IOT Segmented Security Registers Using Spot Technology

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Abstract- *current scenario all the students are in the situation to use the latest Science and Technology in their day-to-dayschool/college programs. As there is an improvement in the technologies daily, students are in the situation to update themselves. At the same time, the current technologies that we are using nowadays are not monitoring the students. For example, in an online training, the students just loginto the training portal, start the training, and do some other work without actively participating in the training. In the same way, the current training portals used by the schools/collegesare using the username and password validation method to log in. The drawback is used by students in such a way they share their usernames and passwordswith others if they are not able to log in on time. A solution to this problem is proposed in this paper. It starts from authorizing the students to access the learning contents by verifying their fingerprints and warning them if the system detects that they are in drowsiness. The proposed system put forward an IOT-based system that will automatically keep a record of students' performance, assignments, submission history, etc. This will help reducethe manpower of faculty members by more than 50%.*

Keywords- IOT, Networking

I. INTRODUCTION

1 About the project

Nowadays, there are plenty of digital educational tools to provide additional assistance for lecturing students. Digital facilities offer conveniences and effectiveness in creating an environment dedicated to boosting educational courses for scholars, by turning a physical reality into a virtual reality ambiance using a combination of hardware and software apparatus. Numerous virtual learning environments (e.g., Google Classroom, Blackboard Learn) provide a learning system for managing educational courses for institutions; creating a virtual community using a portal system; and archiving scholar assessment output with analysis features.

While sharing the training content online, the first step is avoiding unauthorized access from others utilizing user authentication. It is the process of verifying a claimed identity. This is done to perform trusted communications between the training agency and the participants. The user authentication is categorized into three classes as follows:

- Knowledge-based
- Object or Token based
- Biometric based

The knowledge-based authentication is based on login user name and password or PIN codes. Object-based authentication relies on ID cards or tokens – most of the time it is a part of RFID technology. Biometric technologies explain the automated methods of a living person based on physiological or behavioral characteristics like fingerprints or iris scanning.

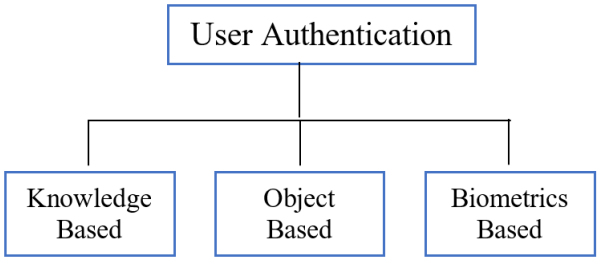

Fig 1: User Authentication

2 Problem Definition

During online training, the trainer or the training agency has no control over the students. The students just log in to the training portal, start the training, and do some other work without actively participating in the training. In the same way, the current training portals used by the schools/colleges are using the username and password validation method to log in. The drawback is used by students in such a way they share their usernames and passwords with others if they are not able to log in on time.

3 Project Scope

To address above said limitations, we are going to create an online training portal that will verify the student fingerprint for authentication. Also, the system should run an alarm if it finds drowsiness in the students.

Project Overview

A solution to this problem is proposed in this paper. It starts from authorizing the students to access the learning contents by verifying their fingerprints and warning them if the system detects that they are in drowsiness. The proposed system put forward an IOT-based system that will automatically keep a record of student's performance, assignments, submission history, etc. This will help reducethe manpower of faculty members by more than 50%.

II. LITERATURE SURVEY

The CAI-based system was further developed in the 1970swhen computer-based tutorials, seminars, and conferencing were started in BASIC programming language lessons.

In the late 1980s, the invention of the personal computer led to the creation of telecourses across a network to various colleges with interaction using email. Microsoft launched the Online Institute to prove the concept of online-based learning in 1996 and made it available for most learning institutions to conduct their online learning platform.

In 2001, Course Work by Stanford University's Academy of Computing developed a full-featured lesson management system, followed by Microsoft Class Server in 2005, Blackboard in 2006, ProProfs in 2012 and so worth for facilitating education towards the future of technology-based learning.

In recent years, ubiquitous internet connectivity with low-cost, high-speed, and pervasive network capability has made almost everything connectable. Industry development and manufacturing drive the miniaturized devices and computing economics to deliver greater computational competence and tiny size of processing modules at lower costs in price and power consumption.

