

## **Design and Implementation of a Portable Attendance Tracking System**

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### **ABSTRACT**

The attendance in schools or colleges is generally recorded in academic diary by the teacher at the end of the lecture while doing so valuable time is wasted. Also, it is tedious to maintain the academic diary. In this paper, we have proposed a portable student attendance system. The portable system is going to have a fingerprint module, Arduino mega 2560, LCD, keypad and a rechargeable battery and a SD card. This portable system will be circulated among students during the lecture. Students will place their finger on fingerprint module to mark the attendance. This system will help to save paper as well as time of the teacher. At the end of the lecture, teacher can get the attendance in the form of excel sheet.

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### **I. INTRODUCTION**

The Portable Student Attendance System is useful in every educational institute. This system records the attendance of every student with the help of fingerprint of student during lectures as well as practical's. The Portable Student Attendance System can replace the manual attendance-sheet of every lecture in every class. Taking the attendance of number of students within lecture hours is more difficult and critical for professors. This procedure is more time consuming. So, we are interested to design such a system which does this work without wasting time of professors. Automated fingerprint-based attendance system has replaced the manual registers in many organizations as well as schools. Portable Fingerprint attendance system prevents fraud recording of attendance of students in institute that student otherwise use to do with manual paper attendance system. By using this system, we can keep track of the holidays also.

Portable Fingerprint student attendance system has a reader that scans finger impressions of students and determines whether they are identical to the previously stored records. If they are found identical, the attendance criteria for the verified students is maintained roll number wise. Attendance system using fingerprint makes student punctual and it saves the time of professors during lecture hours. The proposed system is useful in educational institute as well as offices and tuitions. The proposed system is a portable one so it is easy to handle. The size, weight, and cost of the system is low. This system reduces the manual work as well as stationary in the institute.

The rest of the paper is organized as follows, section 2 has the information about the related work. Section 3 describes the detailed proposed system, it's software flow and block diagram. Section 4 describes the description about major hardware components used. The results and discussions about the proposed system is described in section 5. In section 6, we have discussed the future scope of the proposed system and finally we have derived conclusions about the proposed system.

### **II. LITERATURE REVIEW**

E. Zhu, J. Yin, et.al. proposed the importance of fingerprint scanner with its advantages and ease of use. [1] In many Educational Institutes and University attendance of student is important for appearing for Exam. So, by using this fingerprint scanner, it is easy to record the attendance of students. In this paper we observe that, this technology is increasingly recognized by many people in the world.

N. Galy, et.al. described that, Biometric systems are used to analyze the biological data. [2] The biological data is related to the human characteristics and traits. Identification of people by using traditional methods like passwords or numbers is not reliable. This paper describes the working of fingerprint sensor.

A.K. Jain, et.al. described fingerprint recognition system automatically and identify some key challenges as well as research opportunities in the field. [3]

Nur Izzati Zainal1, et.al. described the design and development of student attendance system. [4] The proposed system in this paper is based on the fingerprint Biometric.

Rasika Naik, Maumita Mal, et.al. proposed idea of wireless attendance management system using fingerprint recognition. [5] In this, the proposed system includes terminal fingerprint acquisition module and attendance management module in computer which is configured with the Zigbee module as the transmitter and receiver node.

Manisha Redhu, et.al. described Fingerprint matching techniques. [6]In this paper they proposed Fingerprint Recognition using Minutia Score matching method.

### III. PROPOSED SYSTEM

We are proposing a portable device, having fingerprint module, sd card, lcd, keypad and rechargeable battery. The proposed system can work in three phases,

- 1) Enrollment phase
- 2) Automatic Attendance Recording
- 3) Manual Attendance Recording

#### Enrollment phase

Initially fingerprints of all students are taken by connecting SD Card to SD Card Module of system and saved it into Fingerprint Module as a template. For Enrollment process, the system must be connected to the Laptop or Computer having program for Enrollment. In Enrollment process we are providing identification mark of fingerprint to each student as their Roll Number. All the templates are saved according to Roll Number. This process will be done generally once in a semester at the beginning. The format for identification mark of fingerprint will be unique for every student. E.g. If a student is in final year, A division and having roll number as 51, then his identification mark will be BA51. Similarly, the prefix for every class will be different. The flowchart for enrollment phase is shown in figure 1.

