**DESIGN AND IMPLEMENTATION OF PORTABLE WIRELESS FINGERPRINT ATTENDANCE SYSTEM USING NODE MCU ESP8266**

**BY**

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**A PROJECT SUBMITTED TO THE ELECTRICAL AND ELECTRONIC ENGINEERING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF HIGHER NATIONAL DIPLOMA IN ENGINEERING**

**APPROVAL PAGE**

This is to declare that this project entitled “Design and Implementation of Fingerprint Attendance System Using Node MCU ESP8266” is my own work except as cited in the references. This Project has been verified and approved having meet the requirement of HND in Electrical and Electronic Engineering Department.

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# **ACKNOWLEDGEMENT**

I would like to present very special thanks to my supervisor, Eng. Jamilu Suleiman who had guide me since the beginning of Proposal Writing subject. Thanks to him for provide guidance, advice, and useful feedback regarding the final year project either in documentation parts or technical parts.

Next, I would like to thank my academic teacher Eng. Abubakar Sadiq who willing to take some time to advise me and help me on how to manage the project encouraging me while I facing problem and when I going to give up. In addition, he also provides me with useful information as well.

Above all, I thank Allah then my parents who keep on encouraging me while I facing problem and when I going to give up. Without their support, I may not be able finish my final year project on time. Their supports are truly appreciated.

Last but not least, my sincere thanks and appreciation go to my moderator, Eng. Aliyu who gives me his time and support on my final year project construction. And very thanks to him for take some time in evaluating the quality of my final year project in technical part.

# **ABSTRACTS**

This project document aims at introducing the presentation phase of a system. There are four chapters introduced in this project documents which is introduction part, literature review part, proposed method/approach part, and conclusion part. This project is about to study on biometric technologies and develop a portable wireless student attendance system that based on fingerprint recognition of student in order to verify their attendance. In this system, a portable attendance system will be developed for student to scan their fingerprint with provided hardware for a purpose to verify their attendance in all classes. At the same time, web-based attendance system will be developed for admin/lecturer to view and analyze student attendance by generate the attendance report. The main purpose to develop this project is to replace the current traditional attendance system by provide faster, accurate, and efficient system. With this new fingerprint recognition attendance system, it can eliminate some problems such as buddy signing, loss of attendance sheet, and control student skip class rate. In developing this project, a finger-print based attendance system has been established to track students' attendance reliably in various sessions through the year.

Database was constructed to store all system information about students. It has been constructed using MYSQL database management system while interface built using XAMPP package and PHP scripts. Random students have been assigned unique ids for each and their fingerprints cached and stored in the reader. Attendance of previous students has been taken at different times for testing. At each time attendance of students has been obtained correctly through the required course attendance page in the interface.

Additionally, the functional framework for this system includes a Node MCU ESP8266 Wi-Fi Module, a ZA620\_M5 fingerprint sensor, a 0.96" OLED display, a Li-Ion battery 3000mAh (18650), a TP4056 Li-Ion Battery charger, an MT3608 Boost converter, an On/Off switch, and a breadboard and wire. It is intended that as this system develops, it will assist lecturers, academic advisors, and students in efficiently managing attendance

# **DEDICATION**

This project is dedicated to my parent, project supervisor and my teachers who stand to see the completion of the project. May ALLAH subhanahu wata’ala reward them with the highest rank in the Jannatul Firdausi Amin.

# **DEFINITION OF TERMS**

SQL Structure Query Language

PHP Hypertext Preprocessor

DBMS DataBase Management System

WAMPP Windows Apache MySQL PHP

[ACKNOWLEDGEMENT 3](#_Toc379174308)

[ABSTRACTS 4](#_Toc379174309)

[DEDICATION 6](#_Toc379174310)

[DEFINITION OF TERMS 7](#_Toc379174311)

[CHAPTER ONE 10](#_Toc379174312)

[1.0 INTRODUCTION 10](#_Toc379174313)

[**1.1 Project Background** 10](#_Toc379174314)

[**1.2 Motivation and Problem Statement** 11](#_Toc379174315)

[**1.2.1 Motivation** 11](#_Toc379174316)

[**1.2.2 Problem Statement** 12](#_Toc379174317)

[**1.3 Project Objectives** 13](#_Toc379174318)

[**1.4 Scope of the Study** 14](#_Toc379174319)

[CHAPTER TWO 15](#_Toc379174320)

[LITERATURE REVIEW 15](#_Toc379174321)

[**2.0 INTRODUCTION** 15](#_Toc379174322)

[**2.1 Related Works:** 15](#_Toc379174323)

[**RFID Based Attendance Management System** 15](#_Toc379174324)

[**Integrated System for Monitoring and Recognizing Students during Class Session** 16](#_Toc379174325)

[**Wireless Fingerprint Based College Attendance System Using Zigbee Technology** 17](#_Toc379174326)

[**Fingerprint Based Attendance and Management Systems** 18](#_Toc379174327)

[CHAPTER THREE 20](#_Toc379174328)

[METHODOLOGY AND SYSTEM DESIGN 20](#_Toc379174329)

[**3.0 INTRODUCTION** 20](#_Toc379174330)

[**3.1 System Design** 20](#_Toc379174331)

[**Hardware Specification:** 20](#_Toc379174332)

[**NodeMCU ESP8266:** 20](#_Toc379174333)

[**ZAS620\_M5 Fingerprint Scanner:** 21](#_Toc379174334)

[**0.96″ I2C OLED Display:** 24](#_Toc379174335)

[**Software Specification:** 25](#_Toc379174336)

[**PHP Programing Language:** 25](#_Toc379174337)

