

A Project Report on

IOT Based Biometric Attendance System

Submitted in partial fulfillment of the requirements for the award
of the degree of

Bachelor of Engineering

in

Information Technology

by

Dinesh Deshmukh(16204015)
Akash Bamne(16204020)
Nilesh Mohite(16204030)
Yash Bhoir(15104031)

Under the Guidance of

Prof.Ganesh D Gourshete



Department of Information Technology

A.P. Shah Institute of Technology
G.B.Road,Kasarvadavli, Thane(W), Mumbai-400615
UNIVERSITY OF MUMBAI

Academic Year 2018-2019

Approval Sheet

This Project Report entitled “*IOT Based Biometric Attendance System*” Submitted by “*Dinesh Deshmukh*”(16204015), “*Akash Bamne*”(16204020), “*Nilesh Mohite*”(16204030), “*Yash Bhoir*”(15104031) is approved for the partial fulfillment of the requirement for the award of the degree of *Bachelor of Engineering* in *Information Technology* from *University of Mumbai*.

(Prof. Ganesh D Gourshete)
Guide

Prof. Kiran Deshpande
Head Department of Information Technology

Place: A.P. Shah Institute of Technology, Thane

Date:

CERTIFICATE

This is to certify that the project entitled “*IOT Based Biometric Attendance System*” submitted by “*Dinesh Deshmukh*” (16204015), ‘*Akash Bamne*” (16204020), “*Nilesh Mohite*” (16204030), “*Yash Bhoir*” (15104031) for the partial fulfillment of the requirement for award of a degree *Bachelor of Engineering* in *Information Technology*.,to the University of Mumbai,is a bonafide work carried out during academic year 2018-2019.

(Prof.Ganesh D Gourshete)
Guide

Prof. Kiran Deshpande
Head Department of Information Technology

Dr. Uttam D.Kolekar
Principal

External Examiner(s)

1.

2.

Place:A.P.Shah Institute of Technology, Thane

Date:

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Signature)

(Dinesh Deshmukh(16204015))

(Akash Bamne(16204020))

(Nilesh Mohite(16204030))

(Yash Bhoir(15104031))

Date:

Acknowledgement

We have great pleasure in presenting the report on **IOT based Biometric Attendance System** . We take this opportunity to express our sincere thanks towards our guide **Prof. Ganesh D. gourshete** Department of IT, APSIT thane for providing the technical guidelines and suggestions regarding line of work. We would like to express our gratitude towards his constant encouragement, support and guidance through the development of project.

We thank **Prof. Kiran B. Deshpande** Head of Department,IT, APSIT for his encouragement during progress meeting and providing guidelines to write this report.

We thank **Prof. Vishal S. Badgujar** BE project co-ordinator, Department of IT, APSIT for being encouraging throughout the course and for guidance.

We also thank the entire staff of APSIT for their invaluable help rendered during the course of this work. We wish to express our deep gratitude towards all our colleagues of APSIT for their encouragement.

Student Name1:Dinesh Deshmukh
Student ID1:16204015

Student Name2:Akash Bamne
Student ID2:16204020

Student Name3:Nilesh Mohite
Student ID3:16204030

Student Name4:Yash Bhoir
Student ID4:15104031

Abstract

In recent past, the number of applications based on biometric and have been successfully applied to different areas as diverse as education, government offices and industry. The objective of this system is to design and develop a student attendance system used in universities for students. Made to solve manual class attendance monitoring problem in developing countries using IOT and biometric technology. A lecturer has to pass the attendance system to mark attendance of students. Internet of things (IOT) is used to monitor and manipulate the data stored on server. This system not only helps teacher to take attendance is useful for displaying data and information in the form of graphical charts, figures, and bars. It helps to generate visual reporting for the performance or general statistics of student as per students attendance.

Contents

1	Introduction	1
1.1	Problem Statement	1
1.2	Objective	1
1.3	Scope of the Project	2
1.4	Using Biometirc	2
1.5	What is Fingerprint	2
1.6	Why use fingerprints?	3
1.7	Using fingerprint recognition system for attendance management	3
2	Literature Review	4
2.1	Literature Review	4
3	Existing System and Proposed system	6
3.1	Existing System	6
3.2	Proposed System	6
3.3	Hardware Level Design	7
3.3.1	ARDUINO	7
3.3.2	FINGERPRINT MODULE	8
3.3.3	LCD 16 x 2	10
3.3.4	Wifi-Module	12
3.3.5	Push-Button	13
3.4	Software	14
3.4.1	Embedded C	14
3.4.2	Arduino IDE	15
4	Implementation	20
4.1	Use Case Diagram	20
4.2	Block Diagram of Hardware	21
4.3	Features of IOT Based Biometric attendance System	22
4.4	Flow of Working	22
5	Result	24
5.1	Hardware Configuration	24
5.2	Server-Side	25
5.3	Database and Graph	28
5.3.1	Time Table	28
5.3.2	Users	28
5.3.3	Graph	29

6	Conclusions and Future Work	30
6.1	Conclusion	30
6.2	Future Work	30
	Bibliography	31
	Appendix-A	32
	Appendix-A	32
	Publication	36

List of Figures

1.1	Example of a ridge ending and a bifurcation	3
3.1	Arduino	7
3.2	Fingerprint Module	8
3.3	Fingerprint Internal Structure	9
3.4	LCD Display	10
3.5	LCD Pin Structure	11
3.6	LCD Pin	11
3.7	Wifi-Module	12
3.8	Wifi-Module pin Description	13
3.9	Push-Button	13
3.10	Blink Example	16
3.11	Selecting Board	17
3.12	Selecting the serial/COM port	18
3.13	Uploading code	19
4.1	Use Case Diagram	20
4.2	Block Diagram	21
5.1	Hardware Configuration	24
5.2	Hardware Configuration	25
5.3	Admin	25
5.4	Registration of student	26
5.5	Student Registration Successfully	26
5.6	View Attendance	27
5.7	View Attendance	27
5.8	Time-Table	28
5.9	User	28
5.10	Graph	29

List of Tables

3.1	Arduino Specification	8
3.2	LCD Specification	11

List of Abbreviations

PHP:	Hypertext Preprocessor
HTML:	Hypertext Markup Language
CSS:	Cascading Style Sheets
SQL:	Structured Query Language
RDBMS:	Relational Database Management System
GUI:	Graphical User Interface
IOT:	Internet Of Things
LCD:	Liquid Crystal Display

Chapter 1

Introduction

1.1 Problem Statement

Designing a student attendance management system based on fingerprint recognition and faster one to many identification that manages records for attendance in institutes or business organization.

1.2 Objective

Current method of keeping the record of daily attendance update of the students is manual. Manual method have a lots of limitations such as every time a lecture, section or laboratory starts the lecturer or teaching Assistant delays the lecture to record students attendance. This is a lengthy process and takes lot of time and effort, especially if it is a lecture with huge number of students. It also causes a lot of disturbance and interruption when an exam is held. Moreover the attendance sheet is subjected to damage and loss while being passed on between different students of teaching staff. And when the number of students enrolled in a certain course is huge, the lecturers tend to call a couple of students name at random which is not fair student evaluation process either. Finally, these attendance records are used by the staff to monitor the students attendance rates. This process could be easy and effective with a small number of students but on the other hand dealing with the records of a large number of students often leads to human error. So to overcome all these limitations of the current system we are designing a system whose main aim is to mark the students attendance automatically and also with in less time and errors.

1.3 Scope of the Project

In future work the same project can be utilized for several security applications where authentication is needed to access the privileges of the respective system. Providing the visualization of attendance after the attendance gets marked successfully by the student on the system itself. We can also use android application on parent side in future so that timely update of their child in school can be send to them on their android phones using iot. We can also trace a particular student in an organization quickly with the help of this system. Application of this system is that it is capable of marking the presence of employees at any workplace and this attendance will be useful for calculating their monthly payment.

1.4 Using Biometric

Biometric Identification Systems are widely used for unique identification of humans mainly for verification and identification. Biometrics is used as a form of identity access management and access control. So use of biometrics in student attendance management system is a secure approach. There are many types of biometric systems like fingerprint recognition, face recognition, voice recognition, iris recognition, palm recognition etc. In this project, we used fingerprint recognition system

1.5 What is Fingerprint

A fingerprint is the pattern of ridges and valleys on the surface of a fingertip. The endpoints and crossing points of ridges are called minutiae. It is a widely accepted assumption that the minutiae pattern of each finger is unique and does not change during ones life. Ridge endings are the points where the ridge curve terminates, and bifurcations are where a ridge splits from a single path to two paths at a Y-junction. Figure 1 illustrates an example of a ridge ending and a bifurcation. In this example, the black pixels correspond to the ridges, and the white pixels correspond to the valleys.

When human fingerprint experts determine if two fingerprints are from the same finger, the matching degree between two minutiae pattern is one of the most important factors. Thanks to the similarity to the way of human fingerprint experts and compactness of templates, the minutiae-based matching method is the most widely studied matching method.

