Wireless Biometric Attendance System for Academic Purpose Using Node MCU Microcontroller and IoT

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ABSTRACT: This paper presents a uncomplicated and portable loom 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 the cloud. This system aims to automate the cumbersome practice of physically taking and storing student attendance records. This project has a wide relevance in school, college, business organization, offices where marking of attendance is obligatory accurately with time. By the use of fingerprint sensor, the system will become more protected and increases the efficiency of the process of taking student attendance for the management.

Thus, it will also prevent proxy attendance and increases the reliability of attendance records. The records are securely stored and can be reliably retrieved whenever required by the educator. All the data of a particular student and teachers are stored in a database when a student's or lecturer's finger is registered for a particular institute and after that whenever the student/Lecturer scans, his/her attendance is counted automatically and stored in the destined database wirelessly with the percentage, eventually helps the lecturer towards the end the semester without any hectic calculation.

KEYWORDS: Biometric; Attendance system;

I. INTRODUCTION

In the human race of machinery, biometrics plays an effectual role in identifying individual. In this project, we have designed a Fingerprint Sensor Based Biometric Attendance System using NodeMCU & IoT. NodeMCU is interfaced with the fingerprint sensor and the desired output can be seen on LCD. Biometric attendance systems are commonly used systems to mark the presence in offices and schools. This project has a wide application in school, college, business organization, offices where marking of attendance is required precisely with time. In addition to this, Wi-Fi module can be added, to upload the data into remote cloud, so as to access the entire unit from the sole system of it from anywhere in the world. Attendance plays a major role in educational institutions. The most common means of taking attendance in the classroom is by calling out the roll numbers of students or asking the students to manually sign the attendance sheet, which is passed around during the lecture. With the recent development of various cloud based computing and storage systems, data can be securely stored and retrieved whenever required. Primarily, fingerprints and iris images are considered to be the most reliable for use in biometric systems.

In this project our aim is to leverage this IoT into the boring attendance system to make it smart and more effective. Most conventional attendance systems available today store the information over a micro SD card and have to be connected to software via a computer to access the information. Here, we will build a biometric attendance system using NodeMCU that scans for finger print and on successful identification of the person it will log the information to a cloud platform like thingsboard by using the esp8266 Wi-Fi module. This information can then be displayed in the dashboard of thingsboard making it available for the required authorities to view and analysis information over the internet without having any direct physical access to the hardware.

II. PROPOSED ALGORITHM

A. *Design Considerations:*

- 5V USB power connection from a rechargeable battery which is attached to the system
- Fingerprint Sensor R307
- NodeMCU Microcontroller
- Arduino IDE software for coding

B. *Description of the Proposed Algorithm:*

NodeMcu board is interfaced with a Finger Print Scanner R307/R305 as shown in Fig 1. Finger Print Scanner R307/R305, will store the finger prints of all the students and once they are stored, the Finger-Print Scanner will weigh against the present finger print on the scanner and formerly stored finger prints. If any finger print is coordinated, the microcontroller will print the concern data stored for the particular finger print on the LCD Display. In addition to this, we can add Wi-Fi module, to upload the data into remote cloud, so as to access the entire unit from the sole system of it from anywhere in the world.
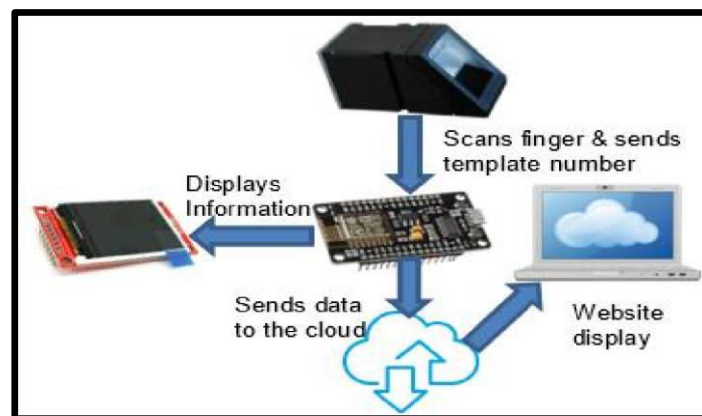

Fig 1: Proposed flow of the project

III. PSEUDO CODE

Add mode:
Step 1: Input the fingerprint ID and the fingerprint
Step 2: Store the fingerprint
Step 3: Stop

Scan mode:
Step 1: Input the fingerprint
Step 2: Check if image is taken and compare it with stored image
Step 3: if (matches ==yes)
    Store the attendance and time
    Else
    Go to step 1 of scan mode
Step 4: End