[**Arduino IDE:** 26](#_Toc379174338)

[**WAMP PACKAGE:** 26](#_Toc379174339)

[CHAPTER FOUR 29](#_Toc379174340)

[4.0 IMPLEMENTATION AND RESULTS 29](#_Toc379174341)

[**4.1 INTRODUCTION** 29](#_Toc379174342)

[**4.2 IMPLEMENTATION** 29](#_Toc379174343)

[**1. Setting up the Website** 29](#_Toc379174344)

[**2. Circuit Diagram of Portable IoT based Fingerprint Biometric Attendance System** 31](#_Toc379174345)

[**3. Source Code/Program** 32](#_Toc379174346)

[**4.3 RESULT** 33](#_Toc379174347)

[**Registration of users:** 33](#_Toc379174348)

[**Authentication of Users:** 35](#_Toc379174349)

[CHAPTER FIVE 37](#_Toc379174350)

[**5.0 CONCLUSION AND RECOMMENDATIONS** 37](#_Toc379174351)

[**5.1 CONCLUSION:** 37](#_Toc379174352)

[**5.2 RECOMMENDATIONS:** 38](#_Toc379174353)

[**5.3 REFERENCES:** 39](#_Toc379174354)

# 

# **CHAPTER ONE**

# **1.0 INTRODUCTION**

## **1.1 Project Background**

Student academic attendance is very important since it will affect the students from gaining knowledge and skills as well as their grades. This project has related about the student attendance system through the matching of their fingerprint to confirm their attendance. The main purpose of carrying out this project is to develop a hybrid student attendance system for which electronic circuitry is developed to obtain the attendance of student by fingerprint and post/review the attendance results using web-based student attendance system. As we know, there is one and only one fingerprint occurs in the world for each person which will never has duplication. So, fingerprint attendance system can be known as the best authentication to detect the individual student attendance record. In addition, according to the technology nowadays, it is not unusual anymore to take the attendance of students through their fingerprint.

Nowadays, most universities and colleges are still using the traditional attendance system which requires student to sign on a piece of paper every time they attend a class throughout the whole semester. Using the traditional attendance system, we can obviously see that there are few problems such as it will be no backup for the attendance records once the lecturer accidentally lost the attendance sheet, course mate help those who did not attend the class sign the attendance which also known as buddy-signing as well, analyzing and tracking student performances based on attendance factor is hard, student lack of knowledge and skills due to the poor attendance in attending classes etc. It is important to overcome these problems since it will help in improving the academic performance of students as well as the teaching environment of the lecturers. Hence, the purpose of carrying out this project is to prevent unwanted situation occur and to find out the problems that causes these problems as well as find the solutions to overcome these problems.

By implementing the developed system, lecturers will no more facing the empty classroom every time while they are lecturing in front the stage. Other than that, student will not be able to ask their buddy to sign for them anymore since the system requires their fingerprint to prove their attendance in the class. In addition, it will be easier to evaluate and analyze the student performance based on their attendance since the system will record the attendance more accurately and efficiently with minimum possible error. Furthermore, student academic performance will increase as well since they cannot fake their attendance through the developed system which means they have to attend all the classes in order to prevent them from get bar.

## **1.2 Motivation and Problem Statement**

### **1.2.1 Motivation**

The motivation to develop this project is to solve some problems that are currently occurring in every colleges/universities. This project purpose is to improve the current paper-based traditional attendance management system that is still in use by many colleges and universities. From the observation, most of the problems found are normally caused by the use of traditional attendance system in these colleges and universities. Therefore, a fingerprint-based student attendance management system will be developed in order to solve these problems. The system is believed will be needed in order to improve the ways the colleges/universities in managing their student’s attendance.

Since most of the colleges/universities still using the traditional attendance system, so, a bold assumption is made which most of the problems faced by these colleges/universities are almost same. In addition, this project will be able to reduce the workload of every lecturer in key-in the student’s attendance records to the system at every end of semester since this system will record all student’s attendance accurately and automatically in every classes attended by students throughout the whole semester. Besides that, students have paid the colleges/universities in order to gain knowledge that helps them in building up their future career. Therefore, every colleges/universities must provide the responsibilities in ensuring their students will really attend all the classes for the subjects they had registered.

### **1.2.2 Problem Statement**

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

Throughout the whole semester, lecturer will only record and evaluate the student attendance through a piece of attendance sheet. Almost last few weeks before the semester end, the student attendance will be key-in to the current system by lecturer in order to generate the bar-list report. But if the lecturer lost the attendance sheet, which mean the record will be lost as well and lecturer will end up unable to enter the correct attendance records to the system at the last few weeks of the semester.

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

Most of the time, lecturer facing a problem which the classroom is empty but the attendance list is full. It is because most of the student will only attend the class for the first few weeks but after then they will request their friends who always attend the class to help them sign the attendance. Since lecturer always busy in lecturing and have no time to check their attendance one-by-one, so students take advantages from this point to help their friends sign.

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

In evaluating an individual student academic performance, it is important to review back their attendance records. It is because through the attendance record, lecturer may easily get to know whether the student with poor performance is result from poor attendance factor or due to another factor. Without correct and accurate student attendance, it is hard to evaluate the real factor of poor performance.

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

Student who absent from the class will not be able to learn what lecturer had taught in the classes which may result them to know nothing about the subject and end-up with poor academic performances. Without the student participation in a class, they may unable to absorb what lecturer teaches in the class and at the same time, it will affect the passing rate of that subject as a result.