These two admittances lead to the advancement of Internet of Things (IoT) devices, which enable the collection of real-world data in a classroom to virtually understand the actual situation of the learning environment using Internet facilities.

Chang proposed an efficient mechanism system using IoT infrastructure to collect students' actual attendance in a smart classroom. He utilized Radio Frequency IDentification(RFID) cards, placed on a row of RFID card slots to enable a roll caller feature. Later, Gligoric et al. introduced a real-time feedback IoT concept framework by utilizing node sensors (i.e., infrared sensors, sound sensors, and camera modules)in the classroom.

The collected information from sensors was analyzed based on the correlation of sound level, movement existence, and camera view intensity to identify students' responses to a lecture and improve lecture quality. Gupta et al. utilized Intel's Galileo board to control the classroom's ambiance by monitoring the lights status of the classroom.

An energy-efficient power management system is introduced based on the lighting status controls by the Galileo board and relay switches. Merino et al. introduced an IoT educational platform (i.e., in a science, Technology, Engineering, and Math (STEM) context) by utilizing wireless robotic modules.

Several Arduino-based robots are described, e.g., DFRobot, Make-block, Ni myRio, and Lego Mindstorm to promote the innovation and motivation of the student during the STEM context learning process.

III. EXISTING MODEL

In the existing model of the online learning system;

- Students are logged in using a username and password.
- Once logged in they are accessing the contents.
- Once finished, they can log out.

Problems in the Existing Model:

- Anyone who knows the username and password can log in.
- When the training content is based on videos, there is no mechanism to check that the students are actively attending the session.
- There are possibilities where a student can do some other work, once the video starts.

IV. PROPOSED MODEL

In the proposed online training portal we are considering the above-mentioned limitations and implemented the following.

- We are going to use biometric-based user authentication with the user's fingerprint as login accessing security i.e. only the students canlog in.
- If others are trying to log in the mechanism will not allow them.
- The mechanism is going to check the active participation of the user by taking photos of his/her face.
- Once the photo is taken, the mechanism will check the eyes to check the drowsiness.
- If the user's eyes are closed for more than 5 seconds or the student is not present in front of the camera, it will alert the student by playing an alarm.
- The student usage data like login date, time, drowsiness alarm status, lessons studied, assignments submitted, test marks, logout time, etc. will stored in a database.
- The above-said data can be accessed by the admin or trainer to understand the user's learning behavior. It will support the trainer to take corrective actions.
- The user is also able to access the data in a user interface for his/her reference.

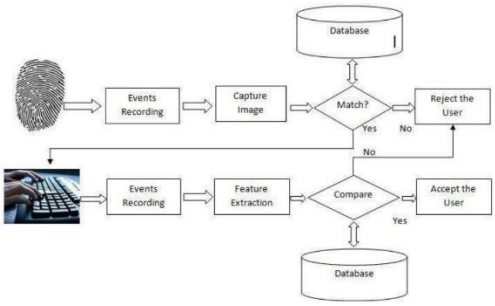

Fig 2: Block Diagram

V. SYSTEM DESIGN

The System Design describes the system requirements, operating environment, system and subsystem architecture, files and database design, input formats, output layout, detailed design, processing logic, and external interfaces, if applicable. A further view sees system analysis as a problem-solving method that splits down a system into its element pieces for the idea of studying how well those parts work and interact to accomplish their purpose.

Systems design entails a systematic approach to the design of a system. Systems design is the progression of defining elements of a system like modules, architecture, components, and their interfaces and data for a system based on the specific requirements. It is the procedure of defining, developing, and scheming systems thatsatisfy the specific requirements and necessities of a business or organization.

System design is "The process of studying a procedure or business to identify its goals, purposes and create systems and procedures that will efficiently achieve them". Another view sees system analysis as a problem-solving technique that breaks down a system into its component pieces to study how well those parts work and interact to accomplish their purpose.

The field of system analysis relates closely to requirements analysis or operations research. It is also "an explicit formal inquiry carried out to help a decision maker identify a better course of action and make a better decision than she might otherwise have made."

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture, and systems engineering.

