DESIGN AND IMPLEMENTATION OF AUTOMATIC STUDENT ATTENDANCE SYSTEM BASED ON FINGERPRINT.

A Project report is submitted in partial fulfillment of the requirements for the award of Degree of Bachelor of Science in Electrical and Electronic Engineering.

Submitted by
Name: Sakibul Hasan
ID: 191-33-893
Name: Md. Ashraful Alam
ID: 191-33-877

Supervised by
Dr. Md. Rezwanul Ahsan
Associate Professor
Department of Electrical and Electronic Engineering

Department of Electrical and Electronic Engineering
Faculty of Engineering
DAFFODIL INTERNATIONAL UNIVERSITY

JANUARY, 2023

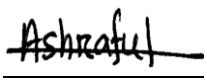
DECLARATION

I Hereby declare that this Project "Design and Implementation of Automatic Student Attendance System Based on Fingerprint" represents my own work which has been done in the laboratories of the department of electrical and electronic engineering under the faculty of engineering of daffodil international university in partial fulfillment of the requirements for the degree of bachelor of science in electrical and electronic engineering, and has not been previously included in a thesis or dissertation submitted to this or any other institution for a degree, diploma or other qualifications. i have attempted to identify all the risks related to this research that may arise in conducting this research, obtained the relevant ethical and/or safety approval (where applicable), and acknowledged my obligations and the rights of the participants.

Signature of the candidates

Name: Sakibul Hasan

ID: 191-33-893



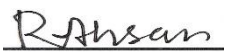
Name: Md. Ashraful Alam

ID: 191-33-877

APPROVAL

The project entitled **"**Design and Implementation of Automatic Student Attendance System Based on Fingerprint**"** Submitted by **Sakibul Hasan, Id: 191-33-893 & Md. Ashraful Alam, Id: 191-33-877** has been done under my supervision and accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical and Electronic Engineering** in **January, 2023.**

Signature of the Supervisor



Supervisor Name

Dr. Md. Rezwanul Ahsan
Associate Professor
Department of Electrical and Electronic Engineering
Faculty of Engineering
Daffodil International University

Dedicated to

Our Parents

CONTENTS

LIST OF FIGURES

LIST OF TABLE

LIST OF ABBREVIATIONS

PLC	Programmable Logic Controller
CCD	Charge-Coupled Device
WI-FI	Wireless Fidelity
IP	Internet Protocol
ARM	Advanced RISC Machines
RF	Radio Frequency
IC	Integrated Circuit
DC	Direct Current
GUI	Graphical User Interface
LED	Light Emitting Diode
ENA	Emergency Nurses Association
SD	Secure Digital
QR	Quick Response
GPIO	General purpose/Output
FTDI	Future Technology Devices International Limited
RPM	Revolutions per minute

ACKNOWLEDGEMENT

First of all, we thank God. We then take this opportunity to express our gratitude and appreciation to our Project Supervisor, Dr. Md. Rezwanul Ahsan, Associate Professor of Department of EEE, for his dedication to our support, encouragement and guidance during this project. This project cannot be accomplished without their helpful advice and help. Thank you also for giving us the opportunity to choose this project. We would also like to thank Professor Dr. Md. Shahid Ullah, Head of the Department of EEE for his continued support, cooperation and encouragement. In addition, we would like to thank all our friends for sharing their knowledge, information and helping us make this project a success. To our dear family, we would like to express our deepest love and gratitude to them for their support and encouragement during studies at this university.

ABSTRACT

It is important to record and maintain the right presence in today's world, because of attendance and success together. Many people have many problems due to lack of proper presence monitoring system. Attendance is one of the moralities of the owners' valuable work. Many educational institutions and government agencies in developing countries are still using paper based attendance methods to maintain existence records. These traditional tidal methods need to be replaced to change the presence of recording with the biometric existence system. The unique nature of the fingerprint is ideal for use in the management system. In this project we use a fingerprint sensor (R307) experiencing a particular person's fingerprint. Most people can protect their fingerprints. Next time when a person puts the finger on the sensor, it will check whether it is a fingerprint. If its fingerprint matches with a fingerprint stored, the LCD appearance shows that it is a person. In this model, all fingerprints are stored every time when someone plays the finger. This study is basically focused on the development of the biometric existence system, which can keep the existing record and count the data for daily purposes. In this project we are going to create a fingerprint sensor based biometric existence system using Arduino Nano. We only interface with fingerprint sensor, including Arduino Nano and LCD display for the desired project. In this project, we use fingerprint module and Arduino Nano to keep the existing data and records in excel sheet. Systems are commonly used to identify the presence in offices and schools. Using high tech apps and biometric systems from the existence of existence registers, these systems have been significantly developed. The project includes wide applications in the workplace that needs to be identified as schools, colleges, businesses and existence. Using fingerprint sensors, system becomes safer for users. The existence of biometric students increases the efficiency of the process of adopting the existence of students.

CHAPTER 1

INTRODUCTION

1.1 Introduction

In the world, biotechnology plays an effective role in the human system. The most common tool for participating in the classroom is to call the student number or ask students to sign in the joint work sheet, which is in the lecture. The process of storage, recording of participation is very complicated. Participation plays an important role in educational institutions. In this project, we will create a biological participation system, fingerprint sensor using the ARDUINO NANO to create a project that we want; we will connect the fingerprint sensor with the ARDUINO NANO & LCD display. In this project, we use fingerprint modules. And ARDUINO NANO to receive participation and record information the biometric joint system is often a system used to identify the existence of offices and schools. The project has extensive applications in schools, colleges, business and offices, which are essential to the time to specify participation. By using fingerprint sensors, the system is safer for users [1].

To connect the microcontroller to the R307 fingerprint scanner, we use the Arduino Nano board, so we store all of the students' fingerprints using the R307 fingerprint scanner. And the fingerprints on the current fingerprint scanners after recording are compared with the fingerprints previously recorded. If the fingerprints are matched the microcontroller prints the concern information for that fingerprint on the LCD.

Our goal in this project is to make it smarter and more effective in a boring participation. Here, we create a biological participation system using the Arduino Nano scan for fingerprints and successful identification of individuals. However, finger printing sensors can be used for other biometric apps such as voting machines and security systems.

1.2 Motivation

The purpose of the development of this activity is to solve some troubles that occur in all college / universities. The purpose of this activity is to improve the traditional planning process of many increased number of universities. The use of traditional participants in these colleges is considering many problems of the problem usually. Therefore, the administrative

systems used to resolve these problems. This process is required to improve the terms of college / university and student control.

Because many university is still using traditional participants, which is violent to take place, these college / universities have many problems. That is 15 minutes. In addition, students pay universities / college to obtain knowledge that helps build their future work. Therefore, all universities should be responsible for the students to judge each class for their entiteness.

1.3 Problem statement

a. No backup for the attendance records once the lecturer accidentally lost the attendance sheet.

Teachers only use attendance sheet to track and assess student attendance throughout the semester. Teachers will focus on student attendance in the current system to compile a bar list report a few weeks before the end of the semester. The record will also be lost. And teachers will not be able to insert valid attendance records into the system during the last week of the semester.

b. Course mate help those who did not attend the class sign the attendance which also known as 'buddy-signing'.

Lecturers frequently encounter the conundrum of an empty classroom but a full attendance list. Because most students will only attend the class for the first few weeks, they will ask their friends who regularly attend the class to help them sign the attendance sheet. Because lecturers are often busy speaking and do not have time to check each student's attendance one by one, students take advantage of this opportunity to assist their pals in signing.

c. Hard in analyzing and tracking student performances based on attendance factor.

It is critical to examine a student's attendance records while judging their academic success. Because the professor may readily determine whether a student's poor performance is due to poor attendance or another factor by looking at the attendance record. It's difficult to assess the true cause of poor performance without reliable student attendance.

d. Student lack of knowledge and skills due to the poor attendance in attending classes.

Students who miss class will be unable to learn what the lecturer has taught in class, leading to a lack of knowledge of the subject and poor academic performance. Students may be

unable to grasp what the lecturer teaches in class if they do not participate in class, and as a result, the passing percentage of that subject will suffer.

1.4 Objectives

Some project objectives were specified throughout the development of this system. The major goal of this project is to develop a fingerprint-based student attendance management system to improve the present existing student attendance system used by most schools and universities. This project's goals have been determined and are stated below.

i. To store attendance in Excel sheet.
ii. To upgrade the current student attendance system to a fully computerized and automated system.
iii. To generate reports on student attendance in order to aid lecturers and staff in analyzing and tracking student attendance.
iv. By using a fingerprint attendance system, students will be less likely to solicit a friend to sign their attendance for them.
v. To make it easier to monitor and analyze student performance based on attendance, because the system will record attendance more correctly and effectively with the least amount of error possible.

1.5 Methodology

The fingerprint attendance system project's operation is extremely straightforward. To begin, the user must use push buttons to enroll their fingerprints. To do so, the user must first press the ENROLL key, after which the LCD will ask for the user's ID to preserve the fingerprint in memory by ID name. As a result, the user must now utilize the UP/DOWN keys to enter their ID. The user has to select the ID (DEL key) and click OK. Now the LCD will ask you to place your finger on the fingerprint sensor. Now the user has to place a finger on the fingerprint module which will take a picture of his finger. The LCD screen will ask you to pull your finger from the fingerprint module. Now the user has to place their finger again and the module will capture the image. Convert to templates and save in inches. Prints the memory module based on the selected ID. Users can now register and enter status by placing a finger on the fingerprint module. All users are added to the system using the same method.

