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Fingerprint Based Attendance System Using IOT

Mr.Gore N S [1], Mr.Bafana S J [2], Miss.Bele A M [3] Miss.Barbole M S [4]
Miss.Bhosale P R [5], Mr. Ass.prof.S.G Shinde [6]
Department Computer science & Engg.college
Bhagwant Institutes of Technology
Barshi - India

ABSTRACT

A biometric time and attendance system is the automated method of recognizing an employee or student based on a physiological or behavioral characteristic. The most common biometric features used for employee or student identification are faces, fingerprints, finger veins, palm veins, irises, and voice patterns. Biometric student attendance system increases the efficiency of the process of taking student attendance record. This paper represents a simple approach to student attendance in the form of an Internet of Things(IOT) based system that records the attendance using fingerprint based biometric scanner and stores them securely over cloud. This process avoids the manually taking and storing student attendance records. It also prevent proxy attendance, thus increasing the reliability of attendance records. The records are securely stored and can be reliably retrieved whenever required by the teacher.

Keywords:- Biometric, Fingerprint, IoT, Fingerprint Scanner, Attendance

I. INTRODUCTION

Every organization whether it be an educational institution or business organization, it has to maintain a proper record of attendance of students or employees for effective functioning of organization. Designing an efficient attendance management system for students to maintain the records with ease and accuracy is an important key behind motivating this project. Nowadays attendance is taken on paper and records are maintained where someone keeps all the records and does all the calculations at the end of the month due to which it takes time and students have to wait till month end to know their attendance. This system would improve accuracy of attendance records because it will remove all the hassles of roll calling and will save valuable time of the students as well as teachers.

In this system the concept of Iot is applied to attendance system of a classroom. A portable module is designed which has the capability of recognizing the student via their fingerprints and then sending the ID of student to the server, whose fingerprint is recognized. First of all the system requires connectivity to the internet, which can be achieved through Wi-Fi So a system is required which has the capability of Wi-Fi connectivity for which Node mcu (ESP8266 12e) is chosen. Now when the system is powered ON, it first scans all the Wi-Fi networks and any network can be connected by entering the password. Once the connection is established, it scans for the fingerprint via fingerprint module r-305 and recognizes the student, whoever is recognized their fingerprint ID is sent to the server (PC).

When the server receives the Fingerprint ID it marks the attendance of the student. Server is basically a PC which maintains all the records of the attendance and calculates the attendance percentage. This attendance can be checked in real time on the website or android application, where a student can check his/her attendance in real time. The existing attendance system requires a teacher to take attendance by roll calling, which has many drawbacks, such as proxy attendance, extra efforts of teacher calculating the attendance percentage, even calculation errors can be made, and students not getting their attendance report till the end of the month. All these problems can be avoided by using this system, as this system uses fingerprint recognition to identify the student, proxy attendance can't be marked, attendance is sent to server in real time, all the calculations are done by the server and students can check their attendance in real time.

II. UNDERSTANDING INTERNET OF THINGS

Everyone is eyeing the next big thing after the .com boom which will make riches. World has never being the same after advent of the internet. Investment gurus and statisticians may have many proposals to make but one thing is for sure, the next big move which will shape the century will depend on internet and embedded technology. That is, in other words internet of things definition is what interests major players now. What we do, how we do and when we do is never going to be the same when the physical environment around us gets lively and starts communicating.

The Internet of Things (IoT) is here and is becoming an increasing topic of interest among technology giants and business communities. The hype is not baseless as there are enough evidences to support the success of "Internet of Things" in the coming years. According to a report by Gartner there will be 30% increase in the number of connected devices in 2016 as compared to 2015 with 6.4 billion IoT devices entering the realm of internet of things. The number is further expected to increase to 26 billion by 2020.
So one might simply ask "What is Internet of Things" and how it is going to impact our lives and career opportunities. There is a lot of complicated technology and terminologies at work in the IoT world but here I will try to keep things simple to explain the concept of Internt of Things easily network infrastructure

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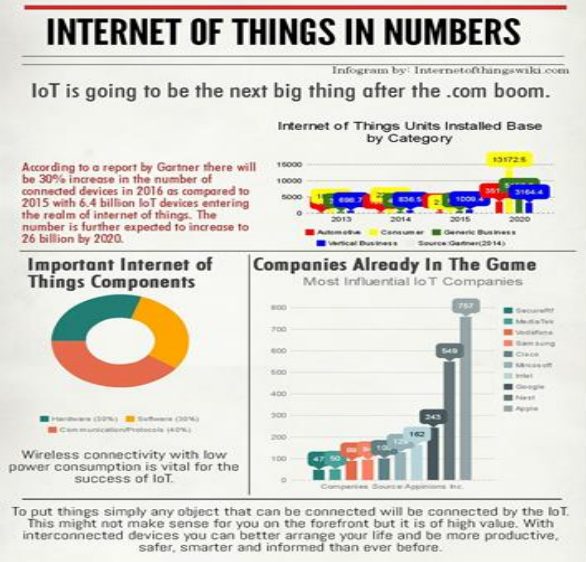


