

FINGERPRINT BASED BIOMETRIC ATTENDANCE SYSTEM USING ARDUINO

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ABSTRACT:

Attendance systems should be available at many different locations, such as workplaces, companies, schools, teams, and homes. There is a lot of participation as participants. But there must be a good system everywhere. Form describes participation. The main purpose of this article is to search and create the join based fingerprint module. In this system, Arduino UNO controller and PLX DAQ device are the main components for to display data in Excel.

KEYWORDS: Arduino, LCD, attendance, fingerprint module

I. INTRODUCTION

In the World of Technology, Biometrics plays an effective role in identifying Human beings. Through this project, you will develop a unique system that can identify students for attendance purpose using their fingerprints. In this project, we are going to design a Fingerprint Sensor Based Biometric Attendance System using Arduino. Simply we will be interfacing fingerprint sensor with Arduino, LCD Display & RTC Module to design the desired project. In this project, we used the fingerprint Module and Arduino to take attendance. 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 accurately with time. By using the fingerprint sensor, the system will become more secure for the users. You will need an Arduino Nano board for interfacing microcontroller with the Finger Print Scanner R307. So with the help of Finger Print Scanner R307 we will store the finger prints of all the students and once they are stored, the Finger Print Scanner will compare the present finger print on the scanner and previously stored finger prints. If any finger print is matched, the microcontroller will print the concern data stored for the particular finger print on the LCD Display. 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. The process of manually taking and maintaining the attendance records becomes highly cumbersome. 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.

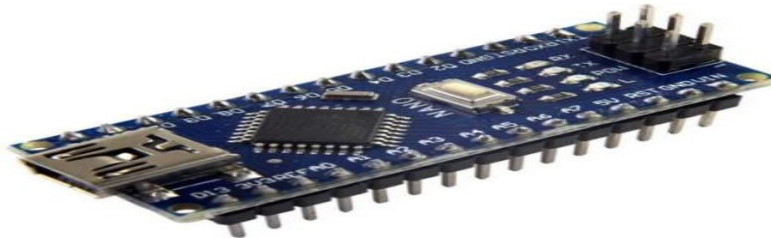
II. METHODOLOGY

We use Fingerprint Sensor module to authenticate a true person or employee by taking their Finger input in the system. Here we are using 2 push buttons to enroll, Delete, ENROLL and DEL key has triple features. ENROLL key is used for enrollment of a new person into the system. So when the user wants to enroll new finger then he/she needs to press ENROLL key then LCD asks for the ID, where user wants to store the finger print image. Now if at this Time user does not want to proceed further then he/she can press ENROLL key again to go back. This time ENROLL key behave as Back key, i.e. ENROLL key has both enrollment and back Function. Fingerprint sensor module captures finger's print image and then converts it into the equivalent Template and saves them into its memory as per selected ID by Arduino. All the process is Commanded by Arduino like taking an image of finger's print, convert it into templates and Storing as ID etc. You can check some more projects using fingerprint module. Here we have Added a LED which indicates that fingerprint module is ready to take an image of the finger. A Buzzer is also used for various indications. Arduino is the main component of this system it is Responsible for control of the whole system.

A. Component Requires:

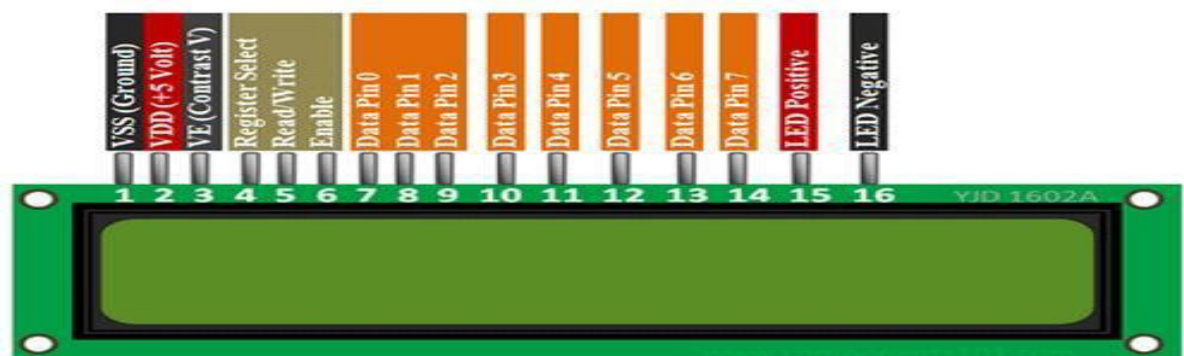
1. Arduino
2. Fingerprint Module – R307
3. Push Buttons
4. LEDs
5. 1k resistor
6. 2.2k resistor
7. Power supply
8. Connecting wires
9. Box
10. Buzzer
11. 16*2 LCD
12. RTC module (DS3231)

