International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 04 Issue: 02 | Feb -2017 www.irjet.net p-ISSN: 2395-0072

IoT based attendance system

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ABSTRACT

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.

Key Words: IoT(Internet of things), attendance, fingerprint, ESP8266 12e.

INTRODUCTION

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.

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 it has Wi-Fi capability, which allows the connectivity to the internet for IoT applications.

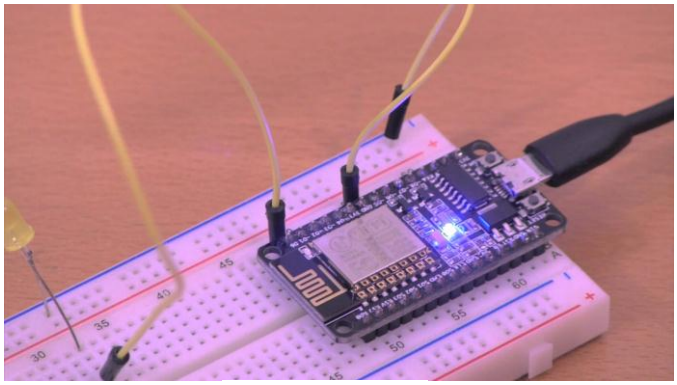

Fig.1 ESP8266 12e

It requires 3.3v to function, but as it has on board 5v to 3.3v converter it can be powered from any USB power source.

R-305 Fingerprint Scanner

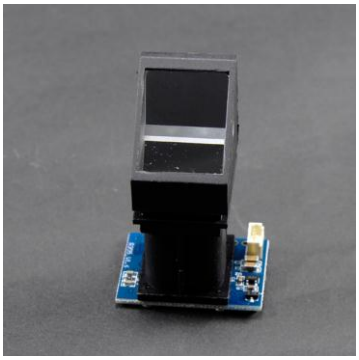

Fig.2 R-305 Fingerprint Scanner

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*32*21.5mm.

OLED Display

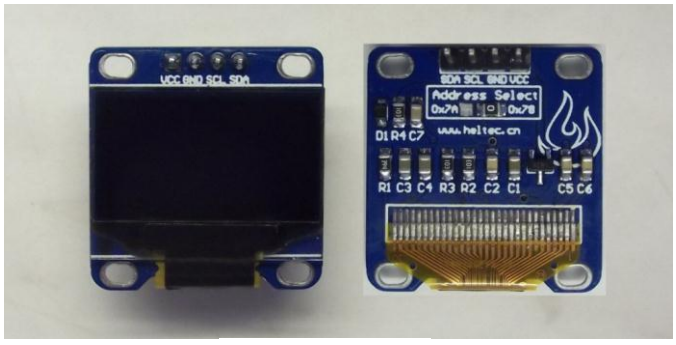

Fig.3 OLED Display

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.

Why Fingerprint?

This system uses fingerprint to recognize a person rather than any password or identity card, as those things can be shared with another person and proxies attendance can be made, but due to the use of fingerprint this is not possible thus reducing the chance of proxy attendance which is a major problem in attendance maintenance. And there has been immense growth in the biometric industry in terms of security, so it is reliable.

Why Node mcu(ESP8266 12e)?

System requires an internet connection which can be connected through Wi-Fi as most of the college campus has Wi-Fi connectivity nowadays. So to connect to the Wi-Fi system requires Wi-Fi connectivity, which is available in this mcu. And other factors such as small form factor and low cost played a vital role in its selection.

OBJECTIVE:

The main objective of the project is to automate the process of attendance and make it possible to check attendance in real time. In this system we made a transmitting module to transmit the fingerprint matched ID and a server to receive the data from the transmitting module and do the calculations to calculate attendance percentage of each and every student. This system also has android application through which student can check their attendance in real time. Android application is also used by teachers to give assignments to students so that students can get the notification. Android application also provides push notifications when new assignments are given by teachers or the attendance of particular student is low.