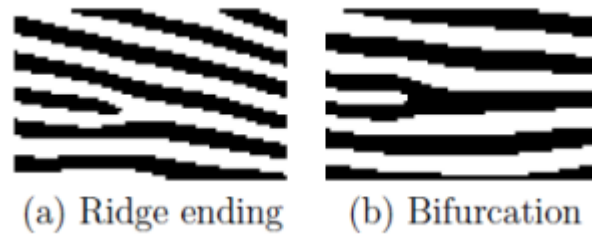


Figure 1.1: Example of a ridge ending and a bifurcation

1.6 Why use fingerprints?

Fingerprints are considered to be the best and fastest method for biometric identification. They are secure to use, unique for every person and does not change in ones lifetime. Besides these, implementation of fingerprint recognition system is cheap, easy and accurate up to satisfiability. Fingerprint recognition has been widely used in both forensic and civilian applications. Compared with other biometrics features , fingerprint-based biometrics is the most proven technique and has the largest market shares . Not only it is faster than other techniques but also the energy consumption by such systems is too less.

1.7 Using fingerprint recognition system for attendance management

Managing attendance records of students of an institute is a tedious task. It consumes time and paper both. To make all the attendance related work automatic and on-line, we have designed an attendance management system which could be implemented in NIT Rourkela. It uses a fingerprint identification system developed in this project. This fingerprint identification system uses existing as well as new techniques in fingerprint recognition and matching. A new one to many matching algorithm for large databases has been introduced in this identification system.

Chapter 2

Literature Review

2.1 Literature Review

The old method for taking attendance is manual work. But this method takes a lot of time and there are chances that the attendance is not marked properly. The second method is fingerprint recognition. But for some people it is intrusive, because it is still related to criminal identification. Another disadvantage of fingerprint recognition is that it can make mistakes with the dryness or dirt of the fingers skin. The another method for taking attendance is iris recognition. The disadvantage of this method is that it is also intrusive and a lot of memory is required for data storage. There are various methods for facial recognition like eigenface method. Various extensions have been made to the eigenface method such eigen features. This method combines facial metrics (measuring distance between facial features) with the eigenface representation. Another method similar to the eigenface technique is 'fisherfaces' which uses Linear discriminant analysis. This method for facial recognition is less sensitive to variation in lighting and pose of the face than using eigenfaces. Fisherface utilities labelled data to retain more of the class specific information during the dimension reduction stage. A further alternative to eigenfaces and fisherfaces is the active appearance model. This approach use an Active Shape Model to describe the outline of a face. By collecting many face outlines, Principal Component Analysis can be used to form a basis set of models which, encapsulate the variation of different faces. Many modern approaches still use Principal Component Analysis as a means of dimension reduction or to form basis images for different modes of variation. Cheng, et al. developed the system to manage the context of the students for the classroom lecture by using note PCs for all the students. Because this system uses the note PC of each student, the attendance and the position of the students are obtained. However, it is difficult to know the detailed situation of the lecture. our system takes images of faces. In recent decade, a number of algorithms for face recognition have been proposed, but most of these works deal with only single image of a face at a time. By continuously observing of face information, our approach can solve the problem of the face detection, and improve the accuracy of face recognition.

[1] Dipali Patil, Pradnya Gavhane, Priyesh Gharat, Prof Urvashi Bhat IOT Based Smart Attendance System Using GSM published in Seventh International Conference on recent trends in Engineering, science and Management (In CULT 2017) 1877-0428 2017. They have implemented the smart attendance system using GSM. This system is very useful to take the attendance in schools and colleges to solve regular lecture attendance monitoring problem in developing countries using direct GSM/GPRS with IOT technology. The application of IOT to student attendance monitoring as developed and deployed in this paper is capable of eliminating time wastage during manual collection of attendance and an opportunity for the educational administrators to compile the attendance effectively..

[2] Piyush Devikar¹, Ajit Krishnamoorthy², Aditya Bhanage³, Mohit Singh Chauhan⁴ Department of Electronics and Telecommunication Engineering, Vivekanand Education Societys Institute of Technology, Mumbai University at India ICRITCSA M S Ramaiah Institute of Technology, Bangalore Vol. 5, Special Issue 2, October 2016. They have implemented this system using various technologies like IoT, Fingerprint Scanner, image processing etc. The proposed system involves a biometric attendance system that integrates an ESP8266 NodeMCU breakout board and a fingerprint scanner. The fingerprint scanner processes the users fingerprint to verify the students attendance. NodeMCU uploads the attendance data to Google Spreadsheet using a service called PushingBox API.

[3] D.Narendharsingh¹, Anusha Reddy² and Dr.Sharma Sudhir Kumar "IOT BASED WIRELESS ATTENDANCE MANAGEMENT SYSTEM USING FINGER PRINT RECOGNITION" in International Journal of Latest Trends in Engineering and Technology Vol.(7)Issue(3), pp. 410-418. In this system two hardware devices are there, first one is a handheld device which will be there in every classroom for taking attendance and second one will be a local server for all handheld devices in the network. Handheld devices are designed on Arduino microcontroller, 16x2 Liquid Crystal Display (LCD), Zig-Bee module, Fingerprint module. Local server is Raspberry Pi web server interfaced with Zig-Bee series 2 module based on an IEEE 802.15 standard.

[4] Nadar Prince, Abhishek Sengupta, Ms.Keerthi Unni "Implementation of IoT Based Attendance System on a Dedicated Web-Server" at International Journal of Scientific Engineering Research, Volume 7, Issue 6, June-2016 In this system they have implemented the client side module for fingerprint attendance using arduino with R305 fingerprint scanner. They further interfaced the arduino with esp8266 and with nokia 5110 display to display the result. At the server side They created different web pages using html, php, javascripts etc. to show the data regarding attendance. We learned from this system how to interface the arduino with different devices like nokia display.

Chapter 3

Existing System and Proposed system

3.1 Existing System

In colleges and schools taking daily attendance of the students is an important task. Usually the method of taking attendance is manual. Due to manual attendance system in colleges and schools there is a lots of chances of making mistakes in taking daily attendance of the students this method is difficult to do and also a time consuming process.so due to all these limitations inThe proposed system is used for taking the daily attendance of the students by using fingerprint of the students and managing the attendance in suitable environments like colleges The faculty activates the system for marking attendance and provides it to the students when enter the classroom attendance of the students will be marked in the database after the fingerprint detection current system it is necessary to design a system for managing automatic attendance without any mistakes.

3.2 Proposed System

We propose a system that provides a solution to the above mentioned problems by automating the process of attendance management that can be used during exams or a lecture which will save effort and time. The proposed system is used for taking the daily attendance of the students by using fingerprint of the students and managing the attendance in suitable environments such as colleges and offices. The system architecture is shown in above Figure consist of Arduino Uno as the main component in the project which will perform all the controlling functions.Xampp Software in PC which is interfaced with the controller using Wifi Module for the database storage.The LCD display is used to display students ID and also whether the students is present or not and user interface.The Wifi module is used for wireless communication between the controller and web application. The proposed system is used for taking the daily attendance of the students by using fingerprint of the students and managing the attendance in suitable environments like colleges. The faculty activates the system for marking attendance and provides it to the students when enter the classroom attendance of the students will be marked in the database after the fingerprint detection.

Various Designing components of this system are discussed below.

3.3 Hardware Level Design

3.3.1 ARDUINO



Figure 3.1: Arduino

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

Summary

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
DC Current per I/O Pin	40mA
DC Current for 3.3V Pin	50mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz
Length	68.6 mm
Width	53.4 mm
Weight	25 g

Table 3.1: Arduino Specification

3.3.2 FINGERPRINT MODULE

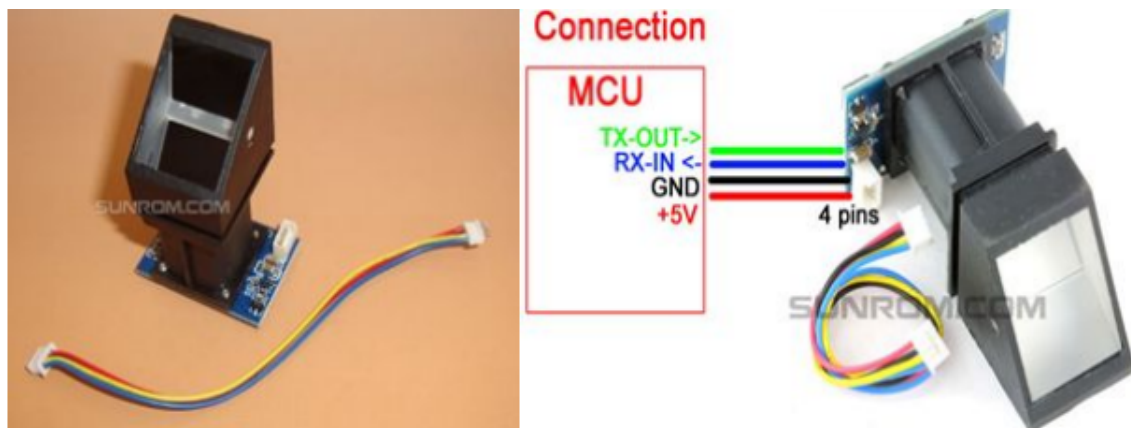


Figure 3.2: Fingerprint Module

Features

- Integrated image collecting and algorithm chip together, ALL-in-One
- Fingerprint reader can conduct secondary development, can be embedded into a variety of end products
- Low power consumption, low cost, small size, excellent performance
- Professional optical technology, precise module manufacturing techniques

- Good image processing capabilities, can successfully capture image up to resolution 500 dpi



Figure 3.3: Fingerprint Internal Structure

Fingerprint processing includes two parts: fingerprint enrollment and fingerprint matching (the matching can be 1:1 or 1:N). When enrolling, 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, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1:N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

3.3.3 LCD 16 x 2



Figure 3.4: LCD Display

Description:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special even custom characters (unlike in seven segments), animations and so on.