Now press the DEL button to delete or delete the saved ID or fingerprint. When you press the Delete button, the LCD will prompt you to select the ID you want to delete. Now the user has to select the ID and press the OK button (the same DEL button). The LCD will now inform you that your fingerprint has been successfully deleted. However, the finger can be used with more biometric devices.

1.6 Thesis Outline

This proposition is coordinated as follows:

Chapter 1: Introduction

Chapter 2: Literature Reviews

Chapter 3: Analysis of the System Component

Chapter 4: Hardware Development & System Design

Chapter 5: Results and Discussions

Chapter 6: Conclusions and Recommendations

CHAPTER 2

LITERATURE REVIEWS

2.1 Introduction

When we face problems, we invent a new way to solve the problem. This trend makes us civilized. And in this era, everything we do is being well furnished and digitalized. There is no such field where technology has not reached and developed anything yet. It is easy to work in a field of developing a project. On the other hand, it is also challenging. While the biometric system is still being developed, implementing such a system can be considered a step ahead. By fixing my goal, I have taken every preparation. This chapter reveals all my background studies to implement my project including the related works like this project and the challenges I faced during the implementation.

2.2 Related Field

Fingerprint is one of the most specific parts of the human body, which separates a person from others and easily accessed. The technology that can automatically identify or identify a person called the fingerprint sensor supports this unique. However, the existing fingerprint sensor can only make fingerprint detection in a machine. For the specified reason, we need each user to be detected in a different fingerprint sensor. The purpose of this research is to build a fingerprint sensor system to concentrate fingerprint data management so that each fingerprint sensor can be recognized. The result of this research is being focused on the use of Ardoo and Raspberry, so that the fingerprint detection in each fingerprint sensor can be done with a successful rate of 98.5 % of the concentrated server recording [2].

On this form, design and development of the school study program comes with the systematively system that results in biometines. In the intention of making bioometric things into the system to go and the system is going to be on the storage and entry. The circuits of this device is built in order to be built, as well as well that made it better to work well. Instead of copyers writing and writing or entering the left-handed class or card reader. This document introduces a sign of the bioometric marker which handles the weakness of the process of traveling is real or long. In addition, our boometic entries are hidden by our superior integrity [3].

In this paper, the attendance system is required in many places as an office, company, school, organizations and meetings. There are many systems going. But, anywhere should have a good process. This book describes one of the terms of attendance. The main goal of this book is a study and build the systems that come using the finger pattern. In this system, Arduino Videos and Plax tool is the main thing to show the directory to Excel [4].

In this form, we suggest the processing process. Enter the instructions of going to school and directory can be hard or more delay. Reading any student names, damages to value per hour. So we have created the effective module that contains the sensitive finger to make a read record. We are recorded with a finger and a student. This subscription is the time of time and the fingers of their fingers and emotions. We only want the system when we are signing his fingers because it is a team. You may have your own roll number as your fingers, something special to school and workers. Once completed the registration process, you may not try the module through the system and add 9V battery in module. It refreshes when modules do not connect to the system. The module can be taken in the classroom and the presence of students. Any student's presence is updated with the database and the data sent to the server using Wi-Fi. If a student does not go one class, their parents will be sent to their parents. If a student has no more than three days, parents will send parents to parents to meet the HOD. So will be automated. The users will be provided in the website that our creation will give username and password, and the website to be displayed in the specified description of students and the percentage of their value. Users can also send messages to information using the site to make parents aid information to parents [5].

The coming is coming to the employees who do a lot of things that happens too many things outside the office or employees have a lot of time. The movement systems in using the online boometric users will reduce the causes of the causes and manager. The intention of the survey is to create an online presence of the medules that link Modules and GPS. The moods of the mood is used as the system of the system as well as security devices as the door to get access to the system. GPS module is added to determine user status and send it to the smartphone. Arduino modules and systems will send text messages for the user's status of user data automatically. Every module works well and testing the process to show reliable techniques based on the original condition. User can access the report using SMS, websites, and application on Android. Emotes may determine the signature of 1.39, and GPS can verify the latitude of 0.00752% to 0.53% [5].

The directory comes in the appropriate control in the world today as to walk in achievement. The progress is one of its employment values. Many educational companies and government teams in developing countries are still using the text based on retaining. It is important to replace these cultures that listens to the biometric advancement. Special difference of special fingers make it ok for processing. Besides having a safety, system and reads the sign will also be available. The fingers are often used in a number of time. Can be used in applications such as identification identification and control of availability. This review is placed the problem of the system to go to stancingily and work, the initiative, their disorders based on parameters are important [6].

The biometric student attendance system increases the efficiency of the student attendance process. The paper provides a simple and portable approach to the attendance of students in the form of the Internet of Things (IOT) based system, which records attendance using a fingerprint based biometric scanner and stores them safely through the cloud. This system aims to automatically automatically take student attendance records and store the storage muddy process. This also prevents proxy attendance, thereby increasing the reliability of attendance records. Records can be stored safely and can be reliably recovered when the teacher is needed [7].

Research is one of the important things to consider during this information process. . Among other methods, human face recognition (HFR) is one of the methods used to evaluate a user. HFR is used in many devices and video conferencing, military operations and access systems. Managing attendance is a difficult process if it is done manually. Automated access systems can be implemented to manage access using a variety of biometrics systems. Using this method can solve the problem of fake presence and proxies. Instead of recording arrivals in text, access by fingerprints and gestures becomes a seamless process [8].

If we talk about the current state of our education system, we find that we have a lot of technologies to use, but we are still following a traditional system. Speaking of the rules of going to university and school, the teachers did the work by hand. Instructors come and manually upgrade to the database. If we combine fingerprint sensor with RFID sensor and IoT (Internet of Things) it can be done automatically and there is no need for teachers to do it. We can use IoT and fingerprint recognition for better performance. IoT data is stored

directly on the server so that we can access it from anywhere and at any time, giving us better expertise and flexibility [9].

In the world of technology, biometrics play an important role in human detection. From this book, we will develop a unique system for identifying students using their fingerprints for attendance. We need an Arduino Uno board to use the R305 fingerprint scanner using a microcontroller. So, with the help of Scanner R305, we store all the fingerprints and when you save them, the fingerprint scanner compares the current fingerprint scanner with the previously saved fingerprint scanner. If any finger falls off, the microcontroller prints concern data stored for the fingerprint and the LCD display. In addition, we can add Wi-Fi modules to upload data to remote IP addresses, access it from anywhere in the world [10].

2.3 Summary

We discussed whole over the Automatic Student Attendance System Based on Fingerprint from beginner to twenty first century in this chapter-2. We mentioned history of the Based on Fingerprint Student Attending System. We think this Based on Fingerprint Student Attending System is very important to identify students.

CHAPTER 3

Analysis of the System Component

3.1 Introduction

In this chapter, we have discussed various components that will be needed to make this design and hardware development of Automatic Student Attendance System Based on Fingerprint.

3.2 Required Component

The system proposed is composed of the following components:

i. Arduino Nano
ii. R307 Fingerprint Sensor
iii. 16*2 LCD Display
iv. Potentiometer
v. On Off switch
vi. Lithium Ion Battery
vii. Battery Holder
viii. Jumper Wire
ix. Breadboard
x. PVC Board
xi. Resistors
xii. LM2596

3.2.1 Arduino Nano

The Arduino Nano is a little, complete, and breadboard-accommodating board dependent on the ATmega328. It needs just a DC power jack, and works with a Mini-B USB link rather than a standard one.

