

**DESIGN AND DEVELOPMENT OF A LOW COST SMART ATTENDANCE
SYSTEM**

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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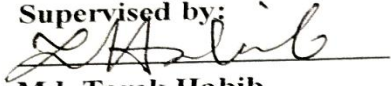
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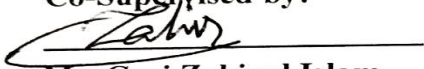
We hereby declare that, this project has been done by us under the supervision of **Md. Tarek Habib, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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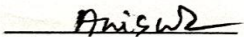


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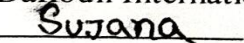
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ABSTRACT

Our project aims at designing a student attendance system which could effectively manage attendance of students. Participation is set apart after understudy identification. For understudy identification, a fingerprint acknowledgment base identification framework is utilized. Fingerprints are viewed as the best and quickest strategy for biometric identification. Biometric Access Control System also provides the highest level of security available today by eliminating the stolen, transferred and duplicating. It likewise will wipe out the issues related with manual work related with paper based and punch card. They are secure to utilize, exceptional for each individual and doesn't change in one's lifetime. Unique mark acknowledgment is an adult field today, yet at the same time distinguishing individual from a lot of enlisted fingerprints is a period taking process. In this venture we are going to configuration Fingerprint Sensor Based Biometric Attendance System utilizing Arduino. Basically we will be interfacing unique mark sensor with Arduino, LCD Display and RTC Module to structure the ideal task. In this venture, we utilized unique mark Module and Arduino to take and keep participation information and records.

Biometric Attendance systems are regularly utilized frameworks to check the nearness in workplaces and schools. This undertaking has a wide application in school, school, business association, workplaces where stamping of participation is required precisely with time. By utilizing the unique mark sensor, the framework will turn out to be increasingly secure for the clients.

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CHAPTER 1

Introduction

1.1 Problem Statement

Structuring an attendance management system using by Biometric fingerprint system and these design is faster many other different identification that manages report for attendance in academy.

1.2 Motivation and Challenges

After analysis problem, we have known that there are many scope to develop this fingertips device. Regularly student's or employee's give their attendance in regular paper sheet. Sometimes it more difficult to store attendance with date and time. After a month when it's calculated if somehow an attendance sheet will lost more complex situation create. Another problem is regular paper sheet attendance will extra time in class time. Students can also give fake attendance in class and no one can't not hold it. It's more complex and old method to take attendance in paper sheet. Now it's time to upgrade and more dynamic solution using biometric technology. Biometric technology is a method which is describe unique physical element of human body. So if we use unique physical element of human body we can easily identify any human.

Every affiliation whether it be an informational establishment or business affiliation, it needs to keep up a legitimate record of participation of understudies or workers for effective working of association. Planning a superior participation the executive's framework for understudies so records be kept up easily and precision was a significant key after rousing this task. This would make strides precision of participation documents since it evacuate every one of the problems of move calling and will spare important time of the understudies just as instructors. Picture handling and fingerprint acknowledgment are propelled today as far as innovation. It was our duty to improve fingerprint identification framework. We diminished coordinating time by apportioning the database to one-tenth and improved coordinating utilizing key based one too many coordinating.

1.3 Using Biometrics

Biometrics means it a major unique physical element of human body which is distinctive and identifications organizations. Some biometrics elements of human body is face recognition which is different and identical from others human. We can easily understood that part of the elements in human body and identify human by using this biometric method.

Using Biometric Identification frameworks are world utilized for person identification of people primarily for authentications and identification. Biometrics is utilized as a type of character get to the executives and access control. So, use of biometric fingerprint system is more secure from another attendance systems. There are heaps of biometric frameworks like fingerprint acknowledgment, face acknowledgment, voice acknowledgment, iris acknowledgment, palm acknowledgment and so on. In these venture we are building up a unique mark acknowledgment frameworks.

1.4 What is fingerprint?

Fingertips is more unique and more secure than other biometrics method. A person more secure and less worried about his security concern by using this method. Fingertips are read by fingerprint module and store it by binary method. A person put his finger on fingertips module and module store his fingertips on device memory and next by binary method like an image file. Fingertips are different from one person to another person. Different types of finger has different pattern. So no matched on one finger to another finger.