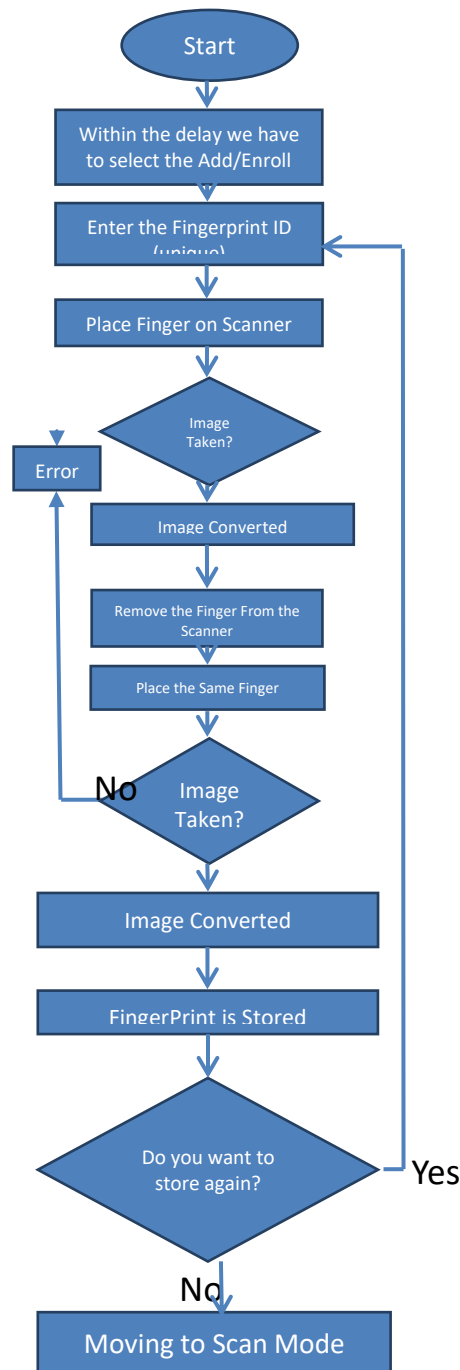The flow diagram for the program is as shown in Fig 2.

Fig 2: Flow diagram for the Pseudo code

IV. SIMULATION RESULTS

Compared to stationary fingerprint systems, it makes the attendance system more disciplined and reduces time consumption and importantly fast response. Fig 3 shows the simulation circuit of the design. Sometimes it may happen that a student's finger may not be recognized instantaneously because of the certain issues which are avoidable but then they can go for one more try, because we have made it such a way that it doesn't allow dual attendance for a single class.
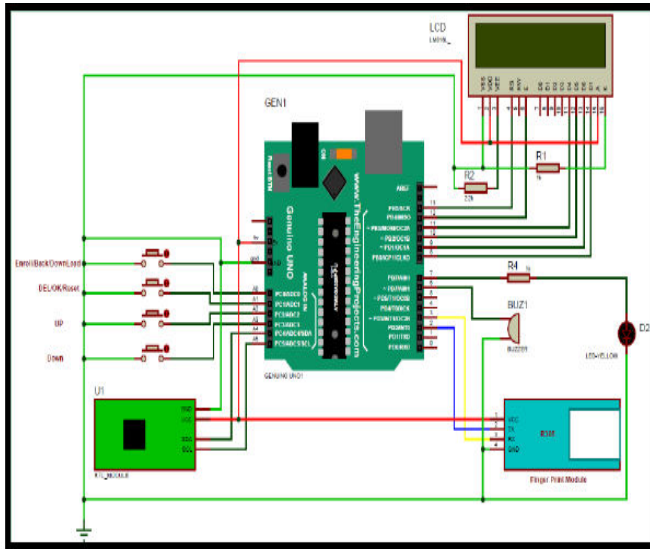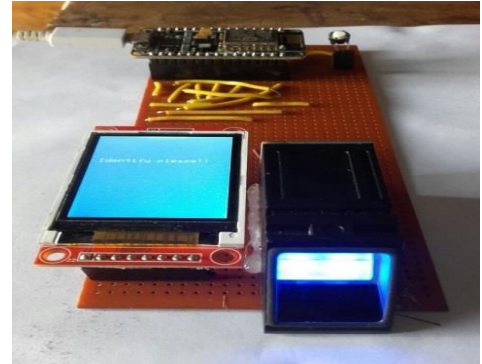
Fig 3: Circuit simulation of the design

Fig 4: Portable biometric attendance system

As per the traditional method there is no need of giving the attendance in the sequence. The important feature is it is lightweight and portable and takes very less ample amount of time to register student's attendance on the database as shown in Fig 4.

V. CONCLUSION AND FUTURE WORK

In this paper we have presented a portable biometric attendance system for academic purpose which interacts wirelessly with a web server and stores information in phpMyAdmin database. We can see that the portability of this system has improved the time consumption compared to the conventional stationary systems and reduced the percentage calculation and marking task of course teacher. It also prevents students from giving false attendance and the security issue is very much protected.

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