

Specificity (True negative rate) =  $TN/(TN+FP) = 1$

*Precision (positive predictive value)* =  $TP / (TP + FP) = 1$

*Accuracy* =  $(TP + TN) / \text{total obs} = 0.975 * 100 = 97\%$

*Error* =  $(FP + FN) / \text{total obs} = 0.025$

Table 1 Classification Matrix

Predicted	Classified as pass	Classified as Fail
Actual Pass	TN[35]	FP [0]
Actual Fail	FN[1]	TP[5]

### CONCLUSION

Incorporate distinctive, accessible training application into a single framework, for example, Online examination, Distance Learning, Urban Education Awareness and Video Conferencing. Innovation based showing gives for better correspondence in the middle of understudy and educator. It additionally gives reasonable training with fulfilling understudies and business' desire from the framework. This framework gives a standard configuration structure for the instructional framework. The Apriori and C4.5 calculation are utilized for an information investigation purpose. These two calculations enhance framework exactness is 97 % which is more noteworthy than existing frameworks.

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