When we are checking a fingerprint we are following the rules of fingertip. The fingertip are two types. Fingerprint is the pattern of ridges and valleys on the superficial of a fingertip. The endpoints and intersection purposes of edges are called minutiae. The overall are tolerating supposition that particulars example of each finger are absolutely one of a kind. If anyone are trying to change this fingertip, it's quite impossible to change during one's life. Edge endings are the focuses where the edge bend ends, and bifurcations are the place an edge parts from a solitary way to two ways at a Y-intersection. Figure 1 delineates a

case of an edge finishing and a bifurcation. In this model, the dark pixels keep in touch with the edges, and the white pixels keep in touch with the valleys.

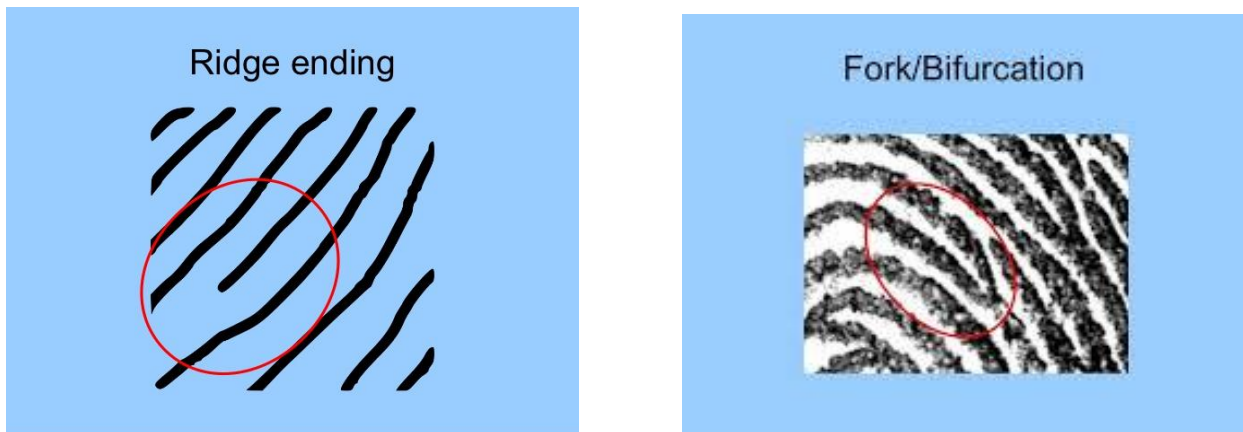


Figure 1.1: Example of a ridge ending and a bifurcation

Exactly when human fingerprint masters choose whether two fingerprints are from the proportional finger, the planning degree between two points of interest model is one of the hugest parts. Because of the likeness to the method for human fingerprint specialists and minimization of formats, the particulars based coordinating strategy is the most broadly concentrated coordinating technique [2].

1.5 Why use fingerprints

In this era, technology are changed day by day. Every person and companies concern about their privacy and security protections. People and companies take more step to how can security more strong and powerful. In this time lots of method in our technology to secure device and other personal issues, but sometimes it's not working properly. In front of many technologies we decided that biometrics method are more helpful and more secure than other technology. Fingerprints are more unique and more secure pattern in security purpose. It's secure because every person have a unique fingertips patterns. So it's not easy to copy that fingertips. It is make better identifications of any security purpose.

Fingerprints are viewed as the best and quickest technique for biometric identification. They are secure to utilize, extraordinary for each individual and doesn't change in one's

lifetime. Other than these, usage of fingerprint acknowledgment framework is modest, simple and exact up to satiability. Unique mark acknowledgment has been broadly utilized in both measurable and nonmilitary personnel applications. Contrasted and different biometrics highlights, fingerprint-based biometrics is the most demonstrated method and has the biggest pieces of the overall industry. It is quicker than different procedures as well as the vitality utilization by such frameworks is excessively less [2].

1.6 Expected Outcomes

- ❖ The system is fully automated and it does not need to any human interaction except settings and initial time settings.
- ❖ The system is accurate and can avoid proxy or false attendance
- ❖ There is no possibility of missing attendance due to the disruption of any student.
- ❖ The scheduled class time cannot waste for the attendance and it also reduces the manpower.
- ❖ This system is more calculated auto and show how many times a person attend in the rooms.
- ❖ This system is easy to use and show results correctly.
- ❖ Device can provide auto time and date and notice that when attendance in registered.
- ❖ Customize and fully supportive.