## **1.3 Project Objectives**

In developing this system, some project objectives had been specified. The main purpose of this project is to improve the current existing student attendance system that in use by most of the colleges/universities by develop a fingerprint-based student attendance management system. Some objectives of this project had been identified and listed below.

i. To replace the current existing student attendance system process to fully computerized and automated student attendance system.

ii. To develop a web-based student attendance system in displaying every student attendance results effectively.

iii. To eliminate the chances for student to ask their buddy sign attendance for them through the implementation of fingerprint attendance system.

## **1.4 Scope of the Study**

The scope of this work is to develop a Portable Fingerprint Student Attendance System that will improve how attendance management is done by using ﬁngerprint as a form of authentication for proof of attending a class. The system will be a browser based application developed using PHP as the preferred programming language for building the user interface and MySQL Server for database design. It does not cover other aspects of biometric.

# **CHAPTER TWO**

# **LITERATURE REVIEW**

## **2.0 INTRODUCTION**

A literature review can be refers to as a review of current system that the researcher had done previously and the review of the system that will be developed. Literature review also focuses on the knowledge and ideas established on a topic as well as their strengths and weaknesses. Nowadays, technology is getting better and better to replacing the traditional system to speed up the process by introducing the computerized system. There are few types of attendance system that had been introduced nowadays in school, college, and university.

## **2.1 Related Works:**

### **RFID Based Attendance Management System**

In the article paper of “RFID Based Attendance Management System” (Microtronics Technologies, 2013), it had known that the attendance is needed to be taken in several places like school, college, university, and workplaces. This article paper main objectives had concerned about to replace the old traditional attendance system technology with Radio Frequency Identification (RFID) technology. It is carry out to overcome some existing problems occur in the traditional attendance system. In the article paper, it also mentioned that the RFID system is developed and is suitable to take the attendance of the students as well as employees. There are two modules introduced in the article which includes reader module and RFID module. In details, each student/employee must have a valid RFID card of RFID tags with them in order to communicate with the RFID reader placed on their workplace/school.

As mentioned in the article, the RFID reader will automatically detect the student/employee attendance and record it while the RFID card gets closer to the RFID reader which means it is using the non-contact type of reader and passive types of card. From the article paper, we can get to know that the attendance system using RFID technology is much better than the traditional attendance system in school/workplace as almost whole the system is done in automation and with high transparency process.

However, there is some drawback that can found from the solution in using RFID technology in the attendance system. First of all, the system will require the student/employee to bring the RFID cards always with them while they are in class or workplace in order to check-in or check-out for the attendance. If the student/employee lost their card, they may need to go to the office to make a new card which will cause them to pay for the lost as well as waiting for the new card to be generated and pass to them.

As we know, student will normally attend a few different classes per day which mean they will need to tell the lecturer if their card had been lost and will require them to report to the faculty by themselves with lecturer approval as evidence in order to gain back their attendance as the system do not provide a manual key in function for the lecturer which may lead to complex process.

### **Integrated System for Monitoring and Recognizing Students during Class Session**

In the journal paper of “Integrated System for Monitoring and Recognizing Students during Class Session” (Mohammad A. et al., 2013), it had known that the attendance system using face recognition is more efficient than other student attendance system methods. The journal paper main objectives had concerned about to replace the manual attendance record system with the face recognition technology in order to eliminate the waste of using paper and response time from students.

As mentioned in the journal paper, face detection is the best among all the biometric attendance system because face can represent the identity of an individual. In the journal paper, it has mentioned that the picture of whole class will be taken by classroom’s camera and upload to the system to do face filtering and then the attendance of the student will be checked automatically by the system once the face matching of a student is successfully performed. From the journal paper, we can get to know that the attendance system using face recognition technology is much better than the manual attendance system in school as the lecturer just requires to active the classroom’s camera that allocated inside the classroom in order to capture the picture of whole class.

However, there is some drawback that can found from the solution in using face recognition technology in the attendance system. First of all, the system will require the lecturer to manually upload photo to the system in order to complete the attendance through face recognition process. Since nowadays people talking about mobility and automation, manually control is not a best solution for the system as it still can be improved.

### **Wireless Fingerprint Based College Attendance System Using Zigbee Technology**

In the journal paper of “Wireless Fingerprint Based College Attendance System Using Zigbee Technology” (Talaviya G. et al., 2013), it had known that the attendance system using fingerprint recognition is more efficient than the manual attendance system since it provide more automation in managing the attendance of the students. The journal paper main objectives had concerned about to make use of fingerprint-based attendance system in marking the attendance of the students who attending the classes for purpose to save the time taken to record down every students attendance and fasten the report generation.

In the fingerprint recognition technology, students will require to register their fingerprint into the database for future matching while they attend every class. Other than that, hardware required in implementing the fingerprint attendance system can be easily acquired compare to other biometric method as fingerprint recognition is very common in use nowadays in the community

However, there is some drawback that can found from the solution in using fingerprint technology in the attendance system. First of all, the journal paper had mentioned that they did not provide manual key-in feature in their attendance system which means those students who come late to the class with reason will still consider absent since manually key-in is not provided.

### **Fingerprint Based Attendance and Management Systems**

Walia and Jain (2016) conducted a study that examines the importance of using fingerprint systems in monitoring educational attendance using GSM and LabView technological systems. The study is based on arguments that traditional educational activities to record student attendance are no longer robust and secure. Hence, it proposes that using fingerprint systems will help in ensuring a secure and robust capture of student attendance information. The study also highlights that using a fingerprint system will help in reducing costs and that its performance can be easily measured in terms of how fast, secure, accurate and user friendly it is. As a result, the study proposes that such problems can be solved by using biometric systems which are made of three finger sensors. That is, an optical finger sensor, ultrasonic finger sensor and a capacitive finger sensor. The results of the study showed that using biometric systems will help in promoting efficiency in capturing attendance information as well as detecting fraud. The results also showed that the prototype biometric system produced using GSM and LabView is user friendly, cost effective and makes it easy to analyze the captured information.