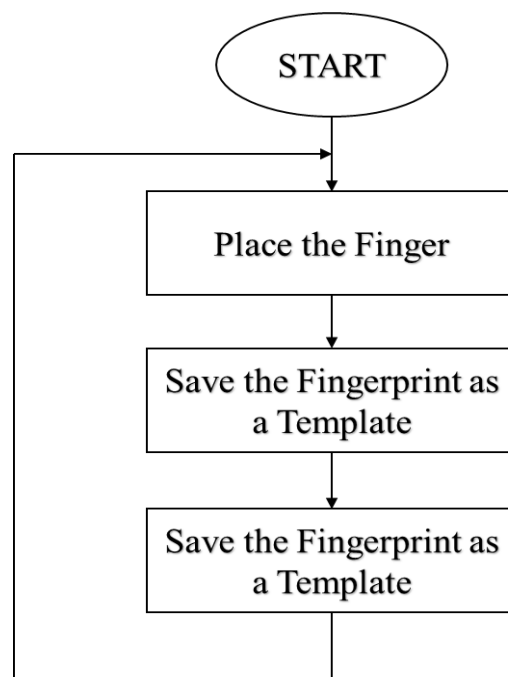


Fig.1. Enrollment phase flowchart

#### Automatic attendance recording

When the fingerprints of student are scanned by Fingerprint sensor then this is saved as a template and compared with all templates stored during enrolment phase. After comparing one template with many templates, attendance of particular student will be recorded according to Roll Number. Then student will see the message on the LCD display as "DATA RECORDED". At the end of the month or according to requirement of user we can extract the EXCEL file from the SD Card by connecting it to PC's or Laptops. All the data consists of time and date. In the EXCEL sheet, in front of present students there will be "1" and in front of absent students "0". The flowchart for automatic attendance recording as shown in figure 2.

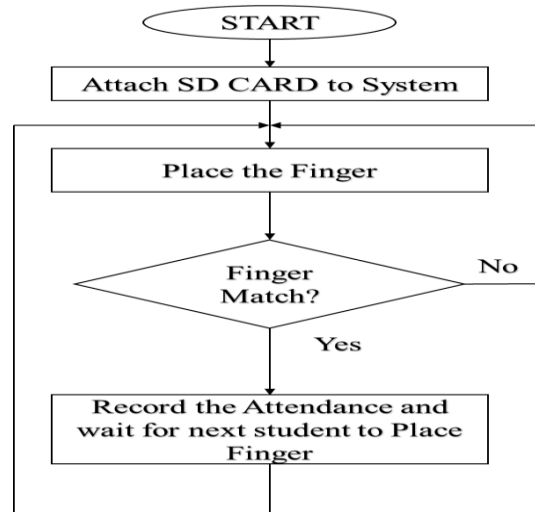


Fig.2. Automatic attendance recording

**Manual attendance recording**

If student is failing to mark the attendance automatically then we are providing manual attendance recording facility for faculty to record the attendance of that student. We are providing "\*" button from keypad for manual attendance mode. After pressing this button, faculty has to place finger for authentication one, Once authentication has been verified then manual attendance process will be started. In this process, Class, Division, and Roll Number of students must be entered using the keypad, and then attendance of that student will be marked. The flowchart for manual attendance recording is shown in figure 3.