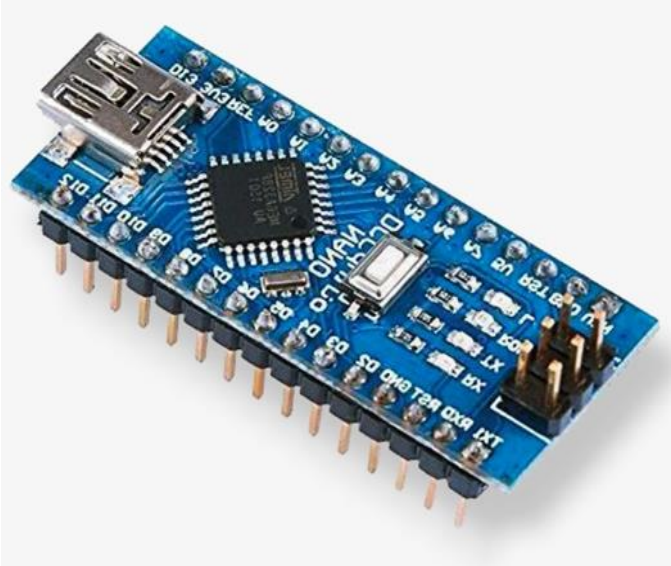


Fig. 3.1 Arduino Nano

3.2.1.a Arduino Nano Board Pinout

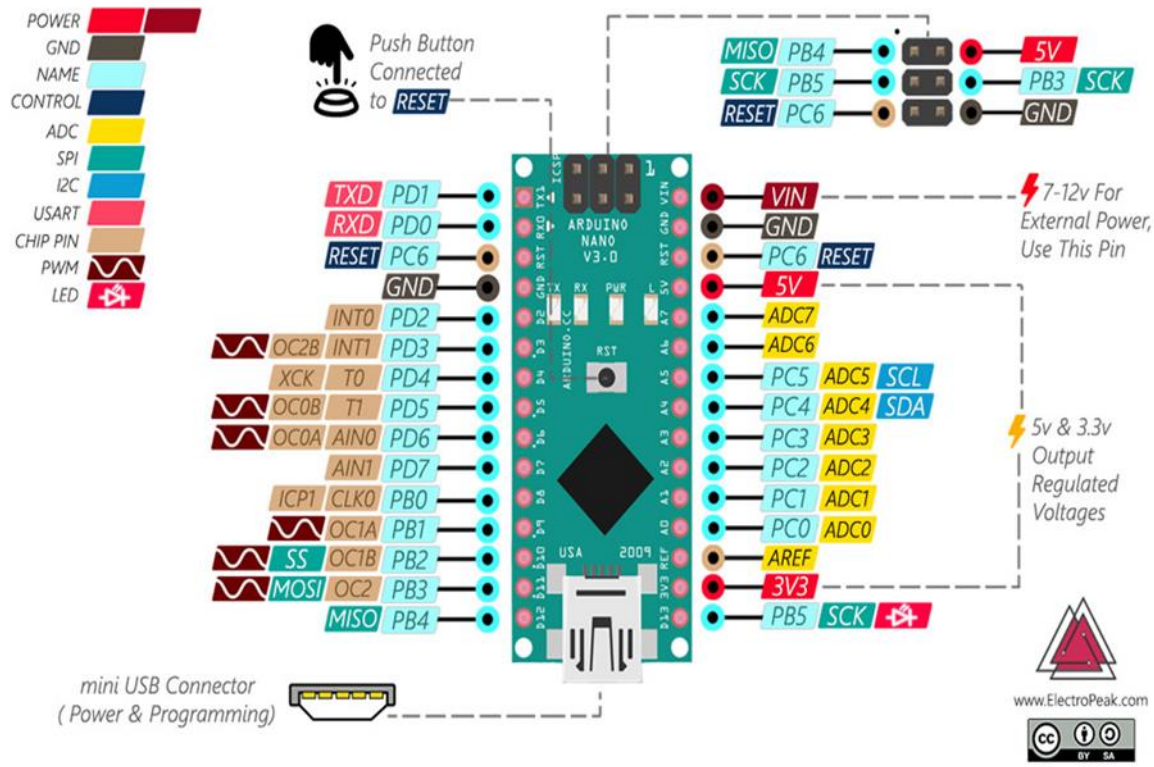


Fig. 3.2 Arduino Nano Board Pin out

3.2.2 Fingerprint Sensor

The R307 Fingerprint includes optical fingerprint sensor, advanced DSP resolution, advanced fingerprint recognition, advanced FLASH ring and other hardware components, stable performance and template storage and other functions.

Fig. 3.3 R307 Fingerprint Sensor

Interface Description:

The R307 fingerprint module can be connected to two interfaces, a TTL UART and a USB2.0, USB2.0 interface computer; RS232 interface can be converted to TTL level, default body rate 57600, see Communication protocol; And microcontrollers such as ARM, DSP and other serial devices with a connection, connected directly to the 3.3V 5V microcontroller. The computer level conversion, the level conversion note, must be connected to something like the MAX232 circuit.

3.2.3 16*2 LCD Display

The liquid crystal display LCD is an electronic display system and has many applications. 16x2 LCD is a compact module commonly used in various circuits. The 16 × 2 water crystal display means that up to 16 characters can be displayed in series and there are two symbols. Each character on this LCD is represented by a 5 × 7 mat 7 pixel matrix. The 16 2 2 x's size can display 224 characters on this double LCD.

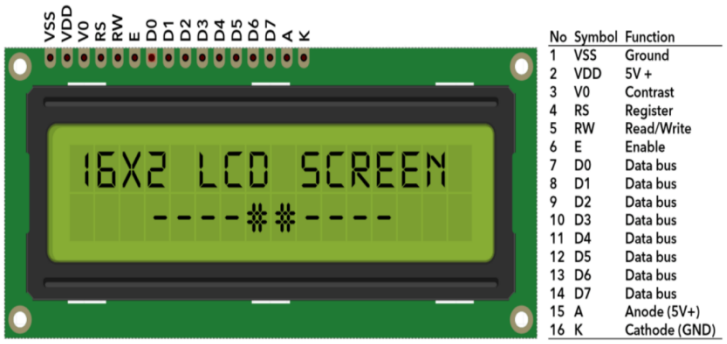


Fig. 3.4 16*2 LCD Display

3.2.4 Potentiometer

The ever-changing potentiometer can open up a number of interesting customer faces. Turn the pot and the opposition changes. Connect the VCC to the outside, the GND to the next, and the center pin will have a voltage switching from 0 to VCC depending on the head of the pot. Find the pin included in the ADC on the microcontroller and get a flexible gift from the customer. This jar has a 10K vertical shape. Check the sheet for side-by-side drawings.

Fig. 3.5 Potentiometer

3.2.5 On Off switch

This is done to activate and turn on the project's power supply. It provides additional protection to our project. Actually this gives our devices extra protection. The switch where we can press is called a "positive on off switch". The most regular utilization of this kind of switch is to turn lights or other electrical hardware on or off.

Fig. 3.6 On/Off Switch

3.2.6 Lithium Ion Battery

A power supply is required to operate every electronic device; we have chosen a 3.7 volt lithium ion battery to activate this project. Lithium batteries speak to a progressive innovation in sustainable power stockpiling, for PE gadgets as well as for transportation. In the car field, in any case, some significant inquiries are as yet open. Disregarding the gigantic advances got in the new past as far as cell execution, today the lithium-particle batteries have lacking energy or life for use in vehicles to coordinate the presentation of inside ignition motors.

Fig. 3.7 Lithium Ion Battery

3.2.7 Battery Holder

The battery holder is chosen to hold the battery the battery holder is chosen to hold the battery. A battery holder or a battery mount is a coordinated or separate hole to hold cells. In the event that it is a different compartment, it tends to be appended to a cell-fueled gadget. It is utilized to hold the cells safely and power the gadget it is joined to. The essential capacity of a battery holder is to encourage the force supply to the gadget it is appended to. A battery holder or a battery mount is a coordinated or separate hole to hold cells. In the event that it is

a different compartment, it tends to be appended to a cell-fueled gadget. It is utilized to hold the cells safely and power the gadget it is joined.

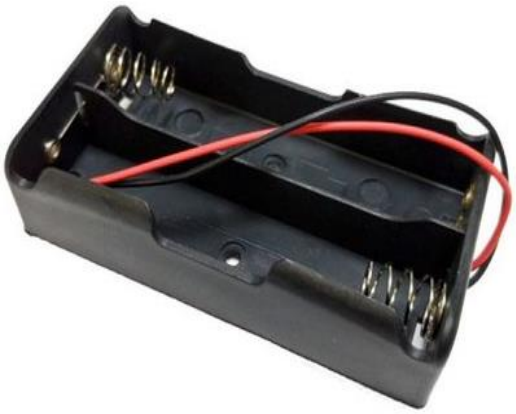


Fig. 3.8 Battery Holder

3.2.8 Jumper Wire

The jumper wires, which are wires that have a connecting point at each end, are used to connect two densities to each other randomly. Commonly used wires are used on different boards to support the business for circuit switching.

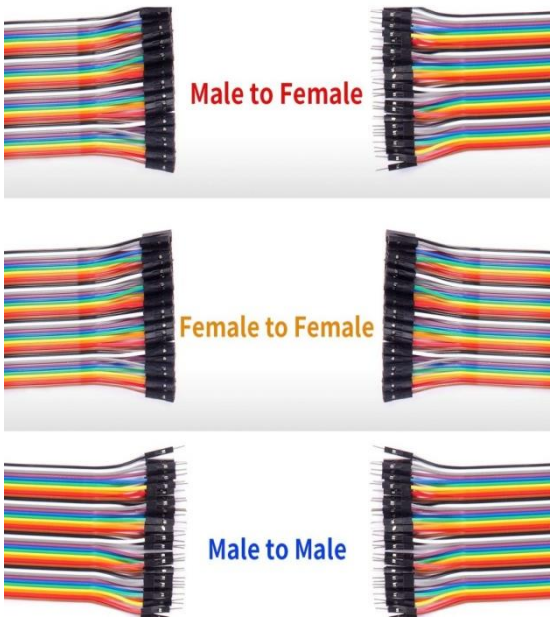


Fig. 3.9 Jumper wire

3.2.9 Vero board

Low-end bread seller for temporary models has hardware features and test circuits. Many electronic applications can be connected to electronic circuits by means of a socket or a socket. And tie it with wire where possible. Underneath the tree, the bread has metal tabs and holes for the main purpose of the tree.