Design Notation:

Design notations are used when planning and should be able to communicate the purpose of a program without the need for formal code. Commonly used design notations are:

- Data Flow Diagram
- Entity Relationship Diagram

5.1 Data Flow Diagram

DFD graphically represents the functions, or processes, which capture, manipulate, store, and distribute data between a system and its environment and between components of a system. The visual representation makes it a good communication tool between the User and the System designer. The structure of DFD allows starting from a broad overview and expands it to a hierarchy of detailed diagrams. Data flow diagrams can be divided into logical and physical. The logical data flow diagram describes the flow of data through a system to perform certain functionality of a business. The physical data flow diagram describes the implementation of the logical data flow.

DFD has often been used for the following reasons:

- Logical information flow of the system
- Determination of physical system construction requirements
- Simplicity of notation

- Establishment of manual and automated systems requirements

DFD Symbols:

NAME	SHAPE	DESCRIPTION
Rectangle		Source (or) Designation
Circles		Process
Open End Box		Data Storage
Arrow		Data Flow

Table 1: DFD Symbols

Data Flow Diagram- Level 0:

Fig 3: DFD – Level 0

Data Flow Diagram- Level 1:

Fig 4: DFD – Level 1

Data Flow Diagram- Level 2:

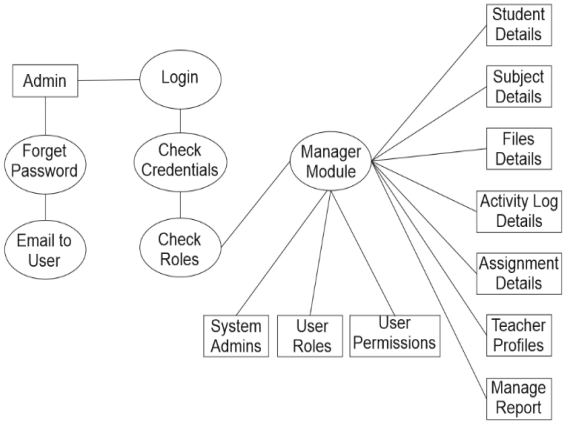

Fig 5: DFD – Level 2

5.2 ER Diagram

The relation upon the system is structured through a conceptual ER-Diagram, which not only specifics the existential entities but also the standard relations through which the system exists and the cardinalities that are necessary for the system state to continue. The Entity Relationship Diagram (ERD) depicts the relationship between the data objects. The ERD is the notation that is used to conduct the datamodeling activity the attributes of each data object noted in the ERD can be described resign a data object description. The set of primary components that are identified by the ERD are;

- Data object
- Relationships
- Attributes
- Various types of indicators.

ER Diagram Symbols

NAME	SHAPE	DESCRIPTION
Rectangle		Entity
Circles		Attribute
Diagonal		Relation
Arrow		Link

Table 2: ER Symbols

ER Diagram

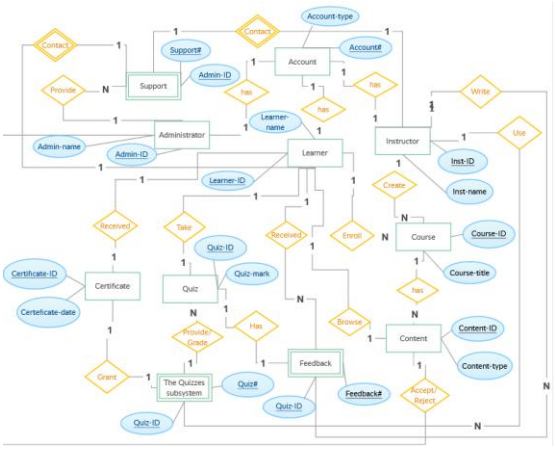

Fig 6: ER Diagram

5.3 Input Design

Input design is the process of converting the user-oriented input to a computer-based format. The goal of the input design is to make the application easier, logical, and free of error. Errors in the input data are controlled by the input design. The quality of the input determines the quality of the system output.

All the data entry screens are interactive so that the user can directly enter data according to the prompted messages. The user is also can directly enter data according to the prompted messages. The users are also provided with the option of selecting an appropriate input from a list of values. This will reduce the number of errors, which are otherwise likely to arise if they were to be entered by the user itself.

Input design is one of the most important phases of the system design. Input design is the process where the input received in the system is planned and designed, to get necessary information from the user, eliminating the information that is not required. The input design aims to ensure the maximum possible levels of accuracy and also ensures that the input is accessible and understood by the user. The input design is the part of the overall system design, which requires very careful attention. If the data going into the system is incorrect then the processing and output will magnify the errors.