Fig: IOT

III. RELATED WORKS

The RFID based attendance system simplifies the process of taking attendance and reduces the paper work and saves the lecture time. Student have to display their RFID card to the RFID reader in order to mark their attendance, and then the collected data will be sent to the professor's cell phone via Bluetooth, in this way he/she can keep the record of attendance daily .
The iris based attendance system includes a small but very high resolution camera for taking the image of the iris, which is then compared with the data enrolled in the database. If the entered data matches with the already existing data, the attendance of particular person is marked present. This system is costlier because of the high resolution camera, but it's the most fool proof system for the task, as the pattern and the colour of the iris is unique for every individual.
The wireless fingerprint attendance management is based on biometrics and wireless technique solves the problem of spurious attendance and the trouble of laying the corresponding network. It can make the users' attendances more easily and effectively.
Enrolment of fingerprints is done on the Server using Digital Persona Fingerprint USB Sensor and verification is done on the client with the transmission of fingerprint
template over the network. In this system attendance report is generated automatically and is further forwarded to faculty members via Email. In addition to this, SMS is also sent to parent's mobile in case of short attendance of students

IV. COMPONENT SELECTION

This system requires a micro controller to function so ESP8266 12e is chosen. It requires a display to display the names of the students whose fingerprint is scanned so an OLED display is chosen. To scan and recognise the fingerprints a fingerprint module R305 is chosen. To provide the power to the system battery of 5v is connected. Other components required are switches, wires, and PCB.

ESP8266 12e

It is the microcontroller of this project. It is chosen because it has very small form factor i.e. 24.75mm x 14.5mm. Moreover ithas Wi-Fi capability, which allows the connectivity to the internet for IoT applications.

V. FINGERPRINT SCANNER

Fingerprint scanner was required for scanning. Enrolling, and detecting the fingerprints. So R-305 is chosen as it provides the capability of storing more than 250 fingerprints. It works on 5V and has good image processing capabilities due to which it captures image up to resolution 500 dpi. It has dimensions of 55*3 2*21.5mm.

OLED DISPLAY

A display is required to display the Wi-Fi networks and student names whose fingerprint matches. So for displaying all the information an OLED Display is chosen. This system has a 0.96" OLED display which has resolution of 128*64.

VI. IMPLEMENTATION

Algorithm

1. Starts the process.

2. Select the option to enrol new fingerprint or delete previous ones.

3. If nothing is selected it scans for the wifi network and joins if new known network.

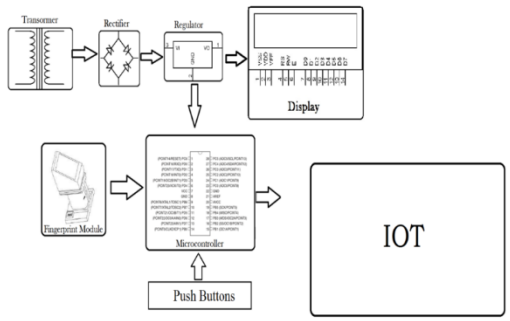


Fig: Architecture of fingerprint BAS using IOT

4. If none of the known networks are present than it displays all the available networks.

5. Any of the new network can be selected and joined by entering the password.

6. Once the connection is established it starts scanning for the fingerprints.

7. When a teacher scans his/her fingerprint it asks for the class and lecture for which attendance is being taken.

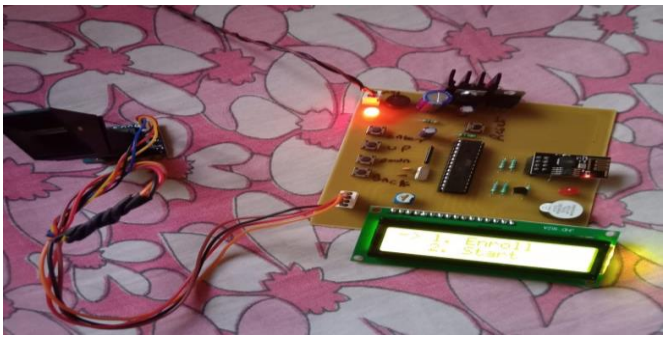
8. Now the students can scan their fingerprints.