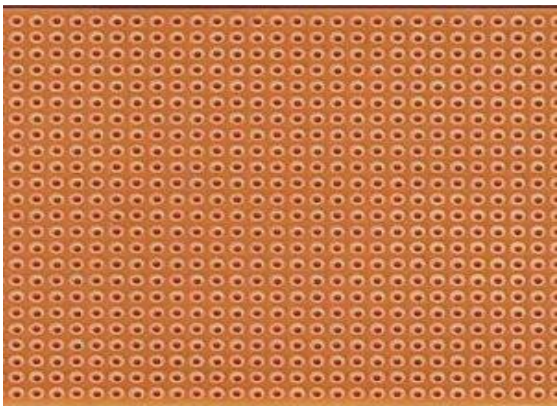


Fig. 3.10 Vero Board

3.2.10 PVC Board

PVC foam board is a feather light, extended unbending PVC froth sheet that is utilized for an assortment of uses including signs and shows, display corners, photograph mounting, inside plan, thermoforming, models, model making and substantially more. It very well may be effectively sawed, stepped, punched, cut, sanded, bored, screwed, nailed, or bolted. It tends to be fortified utilizing PVC cement. It properties incorporate brilliant effect opposition, exceptionally low water ingestion and high erosion obstruction.

Fig. 3.11 PVC Foam Board

3.2.11 LM2596

The LM2596 is a well-known IC deer adaptor. This converter can accept input voltages ranging from 4.5 to 40 volts and convert them to an alternating voltage with a current flow of up to 3 amps. It's often utilized in power modules and heavy load management because of its high current capacity. The present high level of 3A is known for LM2596. It comes in a variety of output voltages, including 3.3V, 5V, and 12V. The LM2596-ADJ, which features a variable output voltage, is the most well-known. The main converter, which operates at a frequency of 150 kHz, consumes the input voltage and adjusts the needed output voltage using an internal switching circuit. It has a high level of performance, as well as thermal and current maximum performance closure. So, if you're seeking for a low-cost, simple-to-use IC converter, go no further.

Fig. 3.12 LM2596 Buck Converter

3.3 Chapter Summary

The basic of this Automatic Student Attendance System Based on Fingerprint is covered in this chapter. All of the components utilized in this project are high-quality and reliable. We strive to discuss the functional aspects of each piece of hardware and contribution in depth in this chapter.

CHAPTER 4

PROPOSED SYSTEM DESIGN

4.1 Introduction

Automatic Student Attendance System Based on Fingerprint with Latest Features Solving Algorithms is described in this chapter, along with its development, deployment, and hardware implementation. The primary focus of this paper is on how this software functions. The following are the details and hardware links:

4.2 Block Diagram Connection

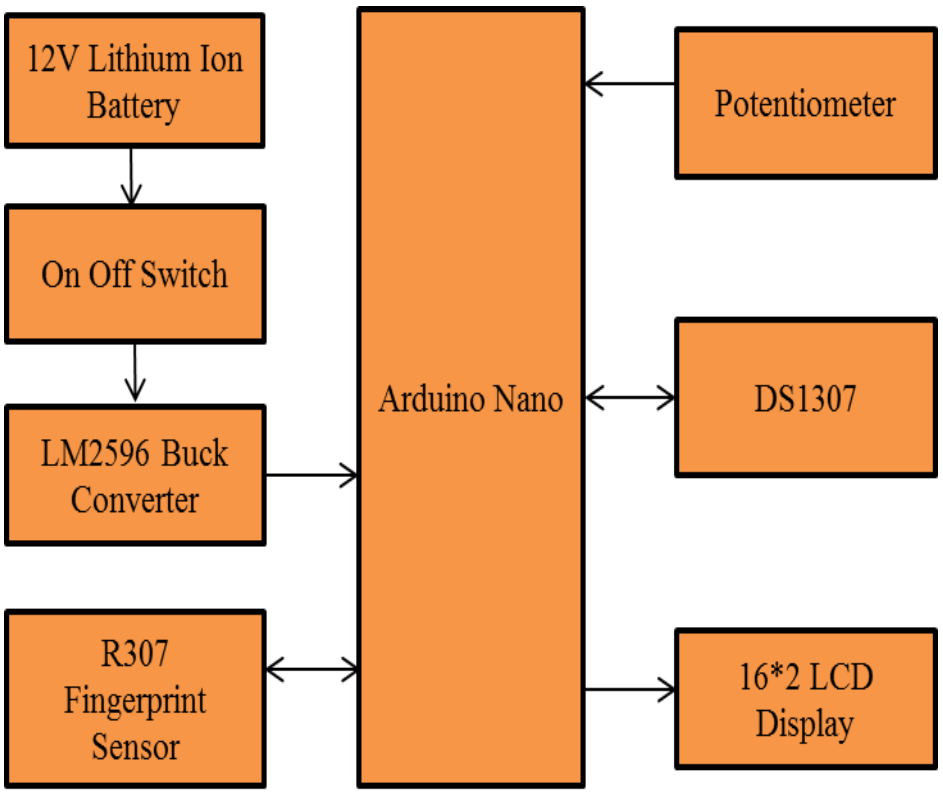


Fig. 4.1 Block Diagram of Based on Fingerprint Student Attending System

4.3 Flow Chart

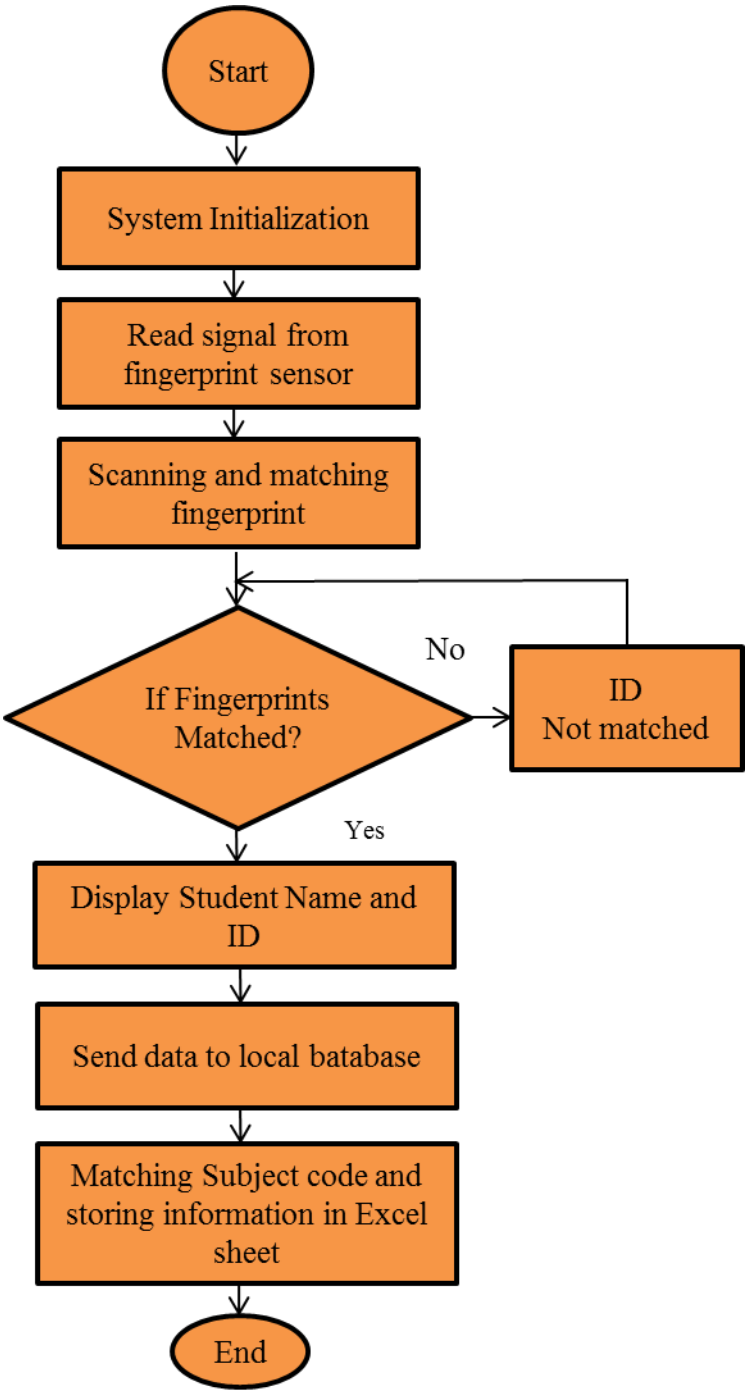


Fig. 4.2 Flow Chart of Based on Fingerprint Student Attending System

Many problems can be solved using biometric methods. After comparing several biometric methods, fingerprint biometrics has proven to be a reliable, mature and legally adopted biometric technology. As a result, the fingerprint-based attendance system will be used to identify large numbers of students in college, as well as to track the attendance of business

employees. These systems go into two stages of operation. 1) Fingerprints were recorded. 2) Fingerprint recognition.

4.4 Algorithm

Arduino fingerprint access code is provided in the following sections. Although this code is well written and worded, we will look at some key points here. The fingerprint reader module is connected to the ARDUINO NANO board.