CHAPTER 2

Background

2.1 Literature Review

A writing survey can be alludes to as an audit of momentum framework that the analyst had done already and the survey of the framework that will be created. A writing survey can be alludes to as an audit of momentum framework that the analyst had done already and the survey of the framework that will be created. There are lots of institute, school, college, university and more other places are using this systems. Those people who are not using this device they are interested to use this device.

In this project we have to implement a device to which is based on fingerprint and this is biometric technology. We have use this because of less cost and prove good service. In the market already have been productions in this type of device. That's device are more costly and some issue of limitations. Our main goal is to faster and more secure than other device in this market at a cheap cost rate. [1]

2.2 Fingerprints Used For Identification

Fingerprints gathered at a wrongdoing scene, or on things of proof from a wrongdoing, have been utilized in scientific science to distinguish suspects, exploited people and different people who contacted a surface. Fingerprints are the essential instrument in each police organization for the recognizable proof of individuals with a criminal history.

Crime in our society is a common disease. We can't stop that, but we can control them. Police can identify easily by use a fingertips which is more useful identification in many cases. Fingerprint is unique and identical that can identifying any people who was there and who work that. Fingerprint is not matched one people to other people. Fingertips are different from one to another. It's store in the dataset like an image binary file. So people and any cyber hacker can't hack easily fingerprint. Fingerprint is more secure. In this project we use fingertips that's why we can easily identify which is present or not.

2.3 Fingerprint Classification

A unique finger impression characterization calculation is exhibited in this paper. Fingerprints are ordered into five classifications: curve, rose curve, left circle, right circle and whorl. The calculation removes particular focuses (centers and deltas) in a unique mark picture and performs grouping dependent on the number and areas of the identified solitary focuses. The classifier is invariant to pivot, interpretation and limited quantities of scale changes. The classifier is rule-based, where the guidelines are created free of a given informational index. The classifier was tried on 4000 pictures in the NIST-4 database and on 5400 pictures in the NIST-9 database. For the NIST-4 database, order exactness's of 85.4% for the five-class issue and 91.1% for the four-class issue (with curve and rose curve set in a similar classification) were accomplished [4].

2.4 Fingerprinting Techniques

Exemplar

Model prints, or known prints, is the name given to fingerprints intentionally gathered from a subject, paying little personality to whether for clarifications behind enlistment in a framework or when verified for an accepted criminal offense. During criminal gets, a lot of model prints will reliably combine one print taken from each finger that has been moved beginning with one edge of the nail then onto the following, plain (or slap) impressions of the entirety of the four fingers of each hand, and plain impressions of each thumb. Model prints can be collected utilizing live channel or by utilizing ink on paper cards [3].

Latent

In criminological science a halfway outstanding finger impression lifted from a surface, is known as an idle noteworthy engraving. Dampness and oil on fingers acknowledge dormant fingerprints on surfaces, for example, glass. In any case, since they are not unquestionably unmistakable their distinctive confirmation may require compound movement [3].

CHAPTER 3

Requirement Specification

3.1 Component Required

Arduino Uno Board



Figure: 3.1 Arduino Uno Board

R307 Fingerprint Scanner Module



Figure: 3.2 R307 Fingerprint Scanner Module

RTC Module (DS1307)

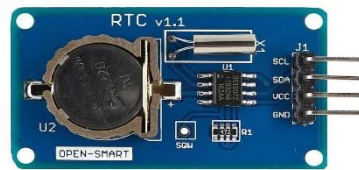


Figure: 3.3 RTC Module (DS1307)