From the above analysis, it can therefore be seen that fingerprint systems play an important role of capturing attendance information. The use of fingerprint systems can thus be said to be an improvement that was made over conventional attendance recording systems such as calling names and papers as well as improvements over the RFID readers. However, it can also be deduced using the above literature that the combining fingerprint systems with other technological devices and systems such as Wi-Fi helps to enhance the functionality of the fingerprint systems. Conclusions can also be made that having a damaged skin and wrongly placing a fingerprint on the scanner can affect the ability of biometric system to read and capture a person’s fingerprint.

# **CHAPTER THREE**

# **METHODOLOGY AND SYSTEM DESIGN**

## **3.0 INTRODUCTION**

The methodology is known as a set of procedures. This chapter will cover the methods used to build this program. From problem analysis to a system designed to achieve the goals of the project mentioned earlier in this research report. In fact this approach is an important part of ensuring the successful completion of the process

## **3.1 System Design**

The system was designed basing on windows environment. PHP programming language was used to design the user interfaces (front end) while MySQL as a DBMS was used to design a database for storing data thereafter a logical connection was established. At the same time test plan were prepared, test plan describes the various tests which will be carried out on the system after completion of development thus achieving objective which is to design a new computerized **system.**

### **Hardware Specification:**

#### **NodeMCU ESP8266:**

NodeMCU is an IOT based microcontroller. The included firmware in it runs on the ESP8266 Wi-Fi SoC from Espressif Systems and the hardware is based on the ESP-12 module.

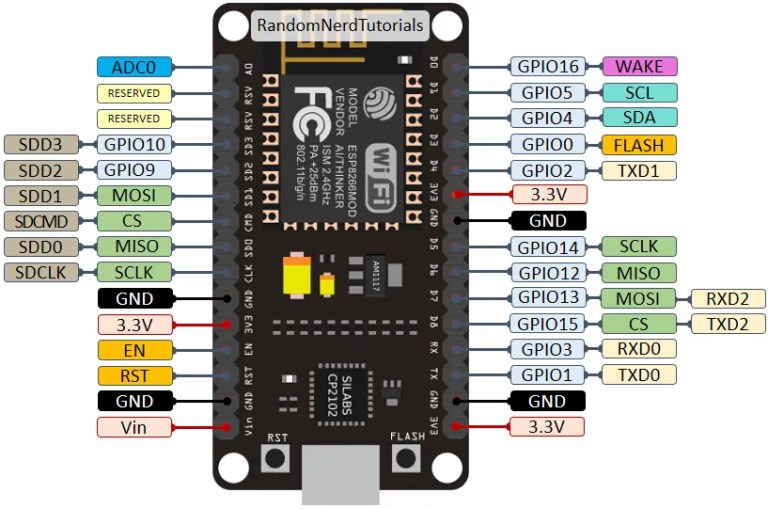
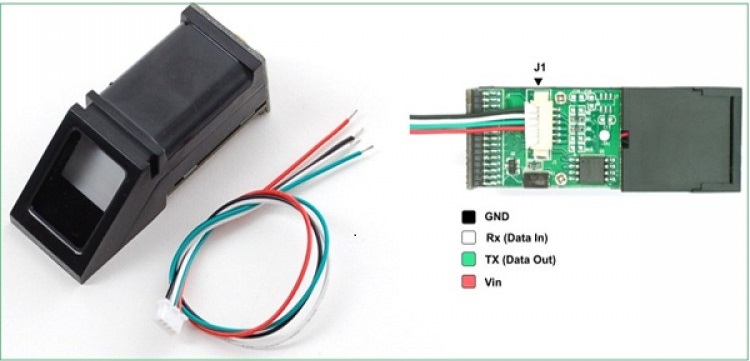


Fig. 1. Physical overview of NodeMCU microcontroller

It has a memory of 128KBytes and storage of 4Mbytes. It runs on USB power system. Arduino C/C++ codes run in this microcontroller and it’s built in Wi-Fi system has enabled it to be used in IOT platforms. We have used this microcontroller to send all the information of the students wirelessly to the database. It also enables the fingerprint sensor to communicate with the server making the whole system usable portably and its smaller size makes the system lighter.

#### **ZAS620\_M5 Fingerprint Scanner:**

Introduction this is a fingerprint sensor module with TTL UART interface for direct connections to microcontroller UART or to PC through MAX232 / USB-Serial adapter. The user can store the fingerprint data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The Fingerprint module can be directly interfaced with any microcontroller as well as Arduino Board. This optical biometric fingerprint reader with great features and can be embedded into a variety of end products like access control system, attendance system, safety deposit box, car door locking system.

**Operation Principle:**

Fingerprint processing includes two parts: fingerprint enrollment and fingerprint matching (the matching can be 1:1 or 1: N).