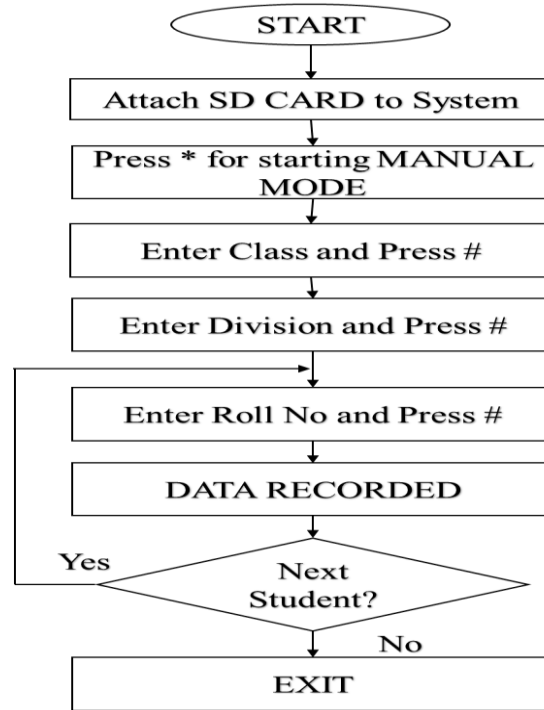


Fig.3.Manual attendance recording

**IV. HARDWARE INTERFACE**

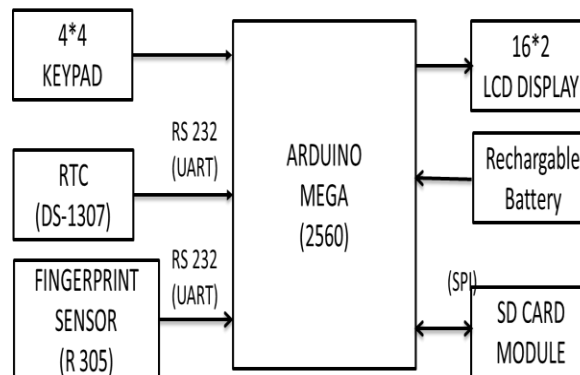


Fig.4. Block Diagram

The detailed block diagram of our system is shown in figure 4.

**Hardware Description-**

Arduino mega 2560 Microcontroller:

The Arduino Mega 2560 is a widely used microcontroller board which based on the ATmega 2560. It has 54 digital input/output pins out of which 14 pins can be used as PWM output, 16 analog inputs, 4 UARTs (Universal Asynchronous Rx & Tx), a 16 MHZ Crystal oscillator, an ICSP header, and a power jack, Reset Button.

In this project, we are using 1 UART for interfacing of Fingerprint Sensor -R307 to ATmega 2560 board. From this board, PIN No 50 (MISO), 51 (MOSI), 52(SCK), 53 (SS) supports SPI communication which used for interfacing of SD Card Module to ATmega 2560 board. We are using 8 digital input pins for interfacing of 4\*4 membrane keypad and PIN No.20 & 21 for interfacing of RTC-DS1307 to board. For interfacing of 16\*2 LCD Display, we required total 16 pins from which 8 pins are Data Lines (7-14), 2 pins are for (Pin1) & Ground (Pin 16), 3 pins are for

Control the operation of LCD (Pin 4-6), 1 pin is used for adjusting the brightness of LCD (Pin 3). The remaining 2 pins are used for power the backlight (Pin 15&16).

#### RTC-DS 1307:

RTC-DS 1307 is used as a time keeping device. Almost all microcontrollers and Arduino have built in timers and timekeepers. But they are power dependent that means they does not run when power supply is OFF. When the power supply turns OFF then all the timers are resets to "0". Almost all RTCs are low-current devices. RTCs are available in the form of ICs. The RTC-DS1307 is a low cost and low power IC. It will keep track of time even if the system is switched off

#### Fingerprint Sensor-R305:

Fingerprint module-R305 consists of optical fingerprint sensor and high-speed DSP Processors. The structure of this is simple and it has stable performance. The fingerprint sensor-R305 is used for scanning the image of fingerprint of student. In the R305 Fingerprint Sensor total 250 fingerprints can be stored in the form of Template. The operation principle of Fingerprint Module R-305 includes two stages,1) Fingerprint Enrollment,2) Fingerprint Matching. The size of template is 512 bytes.