16 X 2 LCD DISPLAY



Figure: 3.4 16*2 lcd display

Push Buttons Switch



Figure: 3.5 Push Buttons Switch

Buzzer



Figure: 3.6 Buzzer

LED

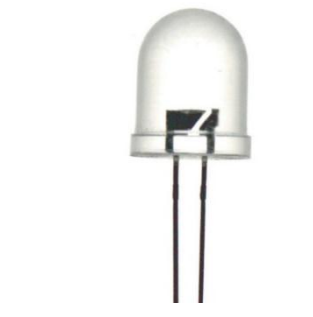


Figure: 3.7 LED

BRADEBOARD

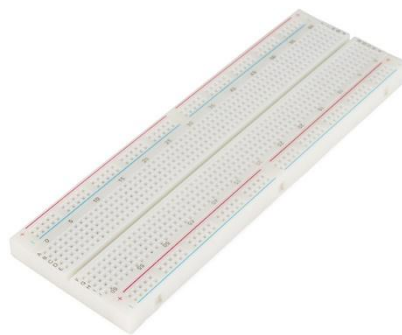


Figure: 3.8 Breadboard

Connecting Wires

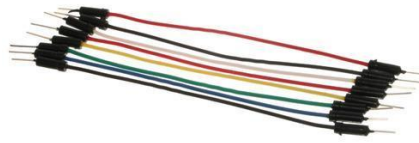


Figure: 3.9 Connecting Wires

3.2 Design Specifications

Used hardware and software in run this device. Memory management is more important in this project purpose. So we have customize this sections. Buyer can decide more variant which he had need. For this project purpose there are need some equipment and assemble that hardware and component. Circuit design is more important before start this project. Hardware and other device combined on circuit platform. This step is necessary for every purpose of design specifications. If any change of component might be change circuit design. After this we had to need software installation for this project and write some program script for this circuit. Fingerprint module and wire connection is developed by circuit design. We just need to connect them properly.

There is some quality that can be found from the formative prototyping technique. Transformative prototyping can help planners with accelerating their system improvement. Moreover, formative prototyping help in improve the idea of unmistakable thing since it needs to encounter scarcely any models and eventually to the last structure after the general functionalities and necessities met. Other than that, chances to fabricate the satisfaction of end-customers in using the system will be high since each delivered model relies upon the essential controlled by the end-customers.

In any case, there are a couple of inadequacies that can found transformative prototyping framework. It is difficult to foresee the finish date and the expense of the undertaking since necessity can be change every once in a while dependent on the end-clients prerequisite. Also, if there is any vulnerability, it can make the engineer feel baffled because of the cash, time, and exertion relinquished beforehand. Other than that, the behind code of the product

may happen high opportunities to be harmed or ineffectively organized because of the successive changes necessity indicated clients every once in a while.

3.3 How Fingerprint Recognition works?

In this project we use fingerprint recognition system. We know that every person has different type of fingertips pattern. When a person put his finger on fingerprint module, fingerprint sensor take the bitmaps image file and store on a database. Its store image file on by default binary digit code. Though fingertips pattern are unique so it's generate a unique binary code pattern image which on store on database. Next time that person put him fingertips sensor, some program search to match the finger image pattern on the database. If matched then take attendance. If doesn't matched show error on device display.

Fingerprint images when we found from the user quality is not good. We couldn't found the optimum quality. That is the reason we evacuate commotions and better their quality. We concentrate features like subtleties and others for organizing. If the game plans of subtleties are facilitated with those in the database, we think of it as an identified fingerprint. In the wake of coordinating, we perform post-coordinating advances which may incorporate indicating subtleties of identified up-and-comer, stamping participation and so forth. A brief flowchart is appeared in next segment [3].

3.4 System Performance Definition

In building up the framework, a couple of concentrated on redesigns had been made for motivation to improve the precision, cost, time, and so forth for the understudy investment the official's structure. Above all else, the new understudy interest system will help in ensure the accuracy of the understudy support records since each understudy will be required to check their cooperation by sifting their novel imprint to the gave one of a kind imprint examine. In this way, none of the understudies will have the option to counterfeit their participation in the new framework. Moreover, since the attendance will naturally refresh the student's participation record in database while students go to each class, along

these lines, the report age highlight will advance an exact information and result for examination reason. In the report creation feature, calculation is very easier from the attendance system. The teacher or any other can easily calculate the attendance of their employees or students. So it's very time efficiency for those people who are using this device. The new students can easily registered their attendance, that's why he/she work this time for the paperwork. In utilizing the new framework, it will take out the utilization paper and save time from key-in the records into current existing system for motivation to amass the end tri-semester report.

CHAPTER 4

DESIGN SPECIFICATION

4.1 Block Diagram

Here is the block diagram of our project.