When enrolling, the user needs to enter the finger two times. The system will process the two-time finger images, generate a template of the finger based on processing results and store the template. When matching, the user enters the finger through the optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, the system will compare the live finger with specific template designated in the Module; for 1: N matching, or searching, the system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

**Features:**

1. Integrated image collecting and algorithm chip together, All-in-one

2. The fingerprint reader can conduct secondary development, can be embedded into a variety of end products

3. Low power consumption, low cost, small size, excellent performance

4. Professional optical technology, precise module manufacturing techniques

5. Good image processing capabilities can successfully capture image up to resolution 500 dpi

**Specifications:**

1. Fingerprint sensor type: Optical

2. Sensor Life: 100 million times

3. Static indicators: 15KVBacklight: bright green

4. Interface: USB1.1/UART (TTL logical level)

5. RS232 communication baud rate: 4800BPS~115200BPS changeable

6. Dimension: 553221.5mm

7. Image Capture Surface 15—18(mm)

8. Verification Speed: 0.3 sec 9. Scanning Speed: 0.5 sec

10. Character file size: 256 bytes

11. Template size: 512 bytes

12. Storage capacity: 250

13. Security level: 5 (1, 2, 3, 4, 5(highest))

14. False Acceptance Rate (FAR):0.0001%

15. False Rejection Rate (FRR): 0.1%

16. Resolution 500 DPI

17. Voltage: 3.6-6.0 VDC

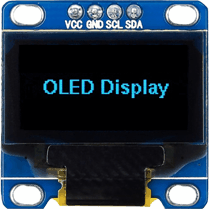
18. Working current: Typical 90 mA, Peak 150mA

19. Matching Method: 1: N

20. Operating Environment Temperature: -20 to 45° centigrade

#### **0.96″ I2C OLED Display:**

This is a 0.96 inch blue OLED display module. The display module can be interfaced with any microcontroller using SPI/IIC protocols. It is having a resolution of 128×64. The package includes display board, display, and 4 pin male header pre-soldered to board. OLED (Organic Light-Emitting Diode) is a self-light-emitting technology composed of a thin, multi-layered organic film placed between an anode and cathode. In contrast to LCD technology, OLED does not require a backlight. OLED possesses high application potential for virtually all types of displays and is regarded as the ultimate technology for the next generation of flat-panel displays.



**Specifications:**

* OLED Driver IC: SSD1306
* Resolution: 128 x 64
* Visual Angle: >160°
* Input Voltage: 3.3V ~ 6V
* Compatible I/O Level: 3.3V, 5V
* Mini Size: 2.7 x 2.8cm
* Only Need 2 I/O Port to Control
* Fully Compatible with Arduino
* Working temperature: -30°C ~ 70°C Module volume ( generous ): 27.0 x 27.0 x 4.1mm
* Factory configured for SPI protocol (can be easily changed to IIC)

### **Software Specification:**

#### **PHP Programing Language:**

For the development of user interface, we used PHP is a general-purpose scripting language geared toward web development. It was originally created by Danish-Canadian programmer Rasmus Lerdorf in 1994. PHP originally stood for Personal Home Page, but it now stands for the recursive initialism PHP: Hypertext Preprocessor.

PHP code is usually processed on a web server by a PHP interpreter implemented as a module, a daemon or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code – which may be any type of data, such as generated HTML or binary image data – would form the whole or part of an HTTP response. Various web template systems, web content management systems, and web frameworks exist which can be employed to orchestrate or facilitate the generation of that response. Additionally, PHP can be used for many programming tasks outside the web context, such as standalone graphical applications and robotic drone control. PHP code can also be directly executed from the command line.

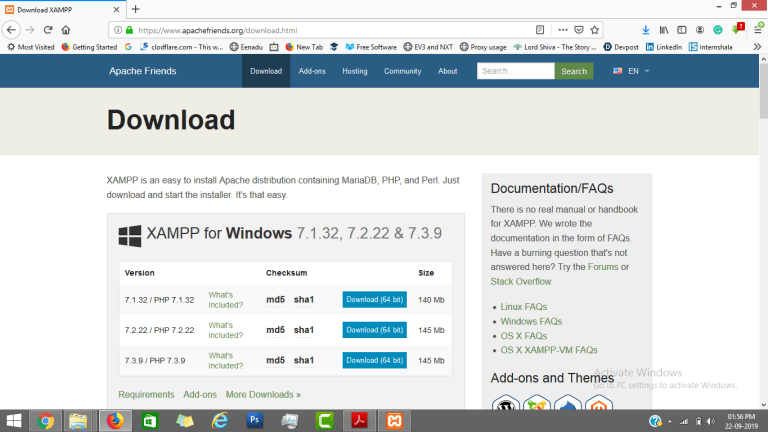
#### **Arduino IDE:**



Arduino IDE is a cross-platform software application where we can write programs in C, C++, and java. It is the only platform available for the programming of Arduino boards such as Arduino UNO, NodeMCU, etc. It contains different types of library files that are required for different types of sensor coding. Arduino IDE makes programming easy by providing several example codes and we have to modify it according to our need, also it contains different libraries for different sensors.

#### **WAMP PACKAGE:**

WAMP is package of independently-created programs installed on computers that use a Microsoft Windows operating system. The interaction of these programs enables dynamic web pages to be served over a computer network, such as the internet or a private network. "WAMP" is an acronym formed from the initials of the operating system (Windows) and the package's principal components: Apache, MySQL and PHP. Other programs may also be included in a package, such as phpMyAdmin which provides a graphical user interface for the MySQL.



Apache acts as web server. Its main job is to parse any file requested by the browser and display the correct results according to the code within that file. PHP originally stands for "Hypertext Preprocessor". PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. PHP is a scripting language, as opposed to a programming language: PHP was designed to write Web scripts, not standalone applications. PHP scripts run only after an event occurs—for example, when a user submits a form or goes to a URL. PHP is server-side, that is, everything PHP does occurs on the server. A Web server application, like Apache, is required and all PHP scripts must be accessed

When user requests page written in php, Apache server reads the php code that contains MySQL queries and then processes it according to its scripted directions. These queries cause data to be retrieved from MySQL database to be sent to the user through the server. Generally, only a user with administrator privileges can install a WAMP package. This means that these packages cannot be installed to a hosted service but only to a computer to which the user has complete access. So, for the attendance system WAMP package should be installed in the server of the system, especially to avoid problems that could take place when host database to be linked to remote server.