Features:

- 5 x 8 dots with cursor
- Built-in controller (KS 0066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

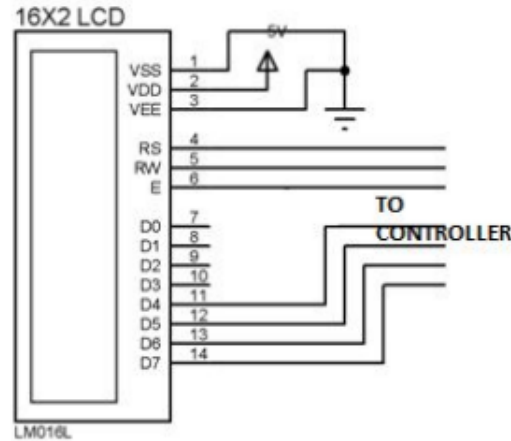


Figure 3.5: LCD Pin Structure

16x2 Liquid Crystal Display which will display the 32 characters at a time in two rows (16 characters in one row). Each character in the display of size 57 pixel matrix, Although this matrix differs for different 162 LCD modules if you take JHD162A this matrix goes to 58. This matrix will not be same for all the 162 LCD modules. There are 16 pins in the LCD module, the pin configuration us given below.

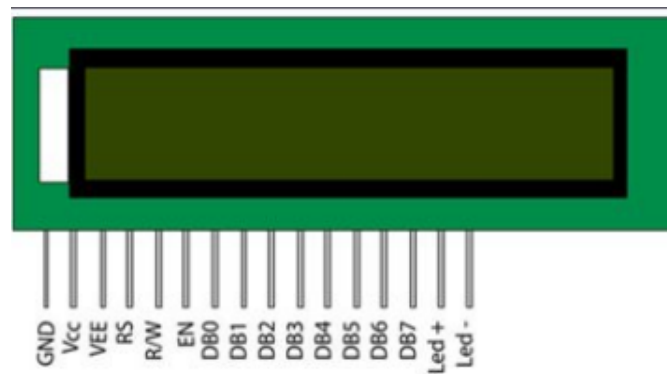


Figure 3.6: LCD Pin

Pin No.	Function	Name
1	Ground 0V	Ground
2	Supply voltage; 5V (4.7V 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	Vee
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write)
6	Sends data to data pins when a high to low pulse is given	Enable

Table 3.2: LCD Specification

3.3.4 Wifi-Module

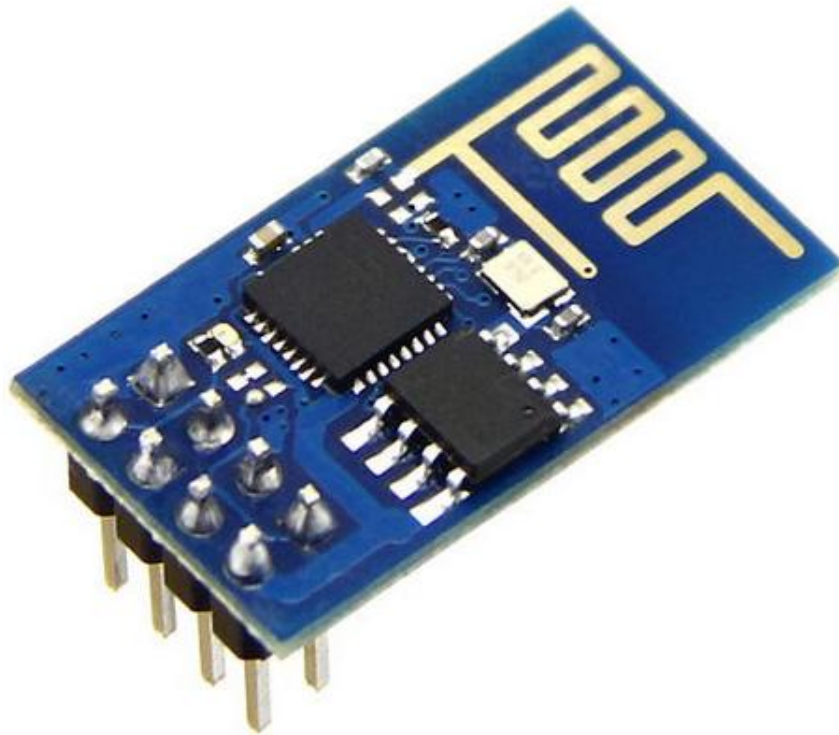


Figure 3.7: Wifi-Module

ESP8266 comes with capabilities of:

- 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2),
- general-purpose input/output (16 GPIO),
- Inter-Integrated Circuit (I²C) serial communication protocol,
- analog-to-digital conversion (10-bit ADC)
- Serial Peripheral Interface (SPI) serial communication protocol,
- IS (Inter-IC Sound) interfaces with DMA(Direct Memory Access) (sharing pins with GPIO),
- UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and
- pulse-width modulation (PWM).

ESP8266-01 Module Pin Description:

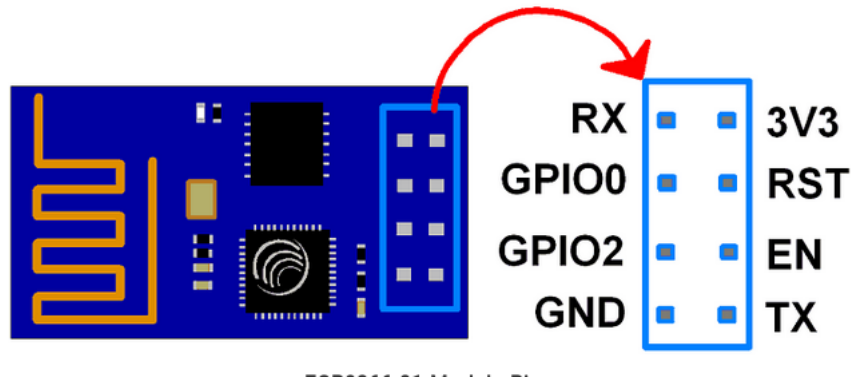


Figure 3.8: Wifi-Module pin Description

3V3:- 3.3 V Power Pin.

GND:- Ground Pin.

RST:- Active Low Reset Pin.

EN:- Active High Enable Pin.

TX:- Serial Transmit Pin of UART.

RX:- Serial Receive Pin of UART.

GPIO0 GPIO2:- General Purpose I/O Pins. These pins decide what mode (boot or normal) the module starts up in. It also decides whether the TX/RX pins are used for Programming the module or for serial I/O purpose.

3.3.5 Push-Button



Figure 3.9: Push-Button

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal.

A switch can only exist in one of two states: open or closed. In the off state, a switch looks like an open gap in the circuit. This, in effect, looks like an open circuit, preventing current from flowing.

Switches with the "push-to-make" (normally-open or NO) mechanism are a type of push button electrical switch that operates by the switch making contact with the electronic system when the button is pressed and breaks the current process when the button is released. An example of this is a keyboard button.

3.4 Software

3.4.1 Embedded C

Introduction to Embedded C:

Looking around, we find ourselves to be surrounded by various types of embedded systems. Be it a digital camera or a mobile phone or a washing machine, all of them has some kind of processor functioning inside it. Associated with each processor is the embedded software. If hardware forms the body of an embedded system, embedded processor acts as the brain, and embedded software forms its soul. It is the embedded software which primarily governs the functioning of embedded systems.

As time progressed, use of microprocessor-specific assembly-only as the programming language reduced and embedded systems moved onto C as the embedded programming language of choice. C is the most widely used programming language for embedded processors/controllers. Assembly is also used but mainly to implement those portions of the code where very high timing accuracy, code size efficiency, etc. are prime requirements.

Use of C in embedded systems is driven by following advantages

- It is small and reasonably simpler to learn, understand, program and debug

- C Compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers.
- Unlike assembly, C has advantage of processor-independence and is not specific to any particular microprocessor/ microcontroller or any system. This makes it convenient for a user to develop programs that can run on most of the systems.
- As C combines functionality of assembly language and features of high level languages, C is treated as a middle-level computer language or high level assembly language
- It is fairly efficient
- It supports access to I/O and provides ease of management of large embedded projects.