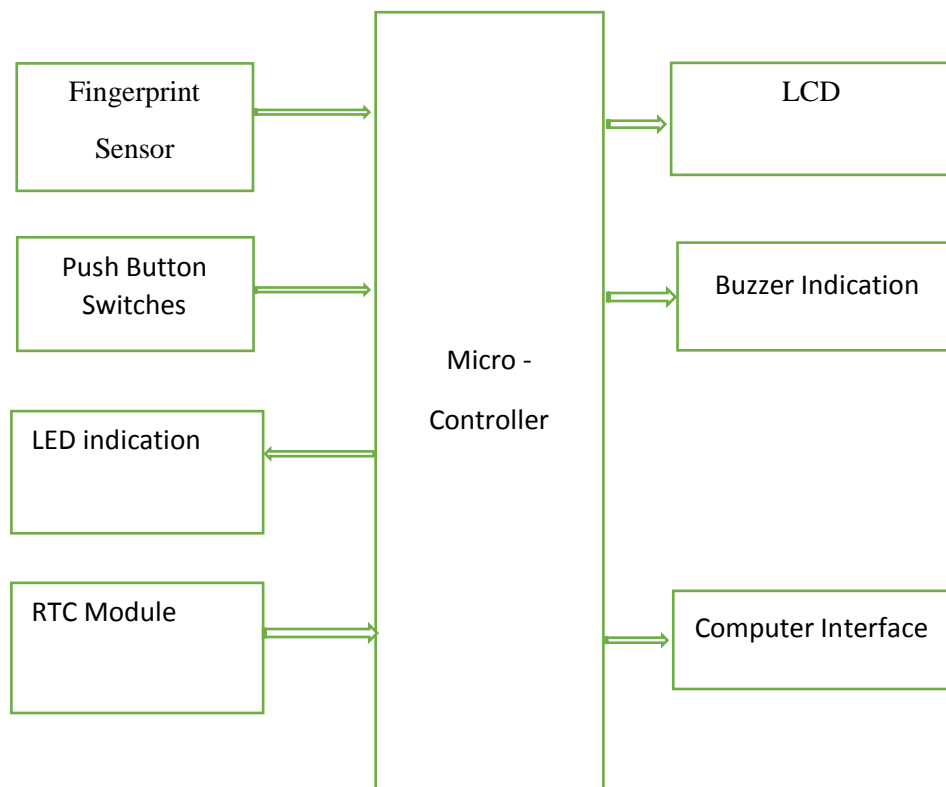


Figure 4.1: Block Diagram

4.2 Circuit Diagram

Circuit Diagram of this project.