Step 1: Start
Step 2: we include the header file, specify the input and output pins, and declare the macro and variables. Following that, in the setup function, we direct designated pins and start the LCD and finger print modules.
Step 3: Following that, we must create code to download attendance statistics.
Step 4: Then we must develop code to clear the attendance data from the EEPROM.
Step 5: After that, we start the finger print module, which displays a welcome message on the LCD.
Step 6: After that, we examined sensor status in loop function and presented it on LCD.
Step 7: Following that, wait for the finger print to take input and match the picture ID obtained with the saved IDs. If a match is found, move on to the next stage.
Step 8: The given function is used to take a finger print picture, transform it into a template, and save it in the finger print module memory with the specified ID.
Step 9: The following function is used to get data from an EEPROM and deliver it to a serial monitor.
Step 10: By serial function, Matching data go to Pycharm software.
Step 11: Aftar that, according to subject code, Data will be to store in Excel sheet.
Step 12: END

4.5 Hardware Connection

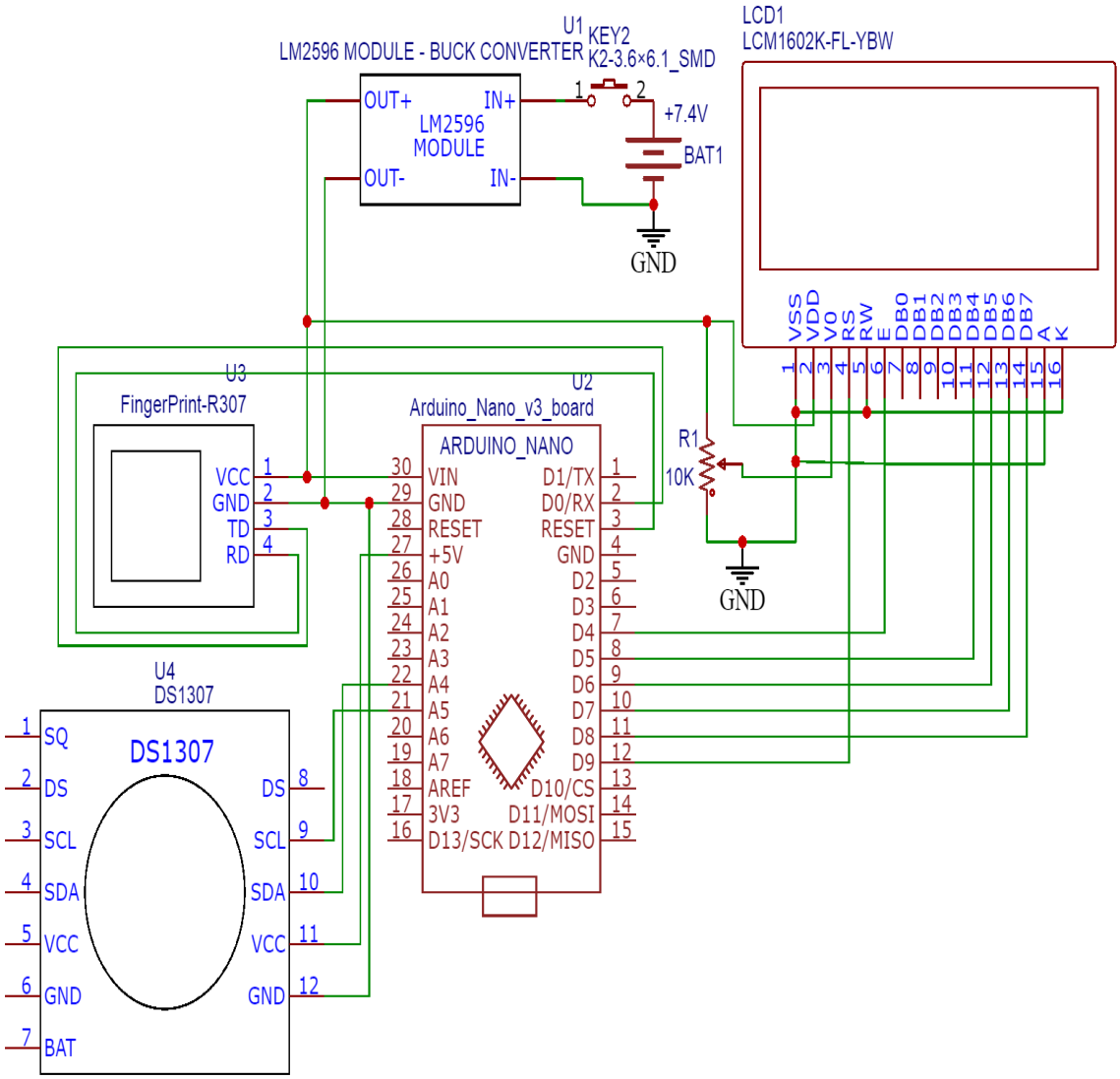


Fig. 4.3 Hardware Connection of Fingerprint attendance system

4.6 Chapter Summary

Automatic Student Attendance System Based on Fingerprint is now ready to display after everything has been completed. The key issue in this chapter is the performance-based approach. As a result, the primary goal of these terms is to comprehend the algorithm and graph picture.

CHAPTER 5
RESULTS AND DISCUSSIONS

5.1 Introduction

All of the results, calculations, and debates will be presented in this chapter. We experimented with Based on Fingerprint Student Attending System for Notification of Guardian with Percentage after we finished the project. We came to a decision about Based on Fingerprint Student Attending System for Notification of Guardian with Percentage after a successful experiment period.

5.2 Final Result

The required findings were obtained by building the experimental model according to the circuit design. When someone presses their finger against the sensor, the data is read and stored in the cloud. When someone wishes to check their fingerprint, they place their finger on the sensor the next time. The sensor reads the information and searches and compares it to fingerprints saved on the device. It displays the username, date, and time if it matches with any of these. If this is not the case, it will be stated that the fingerprints do not match. That's how everything works.

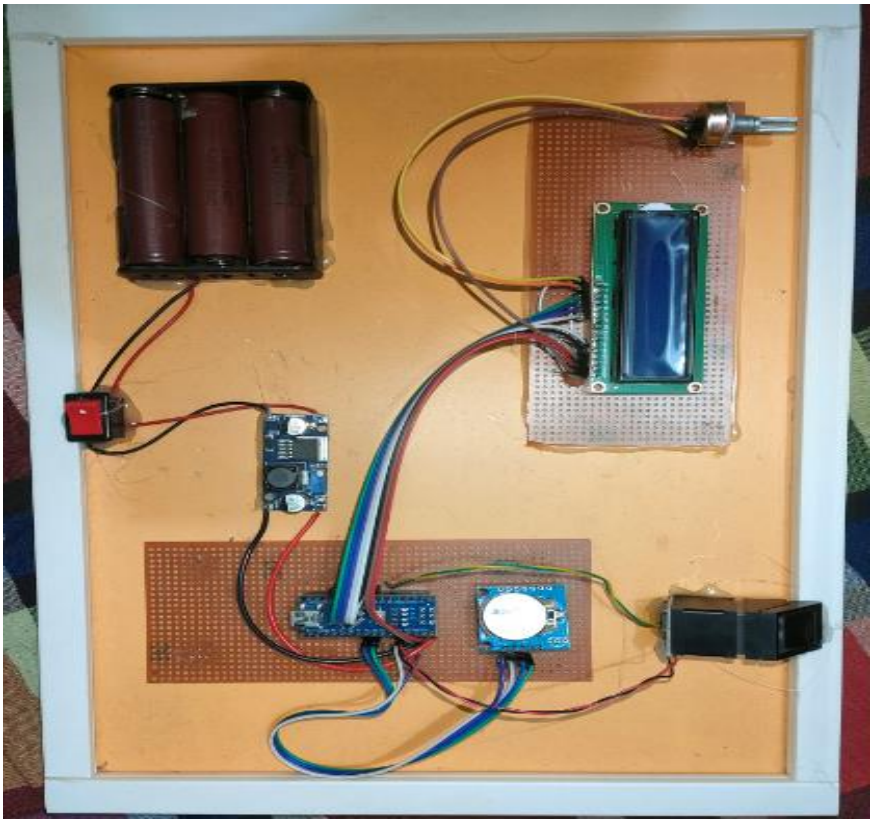


Fig. 5.1 Final projects (Top view)

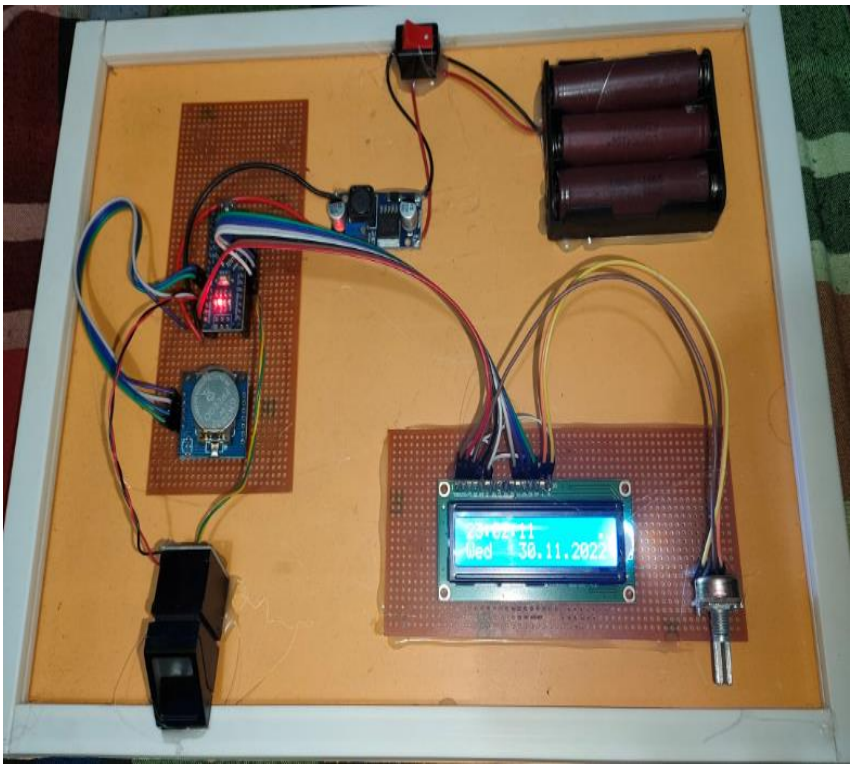


Fig. 5.2 Final projects (Front view)