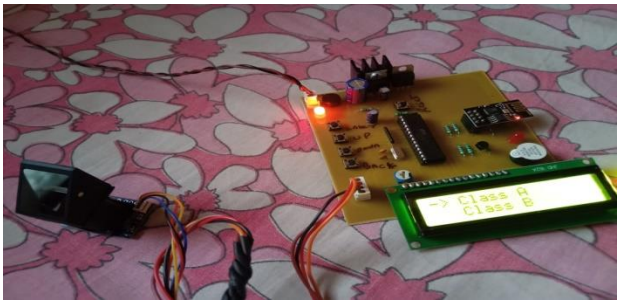
9. Whenever it recognises any student it send their fingerprint ID to the server through packet data transmission. 10. When a server receives the data from the system it updates the attendance of the student.

11. When the attendance of all the students is taken, any student can check his/her attendance on the android application.

VII. RESULTS

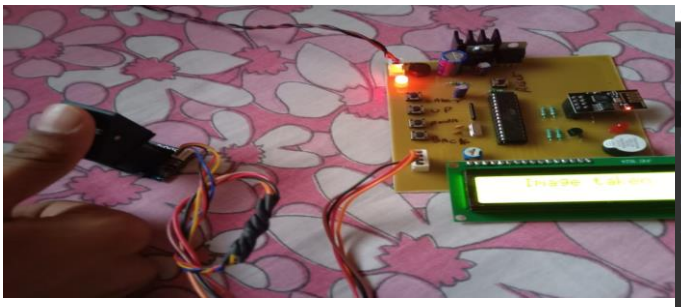
Everyone in this world has marks on their fingers. These marks have a pattern and his pattern is called the fingerprint. Since, they are unique and cannot be removed
or changed, they have become ideal means of biometric identification. An image of the user's fingerprint is captured by fingerprint scanner. This captured image is called as live scan. The live scan is processed digitally to create a biometric template (a collection of certain extracted features) which is stored and used for matching. Identification of fingerprints of individuals is done on the basis of both hardware and software techniques Shown in figure bellow.





→Selection of Class

Fingerprint processing has three primary functions: enrolment, searching and verification. Out of these, enrolment plays an important role. It involves capturing an image of the user's fingerprint. Searching involves sifting through a set of stored fingerprints and comparing them with the input fingerprint. Verification involves acknowledging a match between the input fingerprint and one already present in the stored fingerprints.



→Image Process

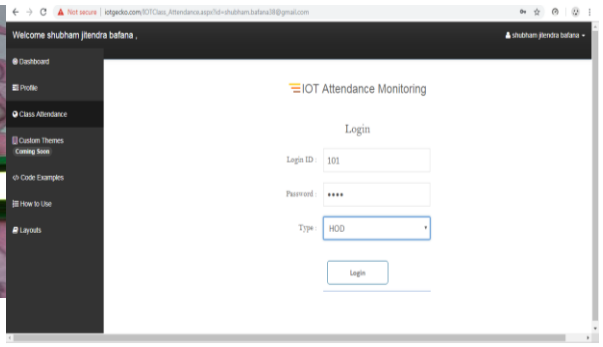
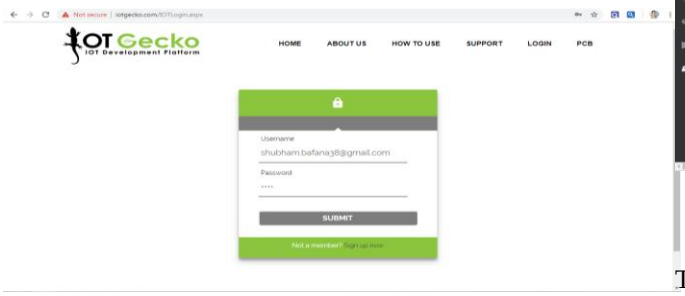


Fig:-HOD Login Form

Login Page-

Admin can login through login page with proper password and username.



→Login Page

ADMIN PAGE-

Here admin can fill and update all his personal details like name, email, number, city & type.

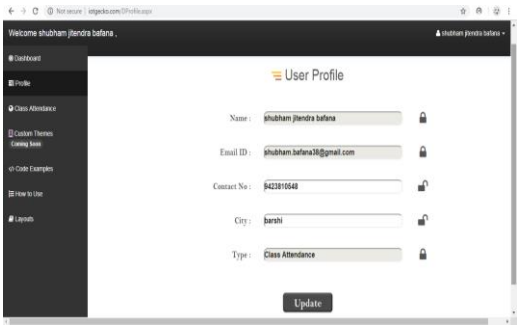


Fig:-Admin Page

HOD LOGIN & MONITORING-

HOD with his/her username and password login to monitoring page.