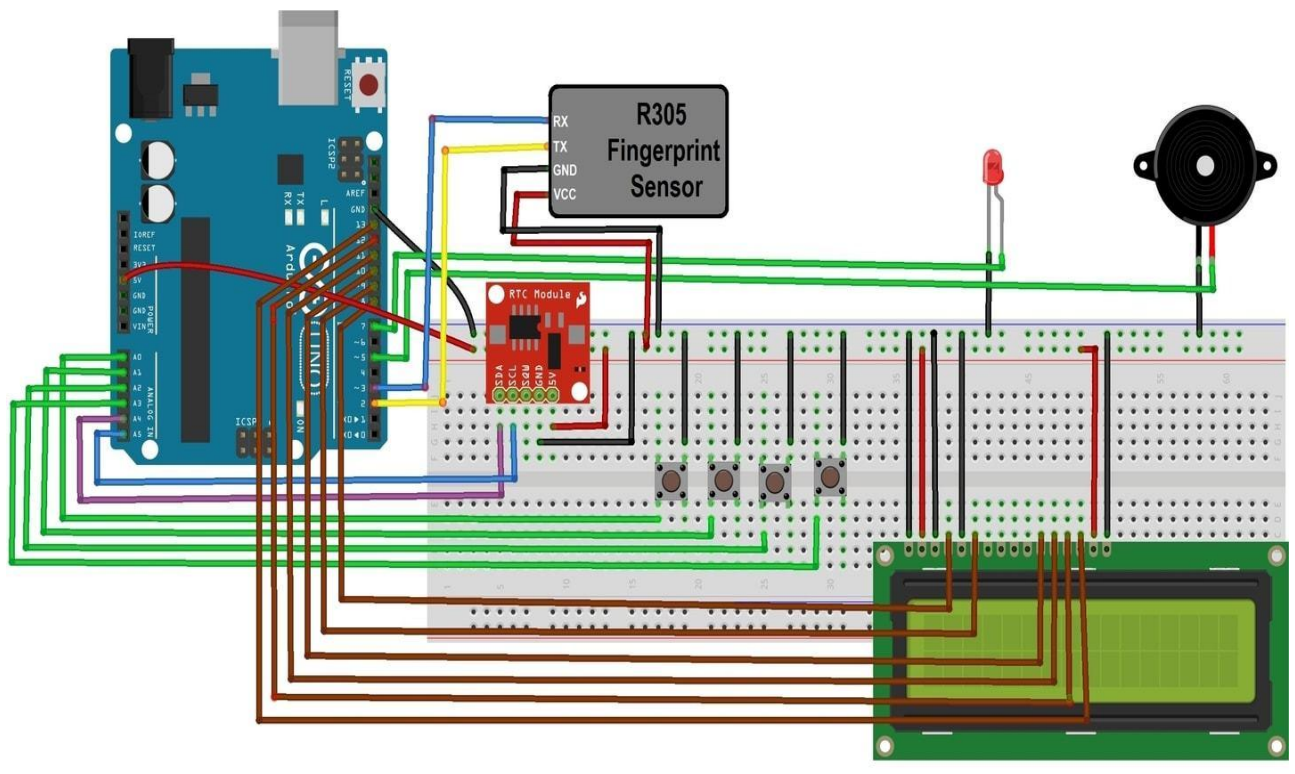


Figure 4.2: Circuit Diagram

CHAPTER 5

Implementation and Testing

5.1 System Implementation

First of all, before starting our task all of necessary tools and all of materials downloaded from the google. Downloaded Arduino IDE, Google chrome and some of the Arduino Libraries etc. It was downloaded and introduced for framework improvement reason. The procedure will be very tedious since each improvement apparatuses should play out the setup required during the establishment In spite of the fact that it is very tedious, however this progression can be viewed as a significant advance before the improvement starts.

When our downloaded and installation was completed then we have focused on our circuit design. Then our next step was configuring Arduino software by manually, open and enroll some library as like as Uno fingerprint library, DS307 for RTC module, Wire library for connecting wire and etc.

By adding some feature of this project we have to change implementation of whole device. In this project system implementation is more important because of that how a system perform and create database on this module. For this system implementation about knowledge of system specification and circuit design which is already describe in design specifications. Software and hardware combined in this project. So we need to know about circuit and software Arduino install in windows operating system. We write code and program script for run this module accurately. This is called microcontroller program. It's combined with software and Arduino.

5.2 Enrolling New Fingerprint

After enrollment fingerprint by using this device. It's save fingertips on database on module memory. A person can save only one fingertips on this device memory. To select New Fingerprint Click on Enroll button. At that point select the memory area where you need to store your unique finger impression utilizing the UP/DOWN catch. At that point

click on OK. Put your finger and expel your finger as the LCD teaches. Put your finger once more. So at long last your unique finger impression gets put away.

5.3 Deleting Stored Fingerprint

A person can't enroll fingertips before deleting his previous fingertips. On press DEL button it recommend to know the user ID and delete fingertips under this user ID. To erase the stored fingerprints push on DEL Button where we used push button. At that point select the memory area where your fingerprint was put away utilizing the UP/DOWN catch. At that point click on OK. So at long last your fingerprint is erased.

5.4 Downloading Data

Downloading this data it shows on serial monitor on Arduino. Its show time and date when it takes attendance from people and also show how many time it press this device. In this project the downloading data is very easy. Simply click one the register/back button and Arduino reset button together. Then you can see the serial monitor of the computer screen. Easily you can see the fingerprint of those people they are attend in class, attendance time and date, id and some other information.

5.5 Test Results and Reports

Here we discussing part by part of our Attendance System Project.

- ❖ Staring this project we can see this display.



Figure 5.1: Attendance System

- ❖ Then our second and third display will be here.