#### Micro SD Card:

Micro SD Card is a type of removable flash memory card used for storing information. In this system, we are using SD Card to store the record of the attendance of student in the form of Notepad. Once the Notepad file is ready then we can extract the Data present in Notepad file in the Excel sheet. Here we are using MICRO SD CARD of 8GB memory.

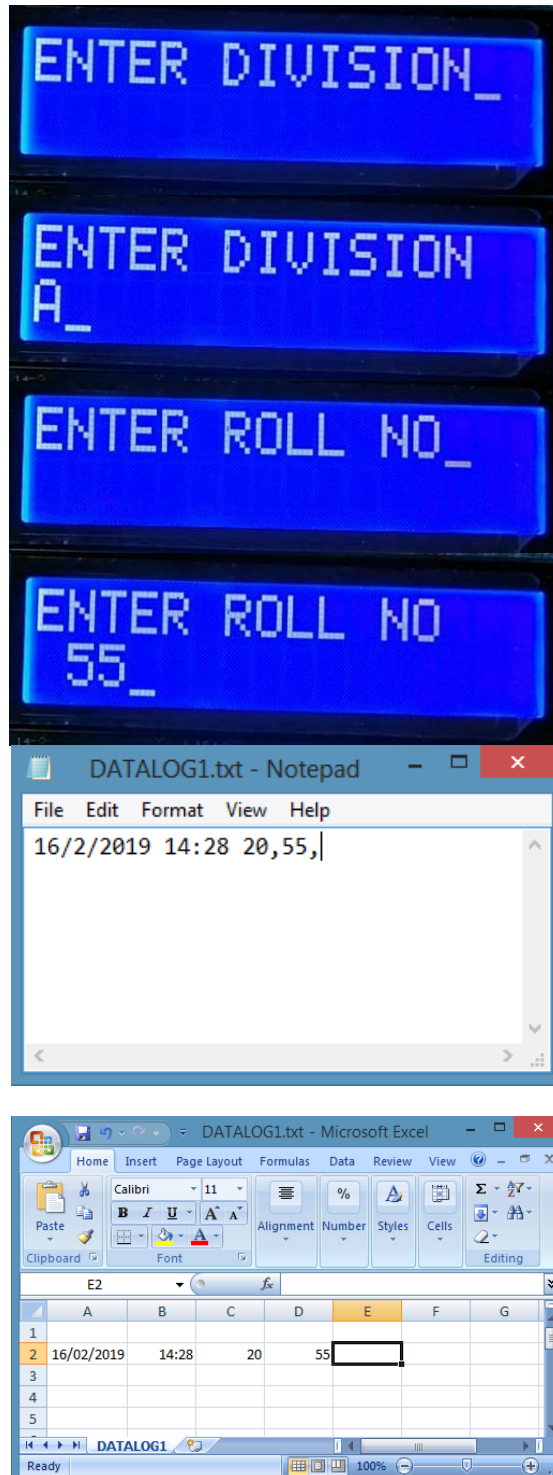
#### 4\*4 Membrane Keypad:

The 4\*4 membrane keypad is used as an input device. In this system, we are using 4\*4 membrane keypad in case for manual attendance for selecting the class and division. The "\*" key is used to start the "Manual Mode" and " # " key is used as "Enter Button".

## V. RESULTS AND DISCUSSION







**VI. FUTURE SCOPE**

The portable student attendance system has lot of scope for improvement. By using GSM module, we can update the current system as follows:

- 1) After taking attendance, student and parent will receive the message of attendance.
- 2) Also at the end of the month parent will receive the total attendance of month.

If internet connectivity is provided, then we can email the monthly attendance of every class to the academic coordinator.

## VII. CONCLUSION

In this paper we have designed and developed the Portable Student Attendance System. This system is based on the fingerprint identification. This system helps to reduce the possibilities of cheating in recording the attendance. The portability of the system saves time in taking attendance. The attendance is recorded digitally and paper is also saved. Because of this system, it is easier to maintain attendance of the entire institute or department. And hence it is Environment Friendly.

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