3.4.2 Arduino IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards. The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub `main()` into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program `avrdude` to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

Steps to run the basic project in Arduino IDE:

- Launch the Arduino application
- If you disconnected your board, plug it back in

- Open the Blink example sketch by going to: File - Examples - 1.Basics - Blink

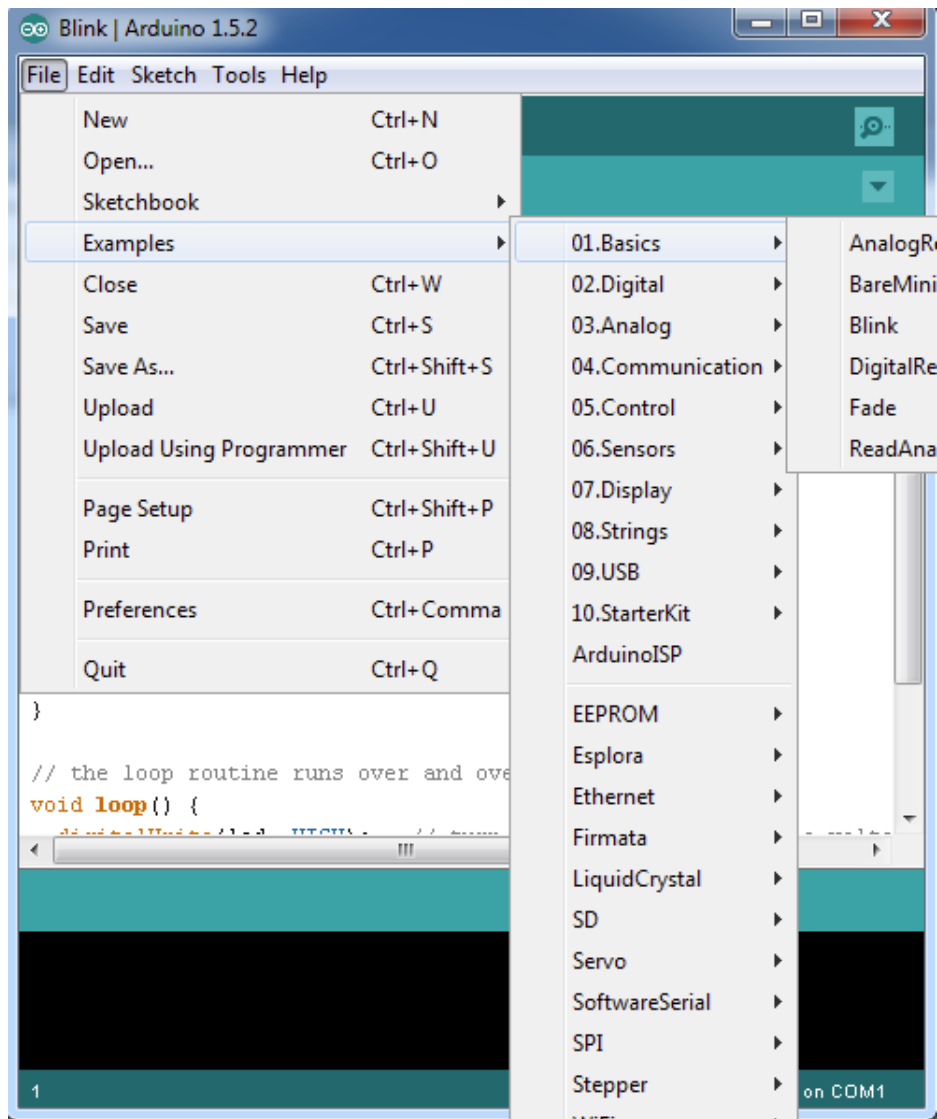


Figure 3.10: Blink Example

- Select the type of Arduino board you're using: Tools - Board - your board type

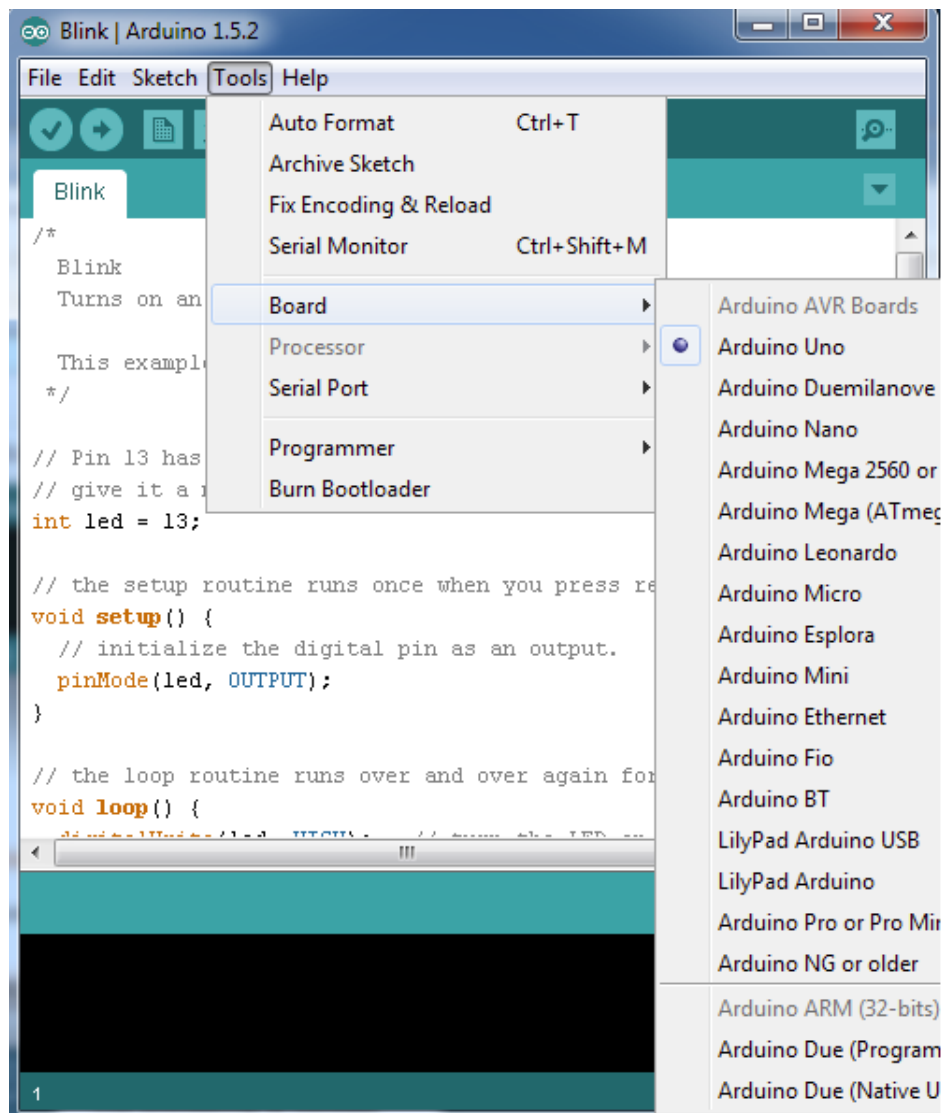


Figure 3.11: Selecting Board

- The serial/COM port that your Arduino is attached to: Tools - Port - COMxx

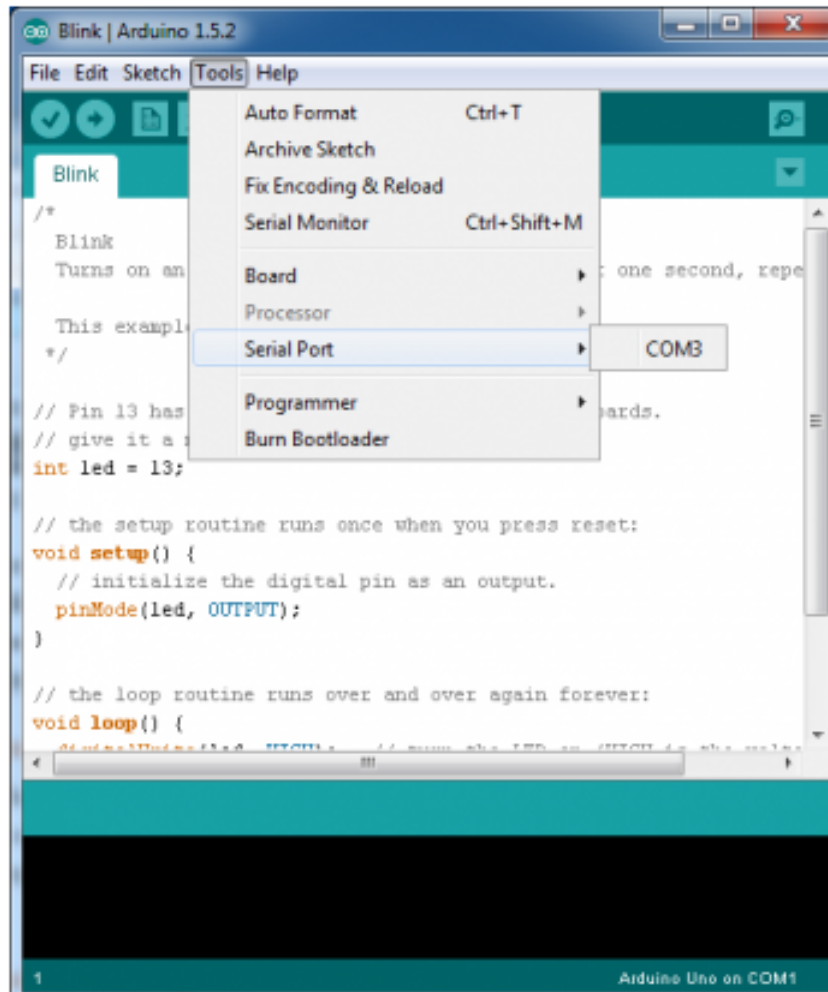


Figure 3.12: Selecting the serial/COM port

- If you're not sure which serial device is your Arduino, take a look at the available ports, then unplug your Arduino and look again. The one that disappeared is your Arduino.
- With your Arduino board connected, and the Blink sketch open, press the 'Upload' button