# **CHAPTER FOUR**

# **4.0 IMPLEMENTATION AND RESULTS**

## **4.1 INTRODUCTION**

For IoT based attendance system first, we created the database with multiple tables including users, users\_logs and admins. We have designed and created our own portable attendance device with R307 fingerprint sensor, ESP8266 NodeMCU, OLED0.96 display and power-bank. For every lecture, this portable device is circulated in the class to take the attendance of the students. Also, we have designed the GUI of the attendance system using PHP.

This GUI will be used as a dashboard for teachers, where they can see the attendance of their lectures and able to get the attendance report of every student for conducted classes from a remote place.

## **4.2 IMPLEMENTATION**

1. Setting up the website

2. Circuit Diagram and hardware connections

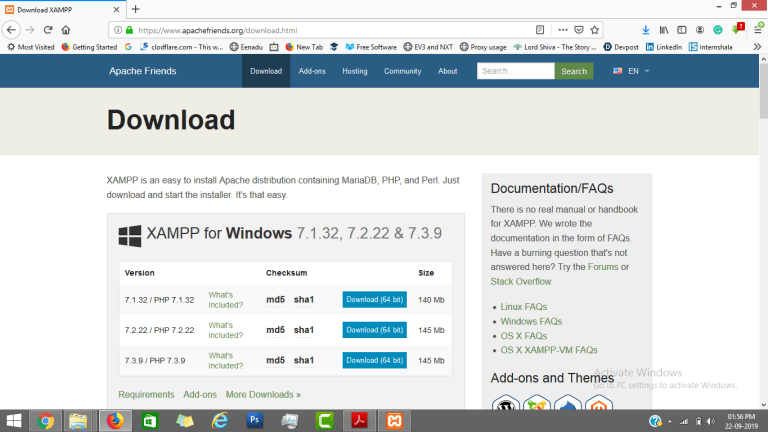
3. Source code development

### **1. Setting up the Website**

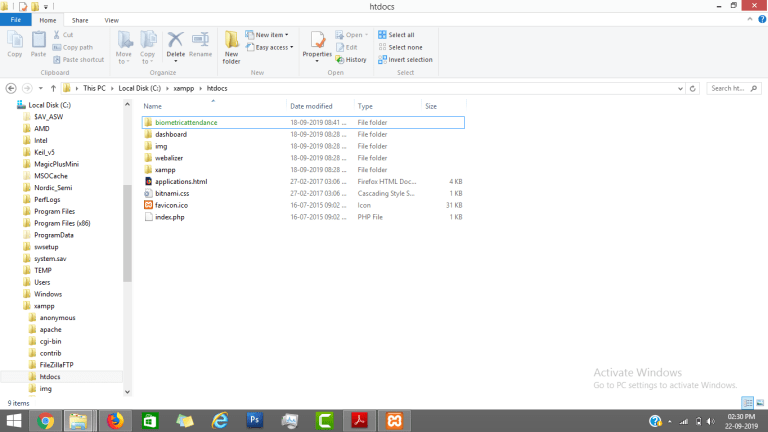
The website used in this project can be configured as global/Local. You need to have a unique domain name and to set up a global website.

If you have a website and a server you can simply copy the folder to the cPanel/website file manager and modify the **connectDb.php** and **install.php** files with your website credentials. But having website domain and hosting will cost you more. In case if you don’t want to spend money on website management, then you can configure your website as local and use your own computer as a server to store the data locally in localhost.

For that, you can use any local server provider Xampp or Wamp. In my case I used the Xampp by Download and install XAMPP I will use XAMPP to demonstrate further process. Choose an appropriate file for your operating system. Xampp is available for Windows, Linux Mac.

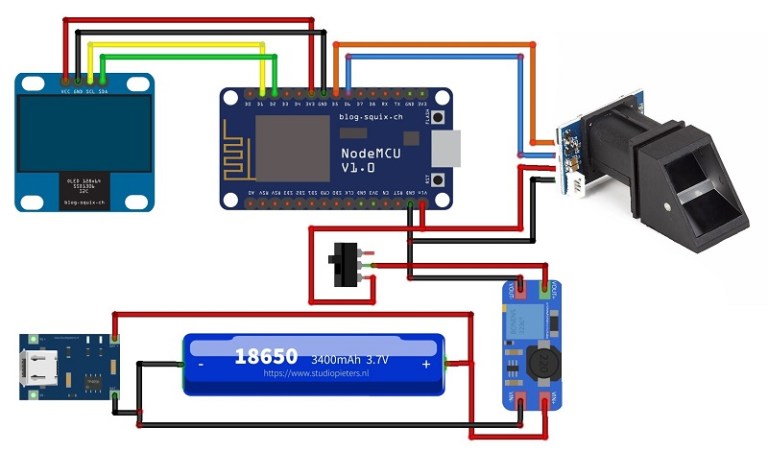


Once the file downloaded successfully install the Xampp, the installation process is very easy, it is like normal software installation only. After successful installation, simply download the file and copy to the folder C:\xampp\htdocs in your computer. This folder is the location where all your website data will store.



### **2. Circuit Diagram of Portable IoT based Fingerprint Biometric Attendance System**

The following circuit diagram shows how an OLED Display & Fingerprint Sensor is interfaced to NodeMCU ESP8266 12E Board.