Block Diagram:

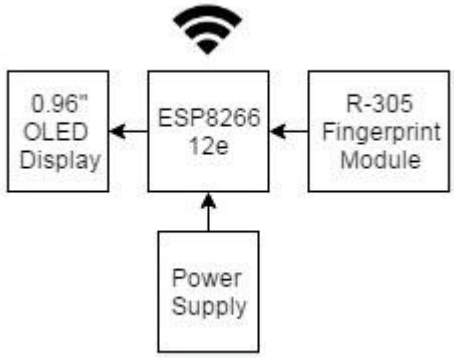

Fig.4 Block Diagram

ALGORITHM:

1. Process Starts
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.
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.

Flow Chart:

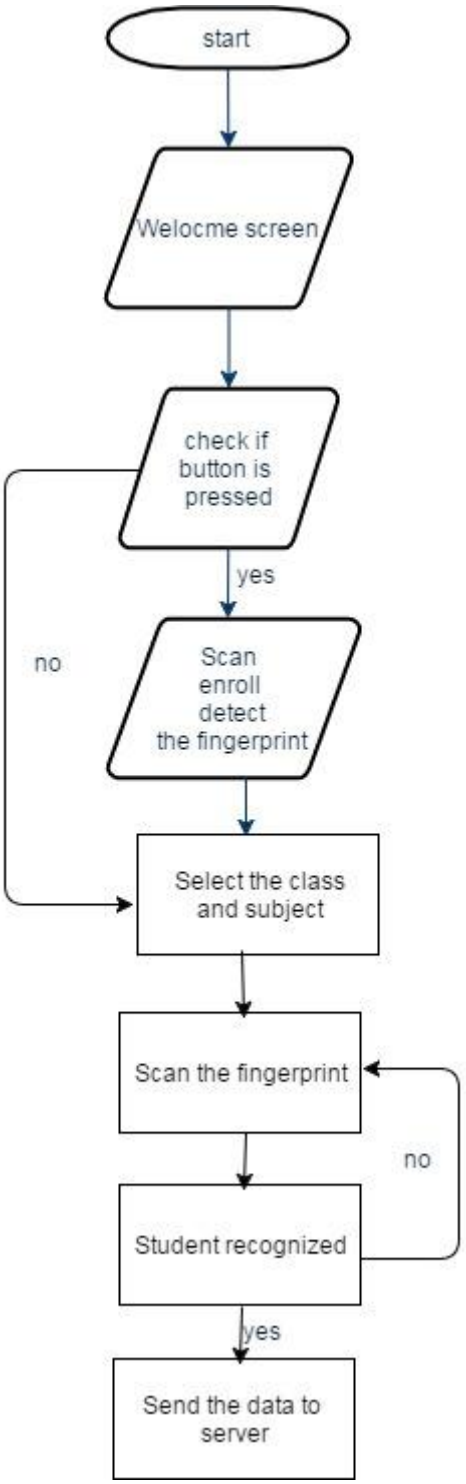

Fig.5 Flow Chart

ADVANTAGES:

- This method has very high accuracy and it is easy to use.
- Fingerprint identification is that it is accepted in legal community, among law enforcement and general public.
- This method is the most economical biometric PC user authentication technique
- Fingerprint identification is widely perceived as highly accurate and very reliable.
- This method required small storage space for the biometric template, reducing the size of database memory required.

DISADVANTAGES:

- The major disadvantage of this technology is that using the fingerprint scanner does not take into consideration when a person physically changes.
- For some people it is very intrusive, because is still related to criminal identification.

APPLICATION:

- This system can be use in biometric attendance of students.
- This system can be used for real time monitoring of any class strength and make attendance record In real time
- It can be used for security purposes where high level security is desired.

CONCLUSION:

Using the concept of Iot Based Attendance system this system is capable of taking the attendance and recording it on server in real time. Server is capable of calculating the attendance percentage and storing it. Any student can check their attendance in real time via an android application. Even teachers can provide assignments on the same application and students can check their assignments.

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