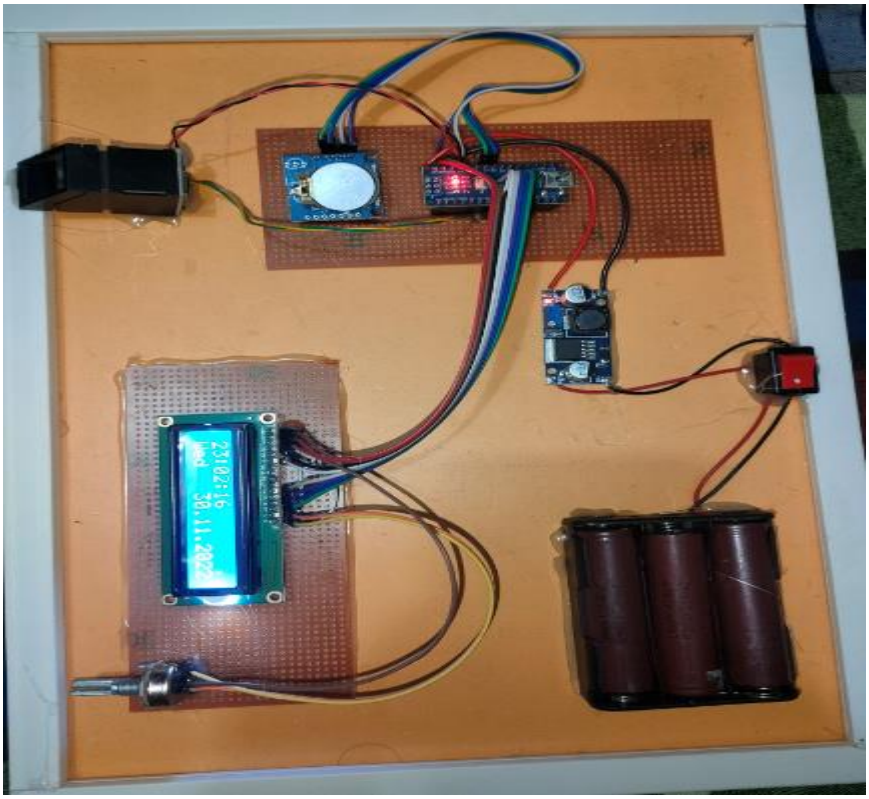


Fig. 5.3 Final projects (right view)

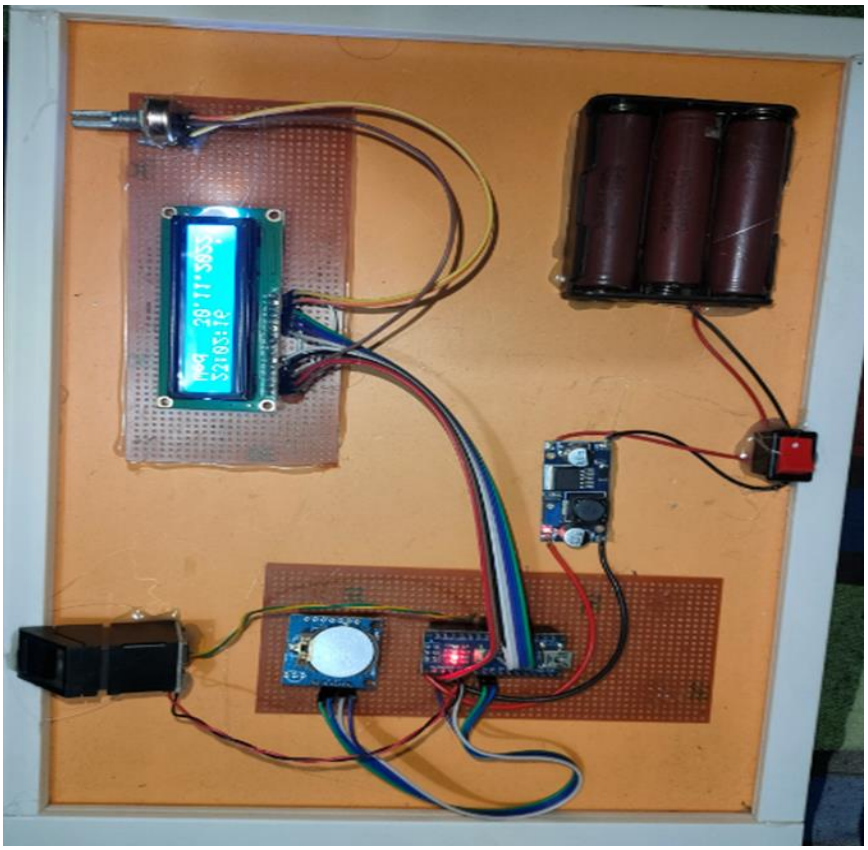


Fig. 5.4 Final projects (left view)

5.3 Excel sheet results

Table 5.1 Data table of Dara Abdus Satter (Digital Electronics)

ID	NAME	DEPARTMENT	MOBILE	ADDRESS	Date & time
191-33-893	Sakibul Hasa	EEE	1741810253	Ashulia Savar, Dhaka-1207	30/11/2022, 20:06:24
191-33-877	Md. Ashraful Alam	EEE	1316282743	Ashulia Savar, Dhaka-1208	30/11/2022, 20:06:34

Table 5.2 Data table of Rezwanul Ahsan (Power System)

ID	NAME	DEPARTME	MOBILE	ADDRESS	Date & time
191-33-893	Sakibul Hasa	EEE	1741810253	Ashulia Savar, D	30/11/2022, 20:05:43
191-33-877	Md. Ashraful Alam	EEE	1316282743	Ashulia Savar, D	30/11/2022, 20:06:05

Table 5.3 Data table of Dara Abdus Satter (EEE)

ID	NAME	DEPARTM	MOBILE	ADDRESS	Date & time
191-33-893	Sakibul Hasa	EEE	1741810253	Ashulia Savar, Dhaka-1207	30/11/2022, 20:08:06

Table 5.4 Data table of Rezwanul Ahsan (TD)

ID	NAME	DEPARTM	MOBILE	ADDRESS	Date & time
191-33-893	Sakibul Hasa	EEE	1741810253	Ashulia Savar, Dhaka-1	30/11/2022, 20:07:17

Programming and coding:

Student attendance systems with GSM fingerprint for Guardian status have a percentage. Data from sensors and diagrams are displayed on the BOLT cloud page. So we need some programming for the Arduino to create other aspects of communication.

1. Arduino IDE

- **Arduino IDE (Integrated Development Environment):**

  The Arduino IDE is an advanced program that allows you to develop and compile code for the Atmega 328P microcontroller. The master code, also known as the

sketch, which is developed on the IDE platform, generates a hex file, which is then sent to the ship's operator and uploaded.