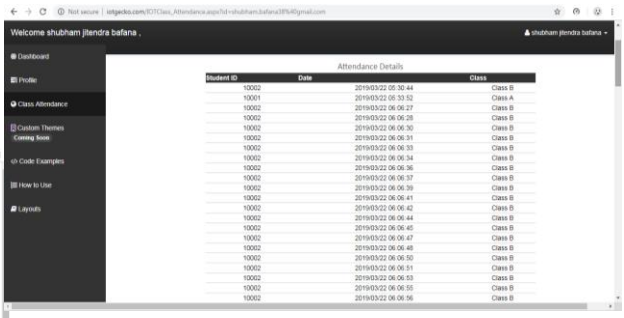


Fig:-Monitoring Page of HOD

TEACHER LOGIN & MONITORING-

Teacher with his/her username and password login to monitoring page. Only particular teacher of that particular class will monitor them.

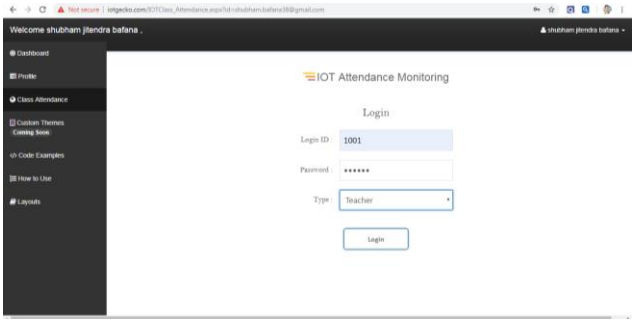


Fig:-Teacher1 Login Form

Teacher can monitor each student attendance only his/her class.

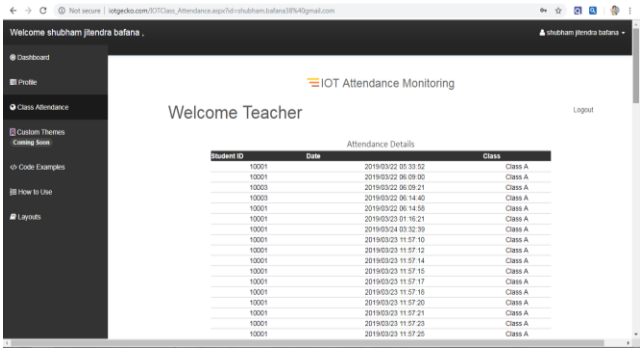


Fig:-Monitoring Page of Teacher

STUDENT LOGIN & MONITORING-

Student with username and password will login to the system.He/She can monitor only his/him attendance.

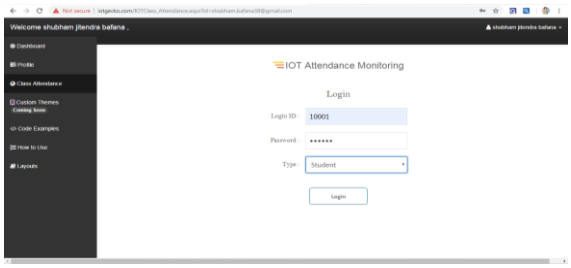


Fig:-Student Login Form

Student can monitor his/her attendance in this page.

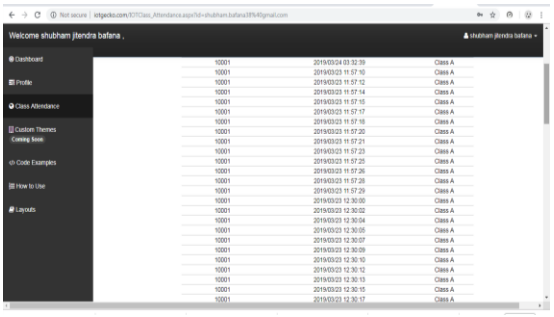


Fig:- Monitoring Page of Student

VIII. CONCLUSION

The traditional process of manually taking and maintaining student attendance is highly inefficient and time consuming. The attendance monitoring system based on biometric authentication has a potential to streamline the whole process. An Internet of Things (IoT) based portable biometric attendance system can prove to be of great value to educational institutions in this regard as it proves to be highly efficient and secure. The cost involved in making this system is quite less, when compared to conventional biometric attendance system.The use of cloud computing to store the attendance records makes all the data easy to access and retrieve as end when required by the teachers. The use of fingerprint scanner ensures the reliability of the attendance record. The system, due to its lack of complexity, proves to be easy to use and user friendly.

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