The above circuit diagram shows how an OLED Display & Fingerprint Sensor is interfaced with NodeMCU ESP8266 12E Board. The I2C pins of OLED Display, i.e. SDA & SCL are connected to NodeMCU D2 & D1 pins respectively. Similarly, the fingerprint sensor is connected to UART pins D5 & D6. The fingerprint sensor TX and Rx wire’s color may vary. So connect it by finding appropriate color wires else the module won’t be detected by NodeMCU. The R305 fingerprint sensor is supplied with 3.3V through pins of NodeMCU. Similarly, connect OLED Vcc pin to 3.3V of NodeMCU.

Additions circuitry and mechanical parts like Battery, Battery management system, Boost converter and a casing. But there will be no change in the Firmware (Source code) we should have rechargeable battery i.e. Li-ion battery whose voltage is not sufficient to drive the R303a Fingerprint sensor. So I decided to add one boost converter (MT3608) to the circuitry to get 5v.

### **3. Source Code/Program**

The source code for the Portable IoT Based Fingerprint Biometric Attendance System using NodeMCU need to do two modifications according to your Wi-Fi Network connection and PC IP.

You have to make sure that the Wi-Fi username and password are provided which is available in the range.

/\* Set these to your desired credentials. \*/

const char \*ssid = "ELECTRICAL"; //ENTER YOUR WIFI SETTINGS

const char \*password = "ELECTRICAL";

Also, change the IP Address if you are using Xampp or change the website domain name if you are using the global website as changed below.

String link = "http://192.168.43.62/biometricattendance/admin/getdata.php"; //computer IP or the server domain

The following libraries must be added via library manager or simply add the following zip files to Arduino libraries folder:

1. OLED GFX Library.

2. SSD1306 Library.

3. Adafruit Fingerprint Sensor Library.

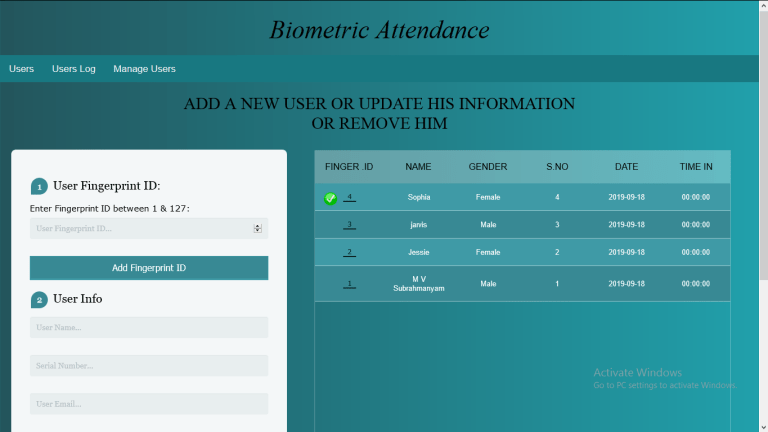
## **4.3 RESULT**

### **Registration of users:**

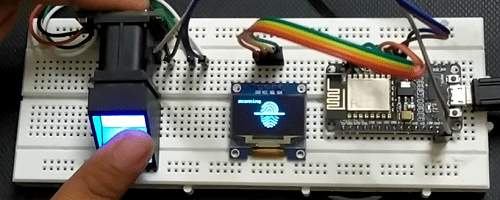
Once the Program successfully uploaded to the NodeMCU, It will boot up with the Adafruit logo and then NodeMCU will try to establish the connection between the Wi-Fi routers which is provided in the program.  Once it gets connected it will display Connected. The same log can be seen on the Serial Monitor as well as in OLED Display.



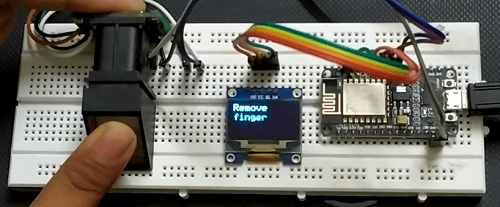
So now you can start the registration process of the user on the website using the following link: <http://localhost/biometricattendance/ManageUsers.php>



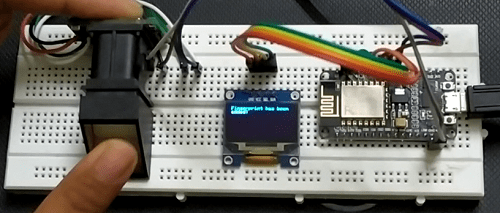
The whole process of registration is explained very well in the video. You can follow the video for the complete registration process. The user fingerprint is taken twice i.e. as mentioned in the datasheet and stored in EEPROM of Fingerprint Sensor. It is to be noted that only 127 fingerprints can be stored in this ZA06\_M5 module.



Pic: User registration Step1\_Scanning



Pic: User registration Step1\_Remove finger

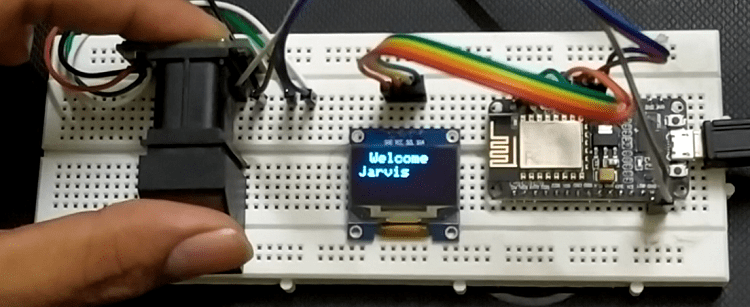


Pic: User registration Step1\_Fingerprint has been added.