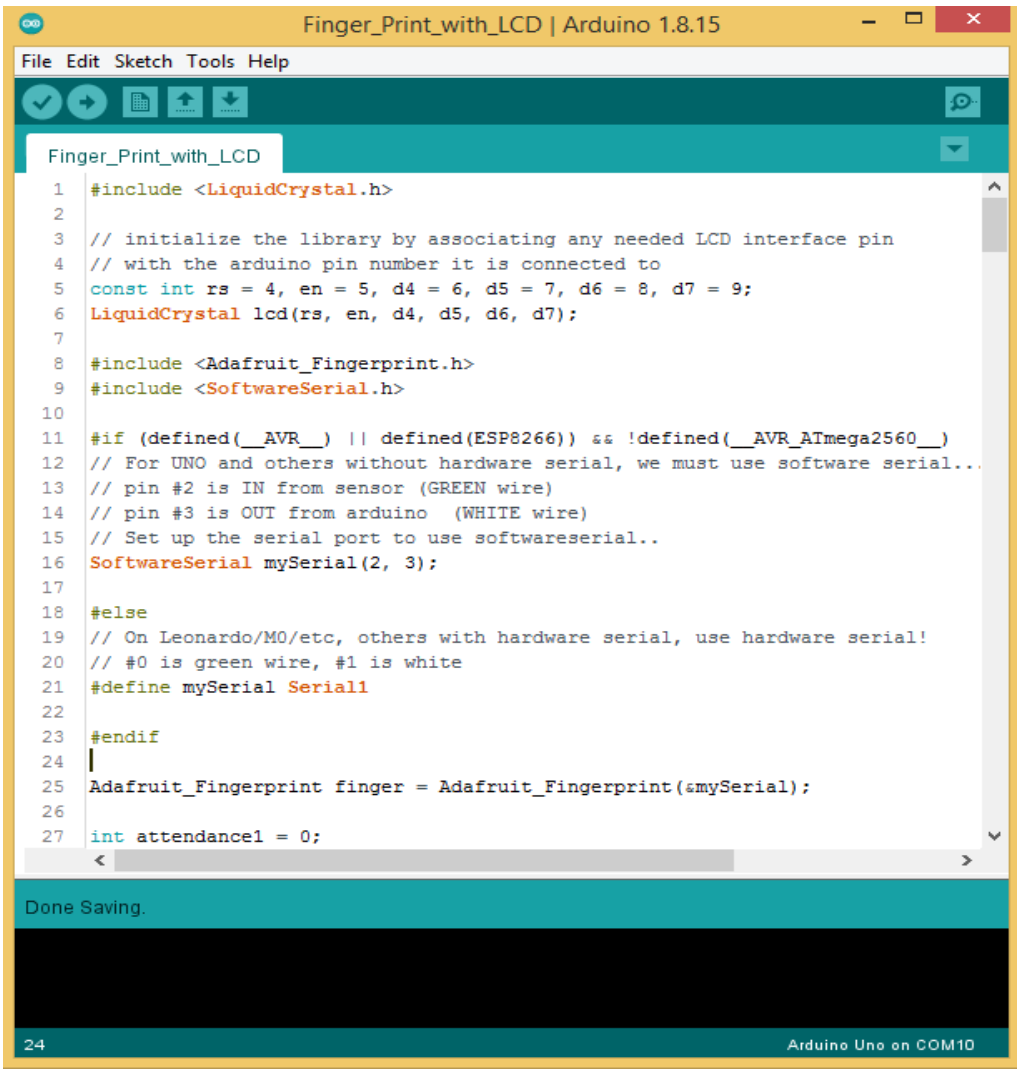


Fig. 5.5 Arduino IDE software

5.4 Cost Analysis

Table 5.1 Cost Analysis of this Project

Serial No.	Name	Quantity	Price (BDT)
1.	ARDUINO NANO	1	850
2.	R307 Fingerprint Sensor	1	2000
3.	SIM800L GSM Module	1	550
4.	16*2 LCD Display	1	220

5.	Potentiometer	2	15
6.	On Off switch	2	10
7.	Lithium Ion Battery	3	330
8.	Battery Holder	1	50
9.	Jumper Wire	As required	140
10.	Breadboard	1	100
11.	PVC Board	1	100
12.	Resistors	As required	5
13.	Buzzer	1	15
14.	LED	1	6
15.	Lm2596	1	95
16.	channel	As required	60
	Total		**4546**

5.5 Summary

The outcome and debate have been covered in this chapter. We were able to show the project's goals using our project. Finally, the assignment is ready to utilize when you finish this chapter. We describe our experiment briefly and display the results.

CHAPTER 6

CONCLUSIONS

6.1 Conclusions

Here we have developed an ARDUINO NANO based recognition system based on biometric fingerprint recognition. In this project, we used the R307 fingerprint sensor which reads the fingerprint and records it digitally. The LCD screen indicates that the doorbell is powered. From the illuminated LED, then save the information along with the username. The operation of this fingerprint recognition system is very simple. First, the user has to log in with the user's fingertip using the Enter key. User need to press ENROLL button and then move to enter ID to save LCD fingerprint into memory and ID name, so now user have to enter ID using UP/LOW button. OK button (DEL button) The LCD will now ask you to place your finger on the fingerprint module. Now the user has to place his finger on the fingerprint module and take a picture of his finger. The LCD will now prompt you to remove your finger from the fingerprint module and prompt you to insert your finger again. Now the user has to add finger again and take a photo of the module and convert it to a template and save the fingerprint and memory of the module with the chosen ID. Now the user will be registered and he/she can give it to the visitor. Watch him/her by typing his/her finger on the fingerprint module. Similarly, all users are registered with the system.

Now if the user wants to delete or delete the saved ID or fingerprint, press the DEL key. Once the key is deleted, press it. The LCD will ask you to select the ID that should be deleted. Now the user has to select the ID and press OK (button one button DEL), the LCD will now inform you that the fingerprint has been thoroughly erased.

This can be edited to automatically calculate the percentage of students who come and to create a closer relationship with the teacher if the student attendance does not reach a certain percentage can be adapted to the environment of the company. Traditional self-acceptance and attendance management practises are ineffective and time-consuming. Biometric analysis-based visual imaging technologies can help to enhance the entire process. The Internet of Things (IoT) may be used to route biometric access systems, which can be quite useful for educational institutions. Because it has been demonstrated to be both effective and

safe. When compared to the biometric adoption system, the cost of developing this system is less. Keeping admissions data on a calculator makes it simple to access and retrieve all information when teachers need it. Because the system is not difficult, fingerprint scanners ensure that the records are dependable. They are also easy to use and pleasant.

6.2 Advantages of the project

- Highly precise fingerprint scanning and storage
- Low cost
- Small footprint installation
- 127 fingerprints can be stored
- An alarm signal to draw the observer's attention.

6.3 Disadvantages of the project

- Only a small number of fingerprints are saved.
- Because everything is connected to the internet, any internet failure might cause the entire system to go down.
- Because fingerprints are mostly saved in EEPROM, this might cause some issues.

6.4 Further Improvements & Future Scope

The student attendance management system is designed to use only one domain. In the future, this system is expected to be promoted for practical use by all departments at a university, school or college. Furthermore, the developed process focuses on administrative and teacher work resulting in less identity for student work only students are allowed to view if they are banned from certain classes. So students have little plans to use in the process. in future assignments Students will be able to instantly request from the system without needing to search for a teacher who has blocked them. Apart from that Reports submitted are in PDF format only; there is no alternative for teachers to produce reports. Additionally, the operating system can only be used on desktops or laptops. But the phone does not support this system. So the future work this system should focus more on smartphone development to make the drawing process easier. Last but not least the fingerprint remote management system still has a lot to improve in order to accomplish all the necessary tasks. However, the current version is good enough to be applicable in real life. As a result, the future

opportunities of this technology are expanding and are very important in home appliances and industries.

REFERENCES

[1] M A Muchtar, Seniman, D Arisandi, S Hasanah "Attendance fingerprint identification system using arduino and single board computer" 2nd International conference on computing and applied informatics 2017 IOP Publishing IOP Conf. Series: Journal of Physics: Conf. Series 978 (2018) 012060 doi :10.1088/1742-6596/978/1/012060

[2] Nur Izzati Zainal, Khairul Azami Sidek, Teddy Surya Gunawan, Hasmah Mansor, and Mira Kartiwi "Design and Development of portable classroom attendance system based on Arduino and fingerprint biometric" Department of Electrical and computer engineering,kulliyah of engineering, department of information systems , kulliyyah of information and communications technology, international Islamic university Malaysia, Kuala Lampur, Malaysia

[3] Khin San Myint, Chan Mya Mya Nyein "Fingerprint Based Attendance System Using Arduino" Department of Electronic Engineering, Technological University (Sagaing) DOI:10.29322/IJSRP.8.7.2018.p7967,http://dx.doi.org/10.29322/IJSRP.8.7.2018.p7967

[4] Karthik Vignesh E, Shanmuganathan S , A.Sumithra S.Kishore and P. Karthikeyan "A Foolproof Biometric Attendance Management System" Information Technology, Velammal College of Engineering and Technology ,Velammal College of Engineering and Technology, Madurai, Tamil Nadu, India.

[5] Lia Kamelia, Eki Ahmad Dzaki Hamidi, Wahvudin Darmalaksana, Afit Nugraha, "Real-Time Online Attendance System Based on Fingerprint and GPS in the Smartphone" UIN Sunan Gunung Djati, Department of Electrical Engineering, Bandung, Indonesia

[6] A. Jain, L. Hong , S. Pankanti, and R. Bolle , "An Identity Authentication System Using Fingerprints", Proceedings of the IEEE, Vol. 85, Issue 9, 1997, pp. 1365-1388.

[7] Piyush Devikar, Ajit Krishnamoorthy, Aditya Bhanage, Mohit Singh Chauhan Department of Electronics and Telecommunication Engineering, Vivekanand Education Society's Institute of Technology, Mumbai University, Mumbai, India.

[8] Dipak Gadekar(1), Sanyukta Ghorpade(2), Vishakha Shelar(3), Ajay Paithane(4)."(1,2,3) Students, (4) Professor, Department of Electronics And Telecommunication Engineering, JSPMs Rajarshi Shahu College of Engineering, Tathwade, Pune, Maharashtra, India.

[9] Niharika Yadu(1) , K Uma(2) Research Scholar, Dept. of Electronics Engineering, BIT, Durg, C.G., India(1) Associate Professor, Dept. of Electronics Engineering, BIT, Durg, C.G., India(2) “A Review on Real Time IOT Based advanced E-attendance System.”

[10] ”Biometric Student Attendance System using IoT”, Sameer Kanse, Monish Shaikh, Siddesh Gadhari , Pravin Labde , Prof. Anuprita Gawande. Department of Electronics and Telecommunication Engineering, Shivajirao S. Jondhle College of Engineering & Technology, Asangaon, Mumbai University, India.