1. ARDUINO NANO:



Arduino Nano is a small, complete, flexible and breadboard- friendly Microcontroller board, based on ATmega328p, developed by Arduino.cc in Italy in 2008 and contains 30 male I/O headers, configured in a DIP30 style. Arduino Nano Pinout contains 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins. It is programmed using Arduino IDE, which can be downloaded from Arduino Official site. Arduino Nano is simply a smaller version of Arduino UNO, thus both have almost the same functionalities. It comes with an operating voltage of 5V, however, the input voltage can vary from 7 to 12V. Arduino Nano's maximum current rating is 40mA, so the load attached to its pins shouldn't draw current more than that. Each of these Digital & Analog Pins is assigned with multiple functions but their main function is to be configured as Input/Output.

2. 16*2LCDDISPLAY:



LCD modules are very commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pinouts have already been visualized above now let us get a bit technical. 16x2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8x1, 8x2, 10x2, 16x1, etc. but the most used one is the 16x2 LCD. So, it will have $(16 \times 2 = 32)$ 32.

3. WiFi Module - ESP8266:



The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller

access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

4. PUSH BUTTON:



A push-button or simply button is a simple switch mechanism to control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their unal and each character will be made of 5x8 Pixel Dots.

III. WORKING

The skin on the palms of our hands have a special pattern called friction ridges that help us grab things effectively without slipping. These patterns consist of ridges and valleys arranged in certain configurations and is unique for each individual. Our finger tips also have them as you can see from the above image. When a finger comes in contact with a surface, the ridges make strong contact with the surface. When we strongly grab something, the moisture, oil, dirt and dead skin cells on our finger can attach to the surface of the material, leaving an impression we call a fingerprint. Various forensic methods involving the use of chemicals are used to extract such fingerprints from crime scenes and are called latent fingerprints. But an optical fingerprint scanner works a bit differently

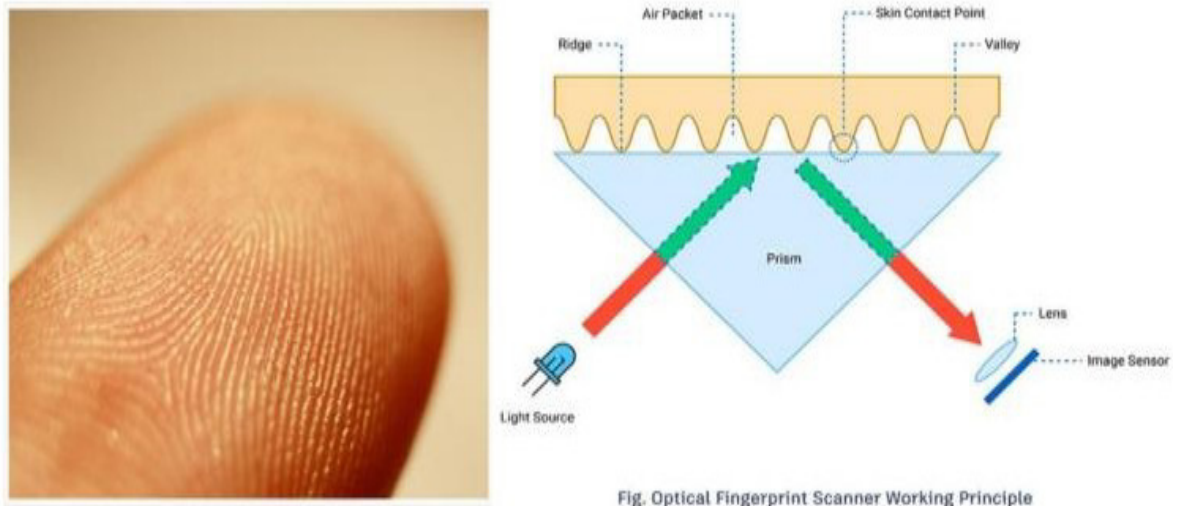
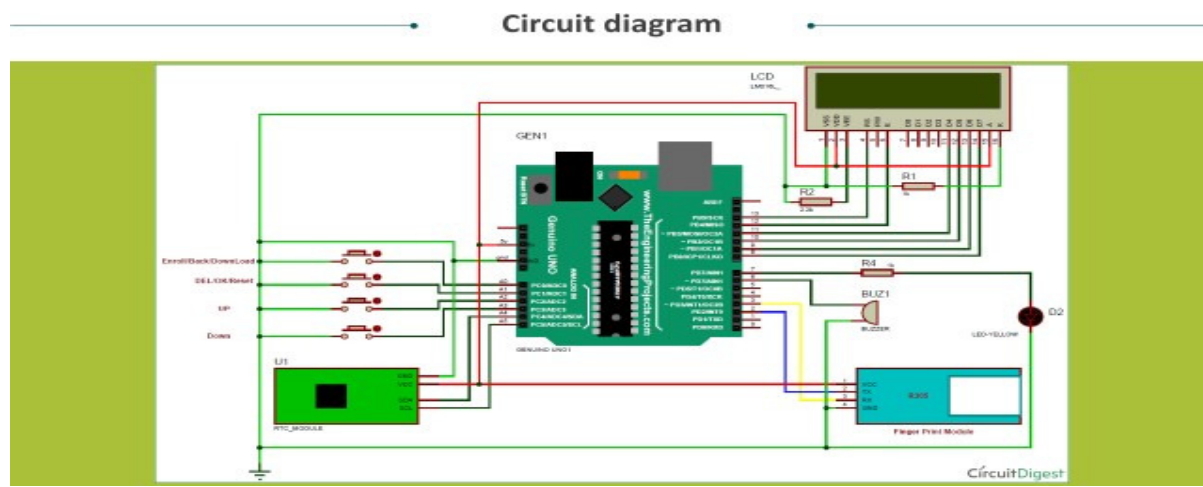