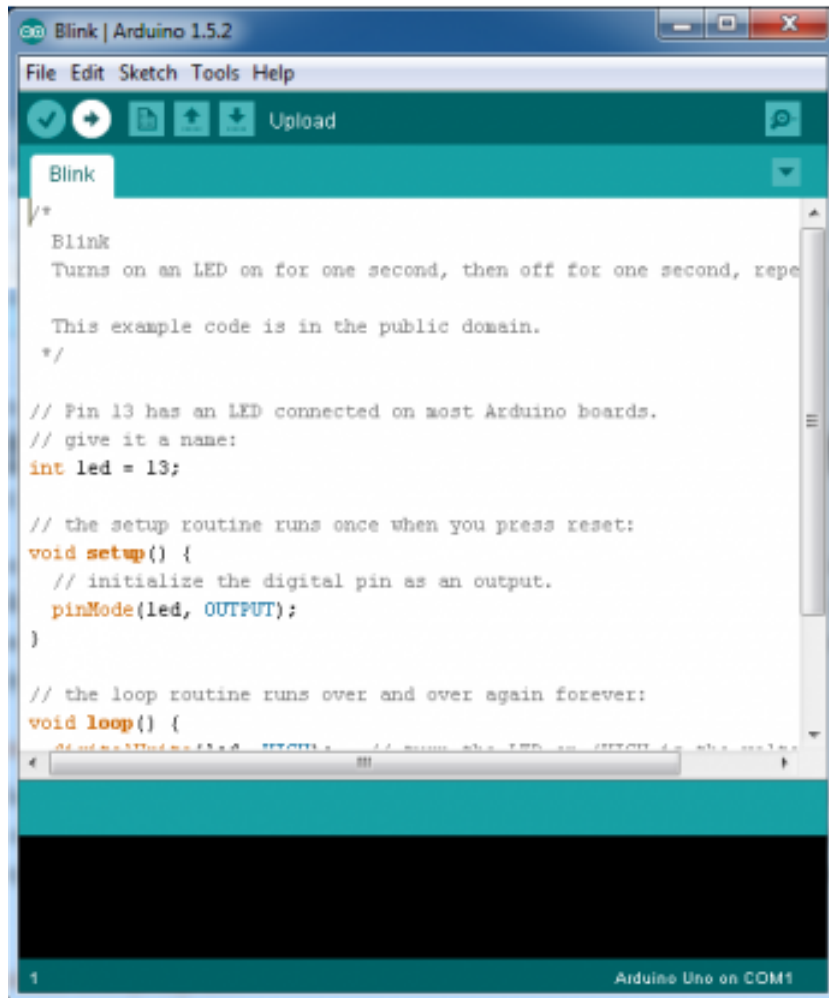


Figure 3.13: Uploading code

- After a second, you should see some LEDs flashing on your Arduino, followed by the message 'Done Uploading' in the status bar of the Blink sketch.
- If everything worked, the onboard LED on your Arduino should now be blinking!

Chapter 4

Implementation

Implementation section contains various diagrams such as Use case Diagram, Block diagram and brief of hardware features as well as flow of Working.

4.1 Use Case Diagram

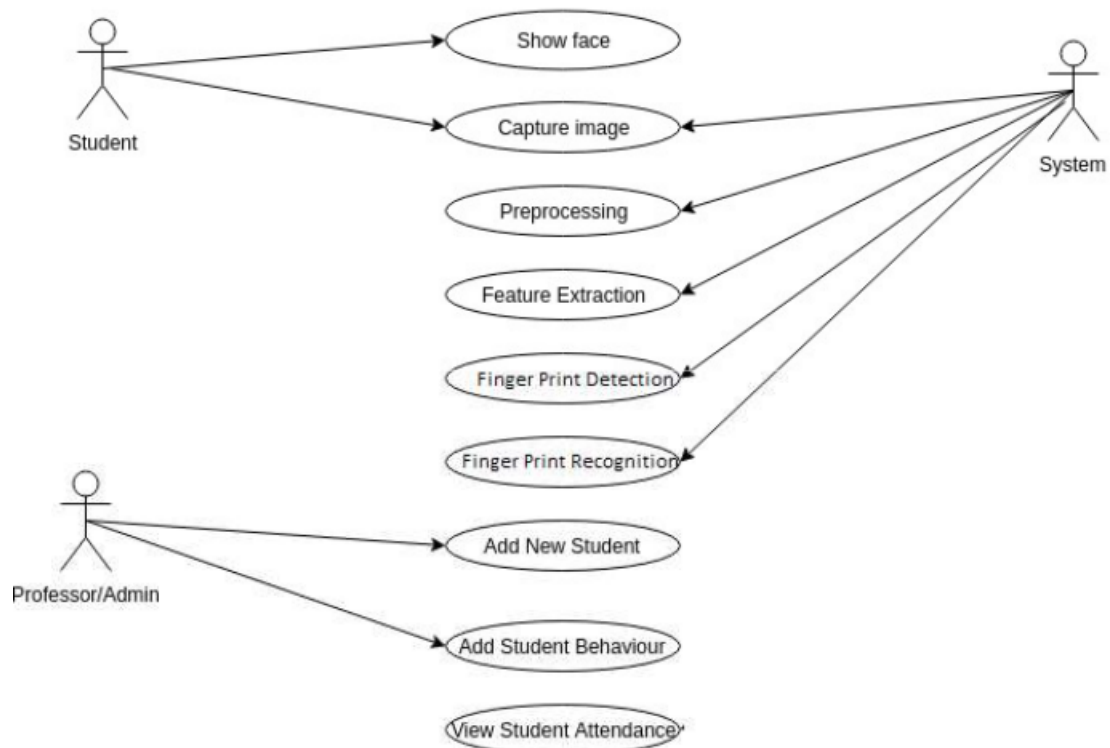


Figure 4.1: Use Case Diagram

4.2 Block Diagram of Hardware

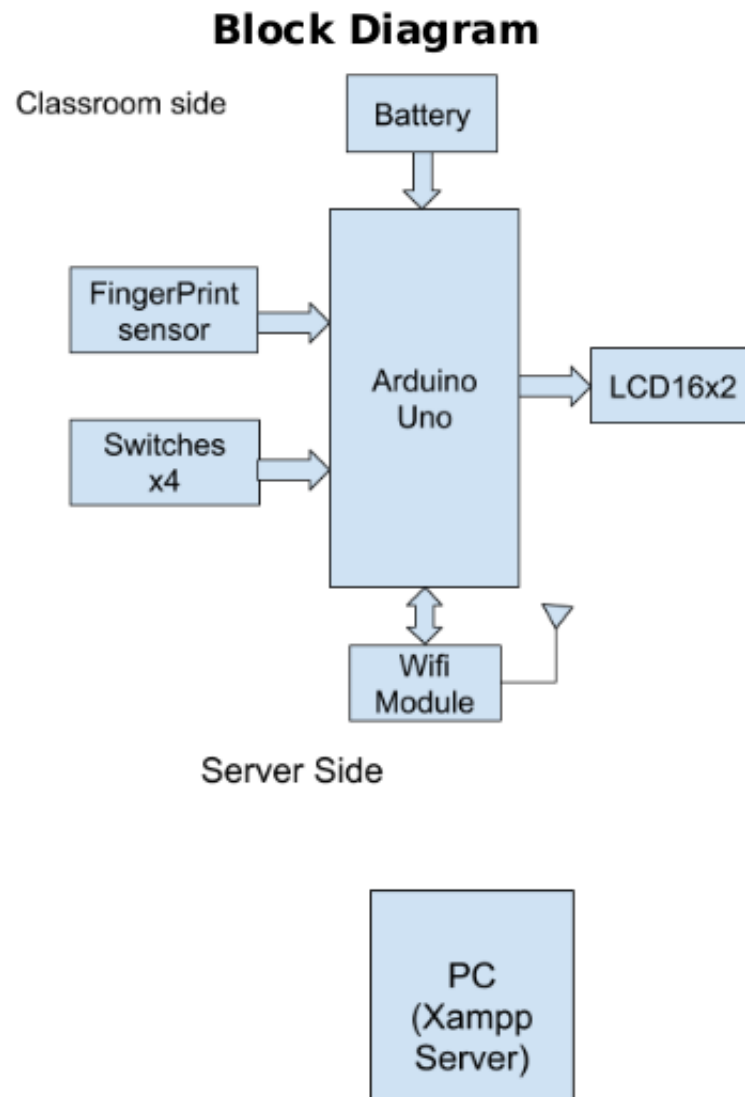


Figure 4.2: Block Diagram

Block Diagram includes the various components of the hardware that are present at the Classroom Side and server side from where admin or teacher will get access to the data.