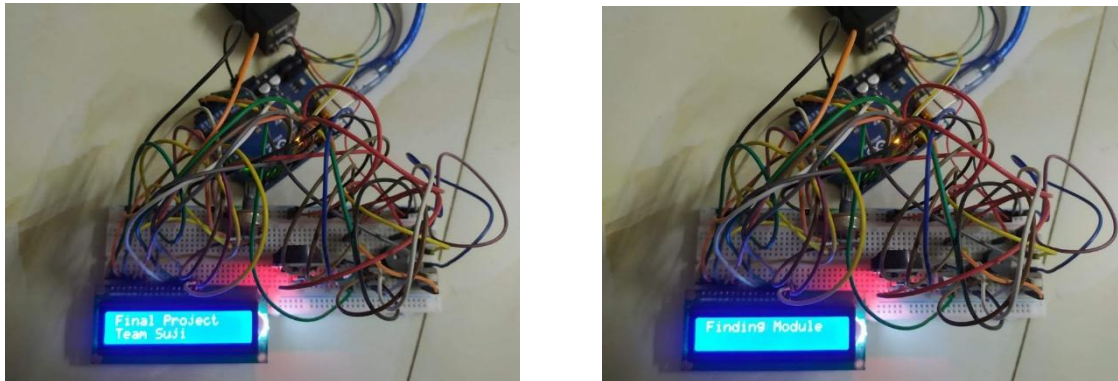


Figure 5.2: Finding Module

- ❖ Now we see the date and time. When the user input their fingertip the time will be also saved in the database.

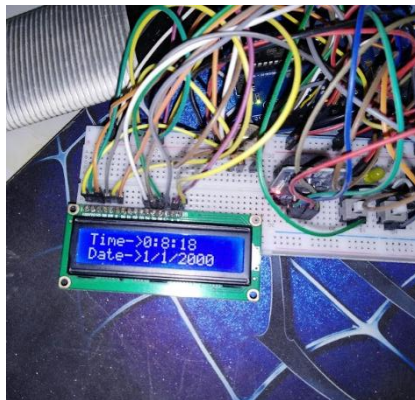


Figure 5.3: Time and date

- ❖ Enrolling a fingertip by their id.

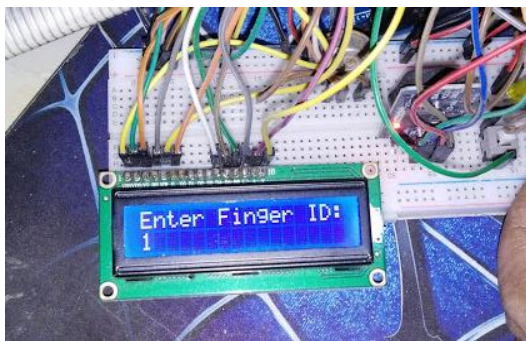


Figure 5.4: Enter Finger ID

- ❖ Putting fingertip on fingerprint module in two times.

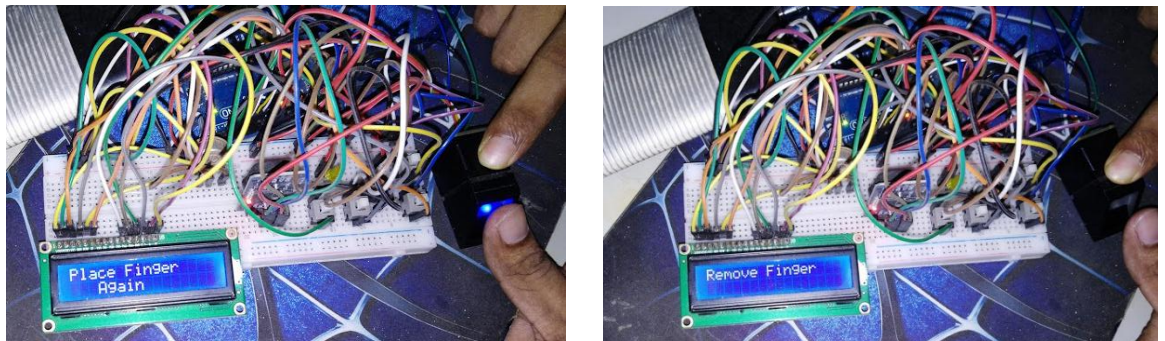


Figure 5.5: Place Finger and Remove Finger

- ❖ Registered Completed and stored in database.