Figure 2: Fingerprint capture technique

IV. SIMULATION RESULTS

A. Prototype hardware connection:



- **ARDUINO NANO:**

Arduino NANO is used here to control the operations involved in Taking attendance. The four operations that are to be performed are to enroll, verify, Delete and reset. Arduino is chosen here as it is easy to use, code, handle and has many Modules which add on features to Arduino board.

- **FINGERPRINT MODULE:**

R307: R307 is an optical fingerprint scanner which is an Upgraded version of R305. R307 has its own database which can store 1000 templates. Security level for R307 is from 1-5. This module has less false error rate, fast searching Process, high speed processor, uses minutiae based algorithm to work with scanned Fingerprints.

- **16X2 LCD DISPLAY:**

LCD Display is used here to provide messages to the user to Have a better interaction with the device. LCD Display has greenlight in background with characters displayed on them in black. Characters are displayed in 7X5 matrix.

- **Wi-Fi Module:**

ESP8266 Wi-Fi module is generally used to establish the wireless Communication between the devices. But this module is not capable of 5-3V logic Shifting and will require an external logic level converter.

V. CONCLUSION AND FUTURE WORK

Here we have developed a Biometric fingerprint based attendance system using Arduino. In this project we have used R307 fingerprint sensor which reads the Fingerprint and stores in the form of digital data. A buzzer is activated and LED blinks then LCD panel shows that data is stored along with username, date and time. Working of this fingerprint attendance system project is fairly simple. First of all, the user needs to enroll fingerprints of the user with the help of push buttons. To do this, user need to press ENROLL key and then LCD asks for entering ID for the fingerprint to save it in memory by ID name. So now user needs to enter ID by using UP/DOWN keys. After selecting ID, user needs to press OK key (DEL key). Now LCD will ask to place finger over the fingerprint module. Now user needs to place his finger over finger print module and then the module takes finger image. Now the LCD will say to remove finger from fingerprint module, and again ask to place finger again. Now user needs to put his finger again and module takes an image and convert it into templates and stores it by selected ID into the finger print module's memory. Now the user will be registered and he/she can feed attendance by putting their finger over fingerprint module. By the same method, all the users will be registered into the system Now if the user wants to remove or delete any of the stored ID or fingerprint, then he/she need to press DEL key. Once delete key is pressed LCD will ask to select ID that need to be deleted. Now user needs to select ID and press OK key (same DEL key). Now LCD will let you know that fingerprint has been deleted successfully.

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