4.3 Features of IOT Based Biometric attendance System

- Fingerprint module-R305 module for fingerprint detection
- Arduino Uno controller-ATmega328P
- Arduino for fingerprint recognition - no image processing for fingerprint
- Date and lecture wise attendance in database.
- IOT intranet concept.
- PC side Xampp server software with graph plot.
- Student database in mySQL with basic information.
- 4 dynamic database of students.
- Students database with basic information of students.
- Hardware should be Battery operated
- 16x2 LCD to display students id and present or not.
- PC and controller with wireless communication - using ESP8266 wifi module.

4.4 Flow of Working

1. Fingerprint of students is registered in the database using fingerprint module.
2. There are 4 switches we are using to register the fingerprint of the students.
3. Then 16x2 LCD display is used to display whether person is present or not.
4. Wifi module is used for transmitting the data from Controller to Xampp server application on PC side.

5. Arduino will recognize fingerprint of the student and will transfer this data to xampp Server using wifi Module..
6. Students are supposed to walk in line to enter into the classroom and have to put an attendance before every lecture.
7. Then Place the finger of the student in the fingerprint scanner and comparison of fingerprint of the student is made with the database.
8. If matched with the database then than automatically attendance of that student will be marked.
9. Students database with basic information of students.
10. And if fingerprint unauthorized then a message with fingerprint unauthorized will be displayed on the LCD.
11. Lecture wise and Date wise report will be generated accordingly and stored in the PC where PC is acting as a server.
12. If there is any error while putting an attendance the same will get notified in the Xampp server.
13. We can store database of 4 students in the system.

Chapter 5

Result

5.1 Hardware Configuration

First we have integrated all the components of the biometric attendance system i.e Arduino, Fingerprint sensor, Wifi-Module, push-buttons etc.

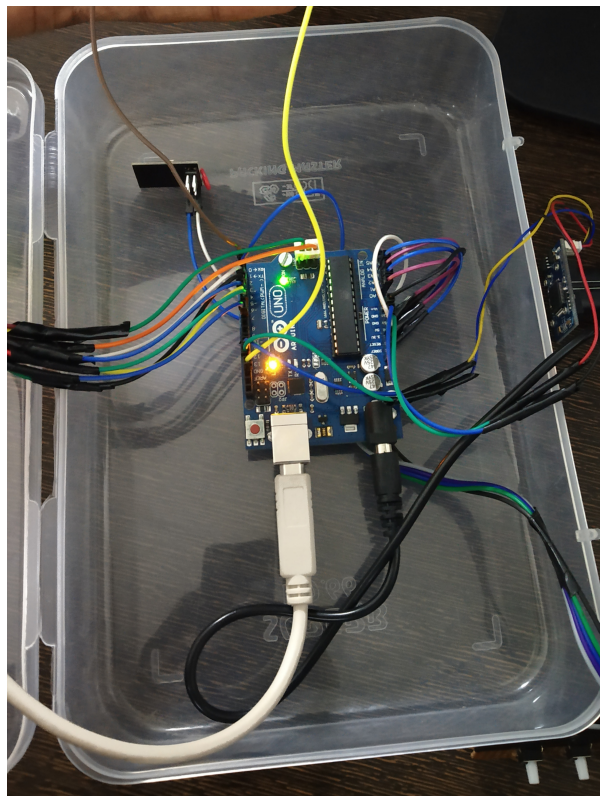


Figure 5.1: Hardware Configuration



Figure 5.2: Hardware Configuration

5.2 Server-Side

The first page is about the admin login to access the student attendance information. The faculty need to enter their username and password to login.

SMART ATTENDANCE SYSTEM

Username

admin

Password

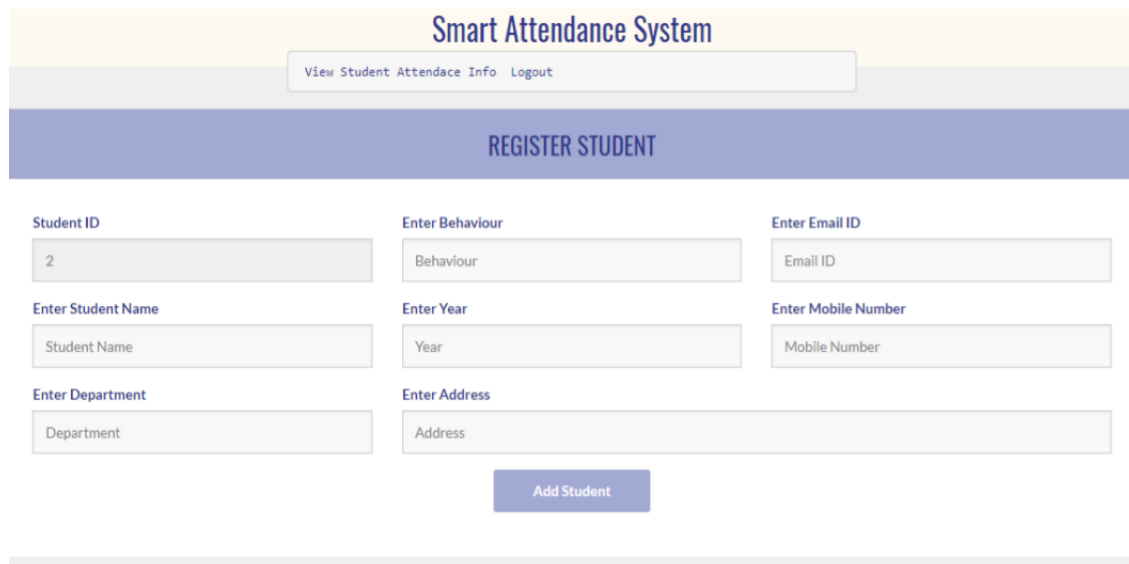
.....

Login

Back

Figure 5.3: Admin

The Second page is about providing details of student for his registration.



The image shows a web form titled "Smart Attendance System" with a subtitle "REGISTER STUDENT". The form contains several input fields for student registration:

- Student ID:** A text box containing the value "2".
- Enter Behaviour:** A text box containing the value "Behaviour".
- Enter Email ID:** A text box containing the value "Email ID".
- Enter Student Name:** A text box containing the value "Student Name".
- Enter Year:** A text box containing the value "Year".
- Enter Mobile Number:** A text box containing the value "Mobile Number".
- Enter Department:** A text box containing the value "Department".
- Enter Address:** A text box containing the value "Address".

At the bottom of the form, there is a blue button labeled "Add Student".

Figure 5.4: Registration of student

Once the Add student button is clicked it gets added to database and provide message is registration done successfully