APPENDIX

Program Code:

//For LCD

```
#include <LiquidCrystal.h>

// initialize the library by associating any needed LCD interface pin
// with the arduino pin number it is connected to
const int rs = 4, en = 5, d4 = 6, d5 = 7, d6 = 8, d7 = 9;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);

#include <Adafruit_Fingerprint.h>
#include <SoftwareSerial.h>

#if (defined(__AVR__) || defined(ARDUINO NANO)) &&
!defined(__AVR_ATmega2560__)
SoftwareSerial mySerial(2, 3);

#else
#define mySerial Serial1

#endif

Adafruit_Fingerprint finger = Adafruit_Fingerprint(&mySerial);

int attendance1 = 0;
int attendance2 = 0;
int attendance3 = 0;

void setup()
{
  Serial.begin(9600);
  lcd.begin(16, 2);
  lcd.setCursor(0, 0);
  lcd.print("Fingerprint Stud");
  lcd.setCursor(0, 1);
  lcd.print("Attending System");
  delay(3000);
  lcd.clear();

  lcd.setCursor(0, 0);
  lcd.print("Presented by");
  delay(3000);
  lcd.clear();
void loop()                    // run over and over again
{
  String userInput = "";
  while (Serial.available() > 0) {
    char c = Serial.read();
```

```
    ID = c;
    // userInput += String(c);
    faceResult();
  }
  //Serial.println(userInput);
  getFingerprintID();
  lcd.setCursor(0, 0);
  lcd.print("                ");
  lcd.setCursor(0, 0);
  lcd.print("No Fingerprint.");
  delay(50);            //don't ned to run this at full speed.
}

uint8_t getFingerprintID() {
  uint8_t p = finger.getImage();
  switch (p) {
    case FINGERPRINT_OK:
      Serial.println("Image taken");
      lcd.setCursor(0, 0);
      lcd.print("Image taken     ");
      lcd.setCursor(0, 1);
      lcd.print("                ");
      break;
    case FINGERPRINT_NOFINGER:
      //Serial.println("No finger detected");
      lcd.setCursor(0, 0);
      lcd.print("No Fingerprint..");
      lcd.setCursor(0, 1);
      lcd.print("Press Finger");
      delay(50);
      return p;
    case FINGERPRINT_PACKETRECIEVEERR:
      Serial.println("Communication error");
      return p;
    case FINGERPRINT_IMAGEFAIL:
      Serial.println("Imaging error");
      return p;
    default:
      Serial.println("Unknown error");
      return p;
  }

  // OK success!

  p = finger.image2Tz();
  switch (p) {
    case FINGERPRINT_OK:
      Serial.println("Image converted");
      break;
    case FINGERPRINT_IMAGEMESS:
```

```
    Serial.println("Image too messy");
    return p;
  case FINGERPRINT_PACKETRECIEVEERR:
    Serial.println("Communication error");
    return p;
  case FINGERPRINT_FEATUREFAIL:
    Serial.println("Could not find fingerprint features");
    return p;
  case FINGERPRINT_INVALIDIMAGE:
    Serial.println("Could not find fingerprint features");
    return p;
  default:
    Serial.println("Unknown error");
    return p;
}

// OK converted!
p = finger.fingerSearch();
if (p == FINGERPRINT_OK) {
  Serial.println("Found a print match!");
} else if (p == FINGERPRINT_PACKETRECIEVEERR) {
  Serial.println("Communication error");
  return p;
} else if (p == FINGERPRINT_NOTFOUND) {
  Serial.println("Did not find a match");
  return p;
} else {
  Serial.println("Unknown error");
  return p;
}

// found a match!
Serial.print("Found ID #"); Serial.print(finger.fingerID);
Serial.print(" with confidence of "); Serial.println(finger.confidence);
delay(1000);
lcd.setCursor(0, 0);
lcd.print("Found a match");
delay(1000);
lcd.clear();

String Name = "Siddique";
int ID = 1;
String Dept = "EEE";
if (finger.fingerID == ID && finger.confidence >= 60)
{
  attendance1 = attendance1 + 1;
  int attendanceP = (100 * attendance1) / 40;
  Serial.println(Name);
  Serial.println(ID);
  //Serial.println(Dept);
```

```
  lcd.setCursor(0, 0);
  lcd.print("ID: ");
  lcd.print(ID);
  lcd.print(" Atten: ");
  lcd.print(attendanceP);
  lcd.print("%");
  lcd.setCursor(0, 1);
  lcd.print("Name: ");
  lcd.print(Name);
  delay(4000);
  lcd.clear();
}

Name = "Sayem";
ID = 2;
Dept = "CSE";
if (finger.fingerID == ID && finger.confidence >= 60)
{
  attendance2 = attendance2 + 1;
  int attendanceP = (100 * attendance2) / 40;
  Serial.println(Name);
  Serial.println(ID);
  //Serial.println(Dept);
  lcd.setCursor(0, 0);
  lcd.print("ID: ");
  lcd.print(ID);
  lcd.print(" Atten: ");
  lcd.print(attendanceP);
  lcd.print("%");
  lcd.setCursor(0, 1);
  lcd.print("Name: ");
  lcd.print(Name);
  delay(4000);
  lcd.clear();
}
Name = "Ayman";
ID = 3;
Dept = "Civil";
if (finger.fingerID == ID && finger.confidence >= 60)
{
  attendance3 = attendance3 + 1;
  int attendanceP = (100 * attendance3) / 40;
  Serial.println(Name);
  Serial.println(ID);
}
```

```
//For Data File
# Python program to demonstrate
# writing to CSV
import serial
import csv
import time

ser = serial.Serial('COM14', baudrate = 9600, timeout=1)
# field names
fields = ['ID', 'NAME', 'DEPARTMENT', 'MOBILE', 'ADDRESS', 'Date & time']

filename1 = "Rezwanul Ahsan (Power System).csv"            # subject code: EEE433
filename2 = "Dara Abdus Satter (Digital Electronics).csv"   # subject code: EEE254
filename3 = "Rezwanul Ahsan (TD).csv"                      # subject code: EEE244
filename4 = "Dara Abdus Satter (EEE).csv"                  # subject code: EEE355

# writing to csv file
with open(filename1, 'a+') as csvfile:
    # creating a csv writer object
    csvwriter = csv.writer(csvfile)
    # writing the fields
    csvwriter.writerow(fields)

with open(filename2, 'a+') as csvfile:
    # creating a csv writer object
    csvwriter = csv.writer(csvfile)
    # writing the fields
    csvwriter.writerow(fields)
with open(filename3, 'a+') as csvfile:
    # creating a csv writer object
    csvwriter = csv.writer(csvfile)
    # writing the fields
    csvwriter.writerow(fields)

with open(filename4, 'a+') as csvfile:
    # creating a csv writer object
    csvwriter = csv.writer(csvfile)
    # writing the fields
    csvwriter.writerow(fields)


def remove(data):
    data = data.lstrip("b")
    data = data.strip("'")
    data = data.rstrip("\\r\\n")
    return(data)


while 1:
    data = str(ser.readline())
```

```
    data = remove(data)
    # print("Data = ", data)
    if data == "EEE433" or data == "EEE254" or data == "EEE244" or data == "EEE355":    #
len(ID)
        print("Data = ", data)
        ID = str(ser.readline())
        ID = remove(ID)
        print("ID = ", ID)

        Name = str(ser.readline())
        Name = remove(Name)
        print("Name = ", Name)

        DEPARTMENT = str(ser.readline())
        DEPARTMENT = remove(DEPARTMENT)
        print("DEPARTMENT = ", DEPARTMENT)

        Mobile = str(ser.readline())
        Mobile = remove(Mobile)
        print("Mobile = ", Mobile)

        Address = str(ser.readline())
        Address = remove(Address)
        print("Address = ", Address)

        time_string = time.strftime("%d/%m/%Y, %H:%M:%S", time.localtime()) # For time
        print(time_string)
        print("\n")
        rows = [[ID, Name, DEPARTMENT, Mobile, Address, time_string]]
        # name of csv file
        filename1 = "Rezwanul Ahsan (Power System).csv"
        filename2 = "Dara Abdus Satter (Digital Electronics).csv"
        filename3 = "Rezwanul Ahsan (TD).csv"
        filename4 = "Dara Abdus Satter (EEE).csv"

        # writing to csv file
        if data == "EEE433":                        # Rezwanul Ahsan (Power System)
            with open(filename1, 'a+') as csvfile:
                # creating a csv writer object
                csvwriter = csv.writer(csvfile)
                # writing the data rows
                csvwriter.writerows(rows)
        elif data == "EEE254":                      # Dara Abdus Satter (Digital Electronics)
            with open(filename2, 'a+') as csvfile:
                # creating a csv writer object
                csvwriter = csv.writer(csvfile)
                # writing the data rows
                csvwriter.writerows(rows)
        elif data == "EEE244":                      # Rezwanul Ahsan (TD)
            with open(filename3, 'a+') as csvfile:
```

```
        # creating a csv writer object
        csvwriter = csv.writer(csvfile)
        # writing the data rows
        csvwriter.writerows(rows)
elif data == "EEE355":                      # Dara Abdus Satter (EEE)
    with open(filename4, 'a+') as csvfile:
        # creating a csv writer object
        csvwriter = csv.writer(csvfile)
        # writing the data rows
        csvwriter.writerows(rows)
```