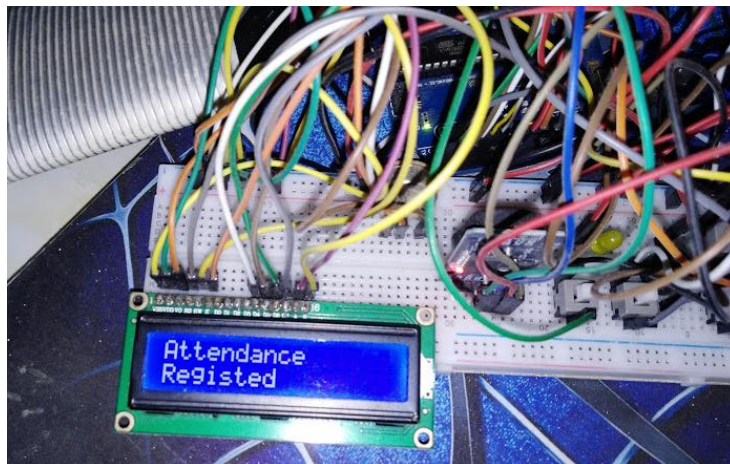


Figure 5.6: Attendance Registered

CHAPTER 6

Conclusion and Future Scope

6.1 Discussion and Conclusion

The Fingerprint Recognition Attendance Management System is created for the utilization of single workforce. In future, it is accepted that this framework will be transformed to be utilized by all resources in a college, school, or school. Other than that, the structure made is more focus on overseer work similarly as educator work which bring about less features provided for the understudy work. Understudy possibly permitted survey on the off chance that they had been banned from certain class. Subsequently, understudy has exceptionally restricted element to use in this framework.

In conclusion, unique finger impression acknowledgment participation framework will be created to supplant the conventional participation framework that are as of now broadly utilizing by numerous schools and colleges. That's why, this venture is structured in exertion to boycott these issues. A portion of the arrangement we had recouped from the present circumstance.

Then again, from the study survey information, a large portion of the members are concur that understudy participation in a class to expand their insight is significant. To wrap things up, school/college with great institute understudies is additionally significant as it will influence that school/college notoriety.

6.2 Scope for Further Development

In this project we have developed a fingerprint biometrics attendance system using Arduino and more other hardware equipment. It has more scope to development this project. If we use extra data memory management we can store more data from user. We can use cloud database for more secure data and fastest performance. We can development a software that's control all user data dynamically. In this project there are lots of scope for this project for future development. We can develop a module which is available in market but expensive price. Our main goal is less cost and better service provide. In future it can

develop by face recognition and software visualization. Software process is more beneficial and more comfort to use. For this project purpose it can show data on computer and LCD display. In future it can show data software and it's more dynamic to use.

6.3 Project Scope

In developing this system, student will give attendance by using fingertips. In that ago, students gives their attendance to their name calling paper. In that case there are some problems about that system. In this project students of university or school can give their attendance by using their fingertips. Most policy is more dynamic and most efficient. Authority can takes attendance and count attendance easily after end of the month. We have known by our problem analysis that there are lots of problem that we use general method of attendance system. So it is more effective that we can develop a project that can solve that problems and it's more secure and more cost effective. There are lots of device already implemented in our market. But our goal is build a more secure and less cost device that can affordable for any type of office, university or school. There are some module cover in current scope. In that case, we have known that fingerprint is the most unique physical element of human, that's why we decide that in this project we will use that to identify easily. Most of this case student's gives their fingertips on the fingerprint module system will take fingertips and match on database fingerprint. If fingerprint is match that store attendance on database with time and date. Attendance data will be store on device memory.

References

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APPENDIX

Appendices A

Projection Reflection: From spring-2019 semester we have started our work for developing our project. We are working on our development project and successfully we have complete our work. This development project will helpful for Student, Teacher and admin. Many institute as like as factory, office and many other places they will be able to use this attendance project. It's really time consuming for all kind of users. In this era, we are finding that how can we done our work in limited time. That's why our project can be synchronized over time. With this project we can prevent waste of time. We can reduce the percentages of false attendance or proxy. The criminology team can found easily their target with their fingerprint. There are many times unfortunately missed the attendance of students or any kind of users. This project is reduce the probability of missing attendance. If we see the govt. office or many other offices we can see their attendance system is very difficult. If any urgent situation is coming they can't found their attendance in earlier way. So, this project deleted the problem of store information. This project can reduce employment and more other benefits in this project. The system is fully automated and it does not need to any human interaction expect setting and initial time settings.

So, we believe that our "Designing and development of Smart Attendance System" project is very helpful of all kind of users and the admin panel. We think so that our project will be Expect a lot of good in future and day by day we will be continuously upgrading this system.

Appendices B

Combination and Acronyms

Here we using our development project in some of Arduino libraries. Now I am including this libraries and some functions.

Libraries

- ❖ Adafruit Fingerprint Sensor libraries.
- ❖ RTCLib
- ❖ Software Serial
- ❖ DS1307 RTC
- ❖ Serial Monitor
- ❖ Wire
- ❖ Liquid Crystal
- ❖ EEPROM

