

# Student Attendance with Fingerprint Reader

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**Abstract** - This project focuses on studying biometric technologies and development of a student attendance system that is based on fingerprint recognition of students in order to verify their attendance. In this project, the attendance system will be developed for students to scan their fingerprint with provided hardware to verify their attendance in all classes. At the same time, a web-based attendance system will be developed for the admin/lecturer to view and analyze student attendance by generating the attendance report. The main purpose to develop this project is to replace the current traditional attendance system by providing a faster, accurate, and efficient system. In this project work, attendance is marked after a student's biometric identification. Finger impression highlights are viewed as the best and quickest strategy for biometric ID. These features are more secure to use and unique for every person that doesn't change in one's lifetime. Student attendance report will be generated and the faculty can analyze it. With this new finger impression acknowledgment participation framework, it can take out certain issues, for example, amigo marking, deficiency of participation sheet, and furthermore control understudy play hooky rate. Lastly, the implementation of this system will definitely provide a more efficient, reliable, and accurate way to manage the student attendance data.

**Keywords:** Attendance system, Biometric attendance, Fingerprint Reader, Student attendance, Online attendance system.

## 1. INTRODUCTION

Attendance Marking is a regular activity that happens in every educational institute. The current system of checking attendance in a majority of the colleges involves a professor conducting a roll call or passing an attendance sheet among the students. The professor then proceeds to upload the data onto an excel file or an on-line database manually. While this method has been used for a long time, it still faces a number of fundamental problems which can be easily eliminated with the help of technology.

Primarily, the pen and paper method involuntarily urges students to mark proxies. Secondly, the human involvement in the form of professors opens up an avenue for human error. Thirdly, it takes up a considerable time for the professors which could be used towards other productive tasks. Thus we propose a system where the entire attendance marking and maintenance procedure is done by a smart device instead of relying on the old, pen

and paper technique. This system makes efficient use of hardware and software principles and also features connectivity using Internet of things (IoT).

The end result is a system which identifies the students, maintains an on-line attendance register in the form of a database and provides the professors with a detailed attendance record of any pupil, on demand.

## 2. LITERATURE SURVEY

A number of different methods have been introduced to reduce the burden of attendance monitoring and storage. However, they have had their own advantages and disadvantages. Some of the papers that we drew inspiration from while developing this cost-effective and portable version of the attendance monitoring system are given below along with their merits and demerits.

**[1] The authors of paper titled "Portable Biometric Attendance System Using IOT"** have tried to bring together concepts of hardware and software engineering to give an end consumer product which can replace the current manner of attendance marking. The hardware section consists of a pod, which is a portable device that was circulated among students in the classroom and also an LCD screen that displays various functional options. Another excellent feature of this implementation is that the teacher starts and stops the system by just scanning their finger. Although the system is good for representing data, it is a bit slower. The authors have mentioned that they may use touchscreen instead of LCD.

**[2] The authors of paper titled "Real-Time Online Attendance System Based on Fingerprint and GPS in the Smartphone"** have built a system of attendance monitoring that integrates GPS technology, biometric and smartphone. Many of the employees work remotely, this system works great for them. It captures attendance through fingerprint along with time, date, place. As it continuously detects location of employees which leads to battery consumption on smartphones which is a major drawback of the system. Also future scopes of the system are not mentioned properly.

**[3] The authors of "A Mobile Application for Wireless Attendance System"** has built an attendance monitoring system using a wireless fingerprint module. The proposed system has two main parts, wireless fingerprint terminal (WFT) and coordinator. The WFT is used to scan and transfer students' fingerprints to the coordinator, whose

function is to receive fingerprints and save them to the database. Using this system, via mobile phones or tablets, instructors can screen understudies' participation as well as can distantly enact the framework and acquire definite PDF reports of understudies' support.

[4] The authors of "IoT based Smart Attendance Monitoring System using RFID" has built a smart attendance system using RFID. The RFID reader is the most fundamental part of the RFID system. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at a frequency of 125 kHz and 12V power supply. The RFID tag is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. This makes the mechanism of recording the attendance effortless, quicker and protected as compared to conventional methods but sometimes people lose their cards or get them damaged, and it is one of the huge inconveniences of utilizing this framework.

### 3. PROPOSED WORK

This fingerprint authentication system, however, is a cost-effective and simplified means of identification. The fingerprint is distinctive to each individual. Even identical twins do not share the same fingerprint features, and they cannot be transferred, lost or forgotten like the password. It permits understudies to enlist for addresses effortlessly and kill blunders that are related to participation registers. The fingerprint authentication process can be divided into three parts, there are:

1. The enrolment process
2. The verification process
3. The data collection process

#### 3.1 System Architecture

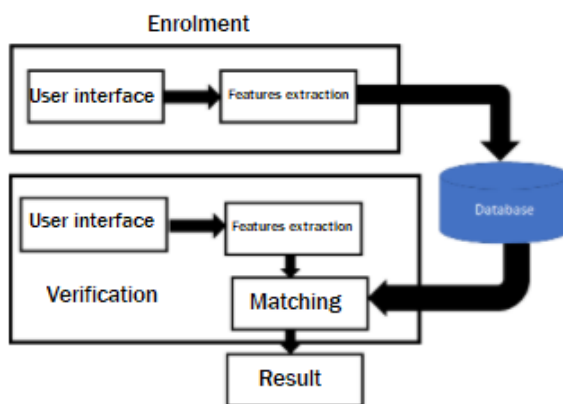


Fig-1 : Proposed system architecture

**Enrollment Block** - The Enroll process consists of obtaining a fingerprint scan with the LED on, and saving the image formed in one of the 127 entries in the database

device. If the returned value is lower than 127, then the function getFingerprintEnroll is called. the Enroll work with the ID section number acquired as a boundary is called. Then all, the Enroll function switches on the LED and waits for a finger scan up to a predetermined timeout. Subsequent to getting the sweep, the scanner gadget saves it in Memory. Then, it switches off the Led. Hence, when the LED is on, it implies that the gadget is playing out a sweep.