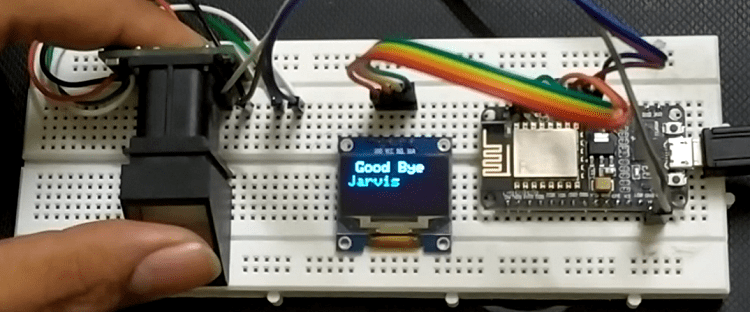
### **Authentication of Users:**

The teacher can login to windows application remotely by entering his/her name, class, and date of lecture to see the attendance of that lecture. The teacher has the rights to update the attendance of the student in case of leave.

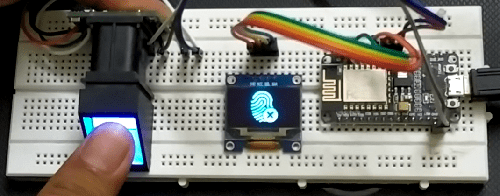
So once the User registration process is completed, you can start scanning and marking the attendance. If a registered user scans his/her finger for the first time on that day, It will display the welcome message as follows.



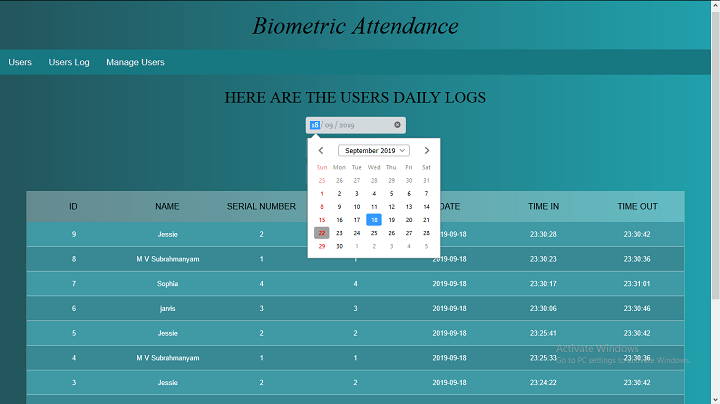
If a registered user scans his/her finger for the second time on that day, It will display the goodbye message as follows.



In case if the fingerprint is not matched or an unregistered candidate tries to authenticate it will display an error message as shown in the figure below.



Finally, you can access the entire Attendance data of the Students/Employee on the website by simply selecting the particular date as shown below, You can also download the same data in excel format by clicking on the Export to Excel button.



# **CHAPTER FIVE**

## **5.0 CONCLUSION AND RECOMMENDATIONS**

## **5.1 CONCLUSION:**

The main aim of this study was to develop a portable fingerprint attendance system that can be used in classroom to verify if a student has authentic proof to sit for an exam. As a result, it can be concluded that traditional attendance systems are no longer effective since they involve a lot of manual activities and process as well as a lot of paperwork.

The biometric attendance system will increase the reliability and accuracy of attendance system. The problem in the manual attendance system for the classrooms is resolved by the IOT based smart attendance system fingerprint scanner. We have design the portable attendance device to circulate in the classroom for taking attendance. Also we have implemented front end windows application as dashboard of attendance system from where teacher can monitor and take attendance report of students. The fingerprint device is circulated in the classroom to take the attendance, and the attendance status is automatically recorded in the database of central attendance server for the corresponding lecture. So, the implemented system will save the time of taking attendance in the class and filling attendance manually on server.

In conclusion, fingerprint recognition attendance system will be developed to replace the traditional attendance system that are currently widely using by many colleges and universities. This project will be considered succeed once hybrid student attendance is developed. This system is designed to make the whole attendance taking process to become more reliable, convenient, efficient, and accurate. Besides that, with the implementation of biometric technology will help in reduce errors and attendance data will be able to compile in easier way. This project is designed to aim in eliminating spotted problems during the initial analysis. The problems spotted are includes buddy-signing, loss of attendance sheet, skip class issue, and hard in analyzing student attendance record from time-to-time.. Last but not least, college/university with good academy students is also very important as it will affect that college/university reputation.

## **5.2 RECOMMENDATIONS:**

Based on the above conclusions, recommendations can therefore be made that the Fingerprint Recognition Student Attendance Management System is only developed for the use of single faculty. In future, it is assumed that this system will be enhanced to be used by all faculties in a university, school, or college. The report generated will only be in the EXCEL file. There is no other available option for lecturer to generate the report.

A student should have two different fingerprints from his two hands linked to the database so as to curb problems that arise when a student has been injured. Besides that, the system developed only can be used on desktop or laptop but smartphone is not recommended for this system. Therefore, in future work, this system should focus more on smartphone development to ease the attendance process. Last but not least, Fingerprint Recognition Student Attendance Management System will still have a lot to improve in order to meet every roles requirement. However, current version is good enough to be implemented to the real life to be used.

## **5.3 REFERENCES:**

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[8]:<https://how2electronics.com/fingerprint-based-biometric-attendance-system-arduino/>

[9]: <https://www.youtube.com/channel/UC6LO26f_9qwysjvSHdVmfrQ/>