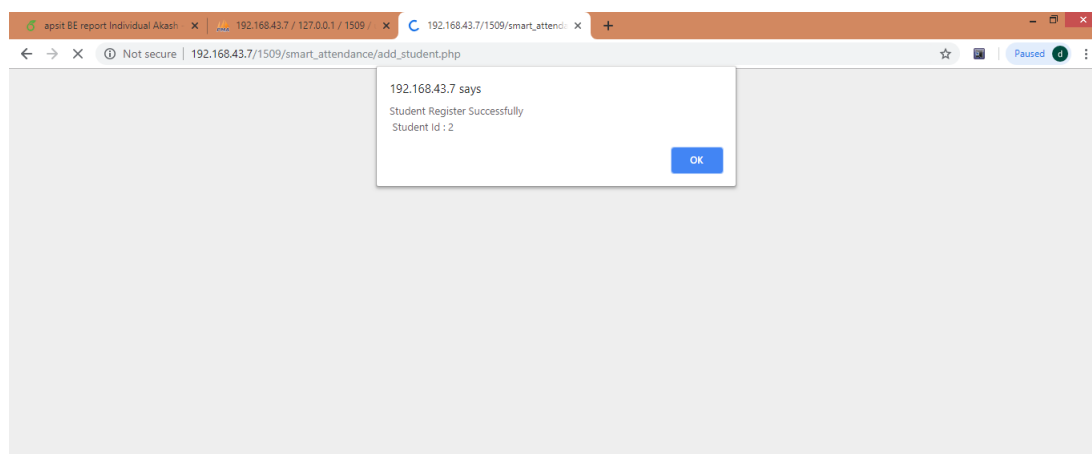
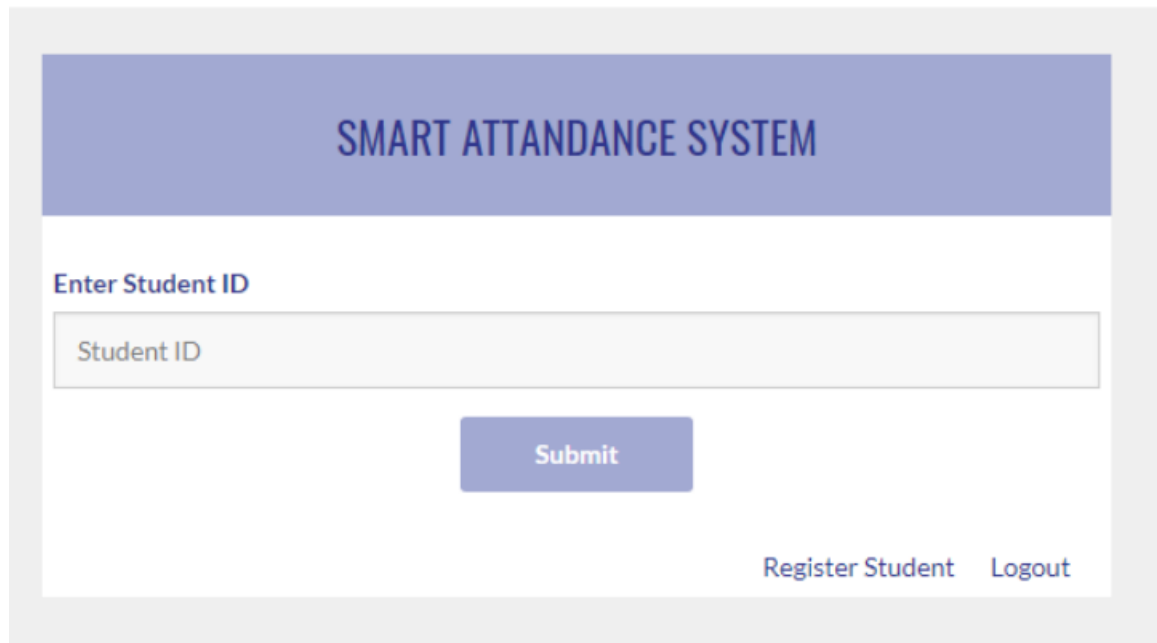


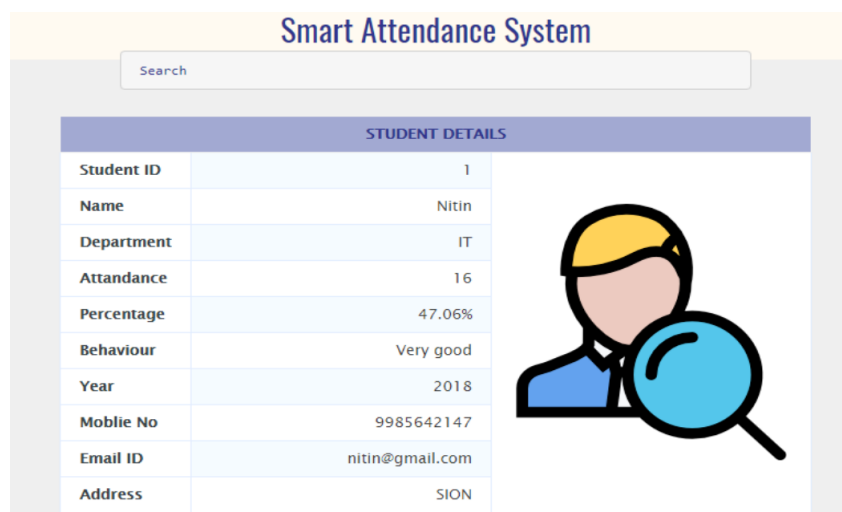
Figure 5.5: Student Registration Successfully

After getting done with students registration successfully, we will get a window to check the attendance of the particular ward. You have to enter students ID and submit it and Then you get a Students attendance Report with all its details such as department, name, year, mobile no etc.



The screenshot shows a web interface titled "SMART ATTENDANCE SYSTEM". Below the title is a section labeled "Enter Student ID". It contains a text input field with the placeholder "Student ID" and a blue "Submit" button. At the bottom right, there are two links: "Register Student" and "Logout".

Figure 5.6: View Attendance



The screenshot shows a web interface titled "Smart Attendance System". Below the title is a search bar. Below the search bar is a table titled "STUDENT DETAILS". The table contains the following information:

STUDENT DETAILS	
Student ID	1
Name	Nitin
Department	IT
Attendance	16
Percentage	47.06%
Behaviour	Very good
Year	2018
Moblie No	9985642147
Email ID	nitin@gmail.com
Address	SION

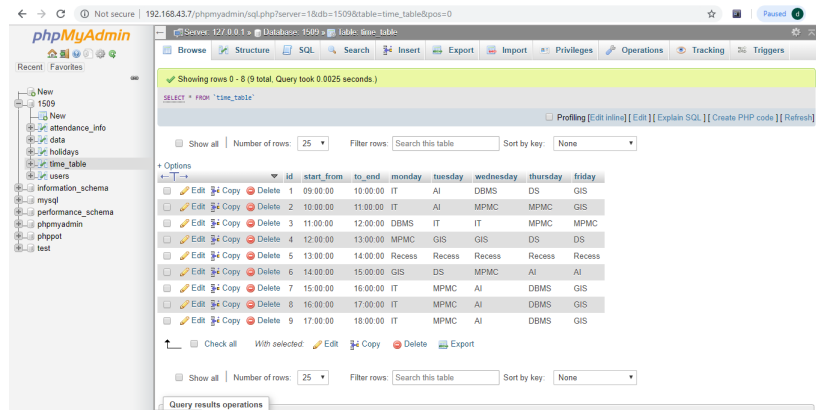
To the right of the table is an illustration of a person wearing a yellow hard hat and a blue shirt, holding a magnifying glass over their face.

Figure 5.7: View Attendance

5.3 Database and Graph

5.3.1 Time Table

The given table below gives the detailed time table with time Duration and subjects going to be held on particular Day.

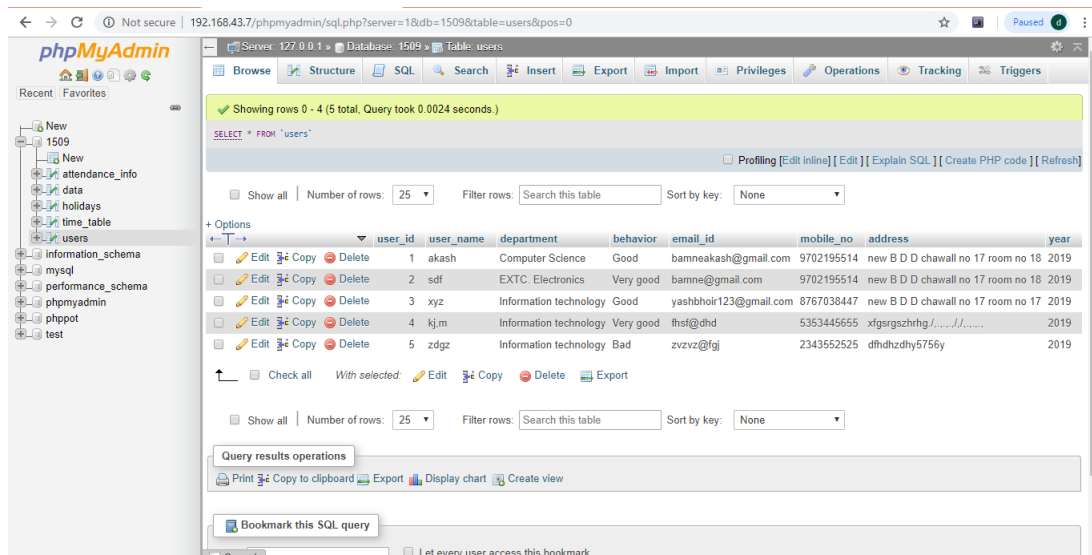


id	start_from	to_end	monday	tuesday	wednesday	thursday	friday
1	09:00:00	10:00:00	IT	AI	DBMS	DS	GIS
2	10:00:00	11:00:00	IT	AI	MPMC	MPMC	GIS
3	11:00:00	12:00:00	DBMS	IT	IT	MPMC	MPMC
4	12:00:00	13:00:00	MPMC	GIS	GIS	DS	DS
5	13:00:00	14:00:00	Recess	Recess	Recess	Recess	Recess
6	14:00:00	15:00:00	GIS	DS	MPMC	AI	AI
7	15:00:00	16:00:00	IT	MPMC	AI	DBMS	GIS
8	16:00:00	17:00:00	IT	MPMC	AI	DBMS	GIS
9	17:00:00	18:00:00	IT	MPMC	AI	DBMS	GIS

Figure 5.8: Time-Table

5.3.2 Users

This Screenshot tells about the Students who have registered for the smart attendance as well as give the details of the particular student such as Department, Id, email id, mobile no and address



user_id	user_name	department	behavior	email_id	mobile_no	address	year
1	akash	Computer Science	Good	bamneakash@gmail.com	9702195514	new B D D chawall no 17 room no 18	2019
2	sdf	EXTC: Electronics	Very good	bamne@gmail.com	9702195514	new B D D chawall no 17 room no 18	2019
3	xyz	Information technology	Good	yashbhoir123@gmail.com	8767038447	new B D D chawall no 17 room no 17	2019
4	kj.m	Information technology	Very good	fhst@dhd	5353445655	xfgrgszhrthg /...../.....	2019
5	zdgz	Information technology	Bad	zvvzv@fgj	2343552525	dhdhdzdh5756y	2019

Figure 5.9: User

5.3.3 Graph

This graph provide the view of students overall ward attendance using tool called charts. Using essential data of a particular student the defaulter list will be generated automatically and updated as per requirement.