**Verification Block** - First, the scanner switches on the LED. Then, the worker trusts that a finger will be set on the scanner. At the point when the finger is on the scanner, this illuminates the worker as needs be. If successful, the server sends a command packet with the captureFinger command using the function. On receiving this, if a -1 is received inside a serial monitor it means it is searching for a fingerprint. In other cases (all were successful), the server runs the getFingerprintIDez function that sends the Identify command. At last, the scanner returns the ID related to the finger. If the finger is not in the database, it returns Waiting for a valid finger. At the point when the cycle has been finished effectively, the server turns off the LED.

**Database Block** - The last process that will be done is the data collection process. The data about the fingerprint device usage or record can be collected after a period of time and can be used as a form of record to know the attendance of a student.

### 4. REQUIREMENT ANALYSIS

#### 4.1 Software

We have used C as our programming language to interact with fingerprint sensors and other components. The program contains the instructions that send the data gotten from the fingerprint to the microcontroller, ensuring that the Real Time Clock time is displayed and stored the moment a fingerprint is found. The attendance can be retrieved on a Web Application directly from a fingerprint sensor. Fingerprint detection is executed to register as well as validate the respective biometric users data.

#### 4.2 Hardware

The first microcontroller is connected to the fingerprint Module and communicates with it through a Serial port. The fingerprint module (R307) device captures the fingerprint of the user and stores it in its memory. It operates at 115200 baud rate. R307 has 4 pins Vin, gnd, Tx and Rx. We have used Arduino to transmit data. This is the main hardware component of our system through which data will be transferred to a database and esp8266 module that has inbuilt Wi-Fi which helps to transmit data, Optical Fingerprint Reader r307, to mark attendance by recording and validating the special features of the user.

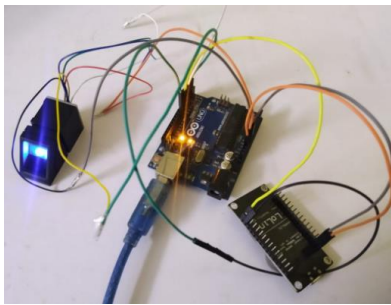


Fig-2 : Hardware connections

### 4.3 Dataset and Parameters

The system receives the student details by filling up the registration form along with the student's fingerprints from the fingerprint scanner as input. The fingerprint scanner can read fingerprints of any or more fingers of both hands. The basic information was stored in the student table. In this student table the key field is the student id number. By this id number all the fingerprints are uniquely identified from one another.

## 5. RESULTS

The experimental results show that the proposed system designed for attendance management, has provided significant results in managing attendance through the fingerprint system. The web GUI provided gives better clarity of the attendance registered and also helps in generating reports as and when needed. The striking feature of the smart IoT based attendance monitoring system is that the administrator can access this data, anytime and anywhere. This helps the administrator to have a control over the attendance management without the need of being physically present at the location. The proposed system is tested with different fingerprints and is successful in recognizing the fingerprints that are registered.

Table-1 : Sample Results for Fingerprint System:

ID no.	Fingerprint Status	Output (0-absent, 1-present)
1	Detected	1
2	Detected	1
3	Not Detected	0
4	Detected	1

5	Not Detected	0
6	Not Detected	0

The final implemented web-page with the required response is shown in "Fig-3" below:

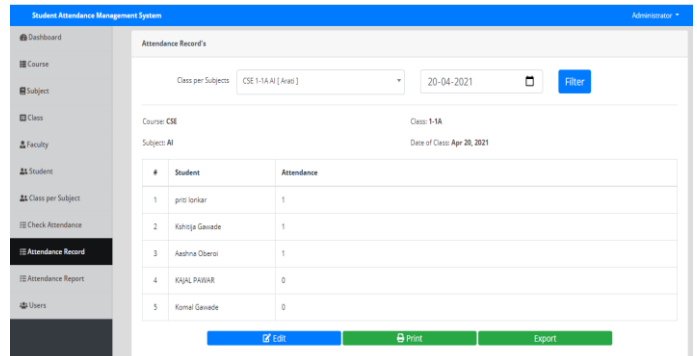


Fig-3: Web Interface for Attendance system

## 6. CONCLUSIONS

This system ensures a quick, hassle free and paperless system suitable for classrooms of the 21st century. The manual updating of attendance and its calculation has now been replaced with a better system that features a fully automated process of attendance which provides reduced load on teachers to maintain attendance registers and easier analysis of attendance. It consists of hardware such as Arduino UNO, NodeMCU, Fingerprint Scanner(R307). We would recommend this system for use in schools and colleges as a replacement to the current scheme.

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