5.4 Output Design

The output form of the system is either by screen or hard copies. Output design aims at communicating the results of the processing of the users. The reports are generated to suit the needs of the users.The reports have to be generated with appropriate levels. In our project outputs are generated by Python as a Word document.

Experimental setup:

The proposed system is implemented using Arduino Uno interfaced with the IOT module. The following components are going to be used to store or check the student's fingerprint.

Arduino Uno

Fingerprint sensor module

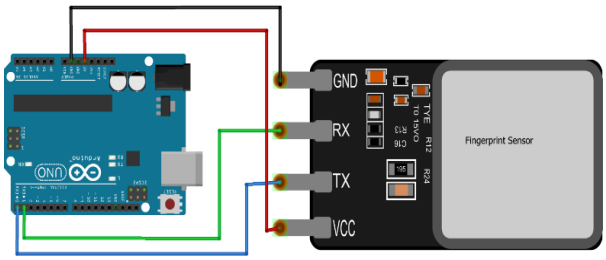

Fig 7: Experimental Setup

VI. CONCLUSION

IOT-based Automated Enhanced Learning is very helpful to ensure that only the assigned students are accessing the learning contents and actively participating. This will enhance the learning involvement of the students. Students will attend to all the learning contents without fail. The proposed technique will improve the quality and level of education leading to better contribution of graduates to society. The proposed system can be further improved by the feedback of learning from the students.

REFERENCES

[1] AlonSchclar, LiorRokach, Adi, Abramson, and Yuval Elovici User Authentication Based on Representative Users, IEEE Transaction on systems, man, and cybernetics –part c: applications and reviews vol. 42, no. 6, November 2012.

[2] De-Song Wang, Jian-Ping Li, A New Fingerprint -Based Remote User Authentication Scheme using mobile devices Apperceiving computing and Intelligence Analysis, 2009. ICACIA 2009, Pages(s):65-68, Chengdu,china.

[3] Ahmed Awad E. Ahmed, and Issa Traore, "Anomaly Intrusion Detection based on Biometrics", Proceedings of the IEEE, 2005.

[4] Anil K. Jain, Arun Ross, and Salil Prabhakar2, "An Introduction to Biometric Recognition", IEEE Transactions on Circuits and Systems for Video

Technology, Special Issue on Image-and Video-Based Biometrics, Vol. 14, No. 1, January 2004.

[5] Lawrence O'Gorman, "Comparing Passwords, Tokens, and Biometrics for User Authentication", Proceedings of the IEEE, Vol.91, No. 12, Dec, pp. 2019-2040, 2003.

[6] S. Shinde; VarshaBendre, "An Embedded Fingerprint Authentication System", 2015 International Conference on Computing Communication Control and Automation.

[7] P. P. Merino, E. S. Ruiz, G. C. Fernandez, M. C. Gil, "A Wireless Robotic Educational Platform Approach,"13thInternational Confer-mention Remote Engineering and Virtual Instrumentation (REV). Madrid,Spain,pp. 145-152, Feb 2016.

[8] L. Zhu, "Research and Design of the Future Classroom Based on Big Data and Cloud Processing,"International Conference on Audio,LanguageandImage Processing (ICALIP). Shanghai, China,pp. 111-114, July 2016.

[9] Gualberto Aguilar; Gabriel Sanchez; Karina Toscano; Moises Salinas "Fingerprint Recognition". ICIMP 2017.

[10] YiqiTew, Tiong Yew Tang and Yoon Ket Lee, "A Study on Enhanced Educational Platform with Adaptive Sensing Devices using IoT Features", Proceedings of APSIPA Annual Summit and Conference 2017

[11] 96boards.org,"WelcometotheHiKey960"http://www.96boards.org/product/hikey960/, November 2016, [Accessedon 14 June 2017].

[12] Amazon.com,"AWSIoT-AmazonWebServices?"https://aws.amazon.com/iot/, June 2017, [Accessed on 14 June2017].

[13] Microsoft.com,"AzureIoTSuite—MicrosoftAzure?"https://azure.microsoft.com/en-us/suites/iot-suite/, June 2017, [Accessedon 14 June 2017].

[14] Amit Saxena; KshitijShinghal; RajulMisra; Alok Agarwal, "Automated Enhanced Learning System using IOT", 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU) - 2019

[15] S Hemalatha, "A systematic review on Fingerprint based Biometric Authentication System", ic-ETITE 2020