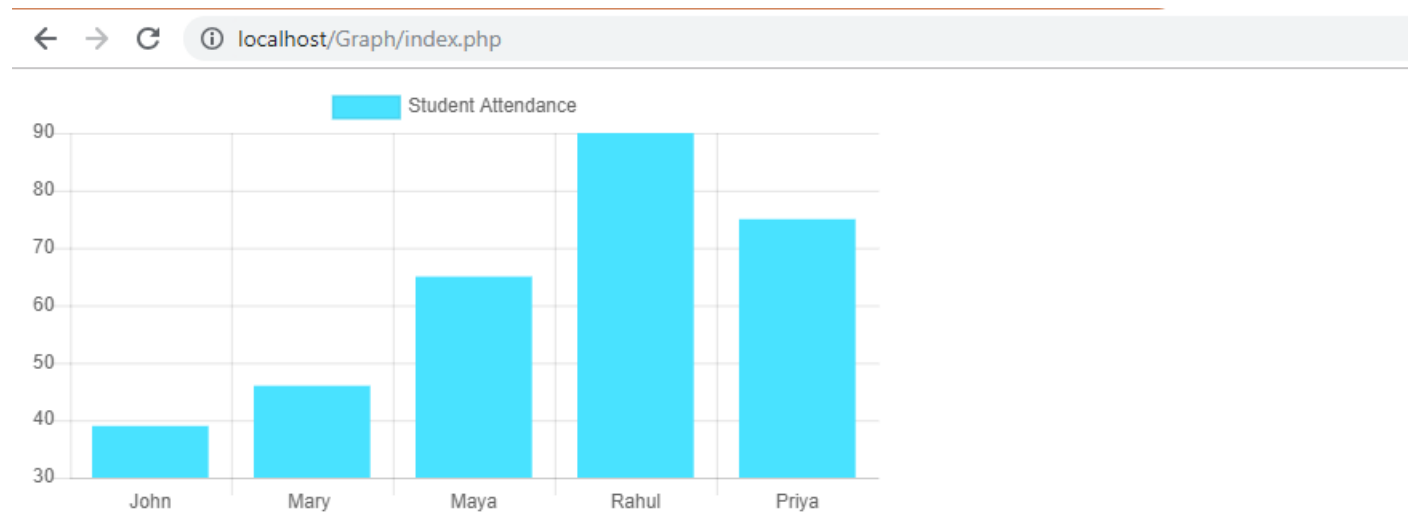


Figure 5.10: Graph

Chapter 6

Conclusions and Future Work

6.1 Conclusion

To overcome the limitations of conventional system, we have developed this system. The proposed system is user friendly, easily data can be sent to school side server. Due to use of IOT the web page can be easily managed by the authorized person. Timely updates of student can be sent to institute. Attendance marking and report generation becomes easy. Less chances of malfunctioning. An Internet of Things (IoT) based portable biometric attendance system can prove to be of great value to educational institutions in this regard as it proves to be highly efficient and secure

6.2 Future Work

In future work the same project can be utilized for several security applications where authentication is needed to access the privileges of the respective system. It can be used in recognizing guilty parties involving in unauthorized business. Face Detection recognition can be added with image processing in future to make the system far better. Many variants of the project can be developed and utilized for home security and personal or organizational benefits. We can also trace a particular student in an organization quickly with the help of this system. We can also use android application on parent side in future so that timely update of their child in school can be send to them on their android phones using IOT.

Bibliography

- [1] Dipali Patil, Pradnya Gavhane, Priyesh Gharat, Prof Urvashi Bhat IOT Based Smart Attendance System Using GSM published in Seventh International Conference on recent trends in Engineering,science and Management (In CULT 2017) 1877-0428 2017.
- [2] Piyush Devikar¹, Ajit Krishnamoorthy², Aditya Bhanage³, Mohit Singh Chauhan⁴ Department of Electronics and Telecommunication Engineering, Vivekanand Education Societys Institute of Technology, Mumbai University at India ICRITCSA M S Ramaiah Institute of Technology, Bangalore Vol. 5, Special Issue 2, October 2016
- [3] D.Narendharsingh¹, Anusha Reddy² and Dr.Sharma Sudhir Kumar "IOT BASED WIRELESS ATTENDANCE MANAGEMENT SYSTEM USING FINGER PRINT RECOGNITION " in International Journal of Latest Trends in Engineering and Technology Vol.(7)Issue(3), pp. 410-418
- [4] Nadar Prince, Abhishek Sengupta, Ms.Keerthi Unni " Implementation of IoT Based Attendance System on a Dedicated Web-Server" at International Journal of Scientific Engineering Research, Volume 7, Issue 6, June-2016

Appendices

Appendix-A:Arduino IDE Download and installation

1. First you have to download the Arduino IDE from link:
<https://www.arduino.cc/en/Main/Software>

2.When the download is finished, un-zip it and open up the Arduino folder to confirm that yes, there are indeed some files and sub-folders inside. The file structure is important so don't be moving any files around unless you really know what you're doing..

3.Power up your Arduino by connecting your Arduino board to your computer with a USB cable (or FTDI connector if you're using an Arduino pro). You should see the an LED labeled 'ON' light up. (this diagram shows the placement of the power LED on the UNO).

4.Installing the Drivers for the Arduino Uno (from Arduino.cc)

- Plug in your board and wait for Windows to begin it's driver installation process
- After a few moments, the process will fail, despite its best efforts
- Click on the Start Menu, and open up the Control Panel
- While in the Control Panel, navigate to System and Security. Next, click on System
- Once the System window is up, open the Device Manager
- Look under Ports (COM LPT). You should see an open port named "Arduino UNO (COMxx)". If there is no COM LPT section, look under 'Other Devices' for 'Unknown Device'.

- Right click on the "Arduino UNO (COMxx)" or "Unknown Device" port and choose the "Update Driver Software" option
- Next, choose the "Browse my computer for Driver software" option
- Finally, navigate to and select the Uno's driver file, named "ArduinoUNO.inf", located in the "Drivers" folder of the Arduino Software download (not the "FTDI USB Drivers" sub-directory). If you cannot see the .inf file, it is probably just hidden. You can select the 'drivers' folder with the 'search sub-folders' option selected instead.
- Windows will finish up the driver installation from there

5. After following the appropriate steps for your software install, we are now ready to test your first program with your Arduino board.

- Launch the Arduino application
- If you disconnected your board, plug it back in
- Open the Blink example sketch by going to: File - Examples - 1.Basics-Blink
- Select the type of Arduino board you're using: Tools - Board-your board type
- Select the serial/COM port that your Arduino is attached to: Tools - Port - COMxx
- If you're not sure which serial device is your Arduino, take a look at the available ports, then unplug your Arduino and look again. The one that disappeared is your Arduino
- With your Arduino board connected, and the Blink sketch open, press the 'Upload' button
- After a second, you should see some LEDs flashing on your Arduino, followed by the message 'Done Uploading' in the status bar of the Blink sketch.
- If everything worked, the onboard LED on your Arduino should now be blinking! You just programmed your first Arduino.

6. After following the appropriate steps for your software install, we are now ready to test your first program with your Arduino board.

- Launch the Arduino application
- If you disconnected your board, plug it back in
- Open the Blink example sketch by going to: File - Examples - 1.Basics-Blink
- Select the type of Arduino board you're using: Tools - Board - your board type
- If you're not sure which serial device is your Arduino, take a look at the available ports, then unplug your Arduino and look again. The one that disappeared is your Arduino.
- With your Arduino board connected and the Blink sketch open, press the 'Upload' button
- After a second, you should see some LEDs flashing on your Arduino, followed by the message 'Done Uploading' in the status bar of the Blink sketch.
- If everything worked, the onboard LED on your Arduino should now be blinking! You just programmed your first Arduino.

Publication

Paper entitled "**IOT Based Biometric Attendance System**" is presented at "**icraci@icastconference.com**" by "**1.Dinesh Deshmukh 2.Yash Bhoir 3.Nilesh Mohite 4.Akash Bamne**".