Faculty of Electrical and Electronic Engineering Technology

CONTROL OF HOUSEHOLD FAN SMART HOUSE APPLICATION

MUHAMMAD HANIF BIN ROSDI

Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

2021

CONTROL OF HOUSEHOLD FAN SMART HOUSE APPLICATION

AUTHOR NAME IS HERE
MUHAMMAD HANIF BIN ROSDI

A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electrical Engineering Technology (Industrial Power) with Honours

Faculty of Electrical and Electronic Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI TEKNOLOGI KEJUTERAAN ELEKTRIK DAN ELEKTRONIK

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : CONTROL OF HOUSEHOLD FAN SMART HOUSE APPLICATION

Sesi Pengajian : SEM 1 2021/2022

Saya MUHAMMAD HANIF BIN ROSDI mengaku membenarkan laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (✓):

☐	**SULIT***	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD***	(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	**TIDAK TERHAD**	

Disahkan oleh:

(TANDATANGAN PENULIS)
Alamat Tetap: 23 JALAN DAHLIA 1
TAMAN DAHLIA 43000 KAJANG
SELANGOR

(COP DAN TANDATANGAN PENYELIA)
MUSTAFA BIN MANAP
Pensyarah
Jabatan Teknologi Kejuruteraan Elektrik
Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik
Universiti Teknikal Malaysia Melaka

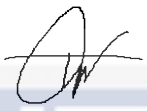
Tarikh: 19 JANUARI 2022

Tarikh: 19/1/2022

*CATATAN: Jika laporan ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali tempoh laporan ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I declare that this project report entitled "Control Of Household Fan Smart House Application" is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : 

Student Name : MUHAMMAD HANIF BIN ROSDI

Date : 11/1/2022

APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Electrical Engineering Technology (Industrial Power) with Honours.

Signature : 

Supervisor Name : MUSTAFA BIN MANAP
Pensyarah
Jabatan Teknologi Kejuruteraan Elektrik
Fakulti Teknologi Kejuruteraan Elektrik dan Elektronik
Universiti Teknikal Malaysia Melaka

Date : .....

Signature : .....

Co-Supervisor Name (if any) : .....

Date : .....

DEDICATION

To my mother, Salmah Binti Selamat and my father, Rosdi Bin Abdul Ghapa, I want to say that I love you very much.

ABSTRACT

Earlier models of generation require more human efforts. Still, in modern times every technology evolves into an advanced version by operating automatically so that the auto fan can be reinvented to make it more innovative in this project. Fans make people feel more relaxed but don't lower the temperature of the room. It automatically runs according to the surrounding temperature and will be automatically switched under a specific temperature to save energy. Because of existing fans, the speed of each fan, depending on weather conditions, is challenging to monitor. The idea behind the controlled intelligent ventilation temperature is to control fan speed using a micro controller based on temperature changes detected by the sensor's temperature and humidity. In addition to homeowners, schools, companies, and other public buildings can benefit from this intelligent feature in a fan as they have a specific routine. This project work is therefore done to minimize human effort and simultaneously save energy, which takes an hour.

ABSTRAK

Model generasi terdahulu memerlukan lebih banyak usaha manusia. Namun pada zaman moden ini, setiap teknologi berkembang menjadi versi lanjutan dengan beroperasi secara automatik sehingga kipas automatik dapat diciptakan semula untuk menjadikannya lebih inovatif dalam projek ini. Kipas ini membuatkan orang berasa lebih santai tetapi tidak menurunkan suhu bilik. Secara automatik berjalan sesuai dengan suhu sekitarnya dan secara automatik akan diubah di bawah suhu tertentu untuk menjimatkan tenaga. Dengan kewujudan kipas ini, kelajuan setiap kipas ini bergantung pada keadaan cuaca dan sukar untuk dipantau. Idea di sebalik suhu pengudaraan pintar yang terkawal adalah untuk mengawal kelajuan kipas menggunakan mikrokontroler berdasarkan perubahan suhu yang dikesan oleh suhu dan kelembapan sensor. Selain pemilik rumah, sekolah, syarikat, dan bangunan awam yang lain dapat memanfaatkan kelebihan yang ada pada kipas ini kerana mereka memiliki rutin tertentu. Oleh itu, kerja projek ini dilakukan untuk meminimumkan usaha manusia dan sekaligus menjimatkan tenaga yang memakan masa satu jam.

ACKNOWLEDGEMENTS

This project would not have been possible without my supervisor, Ts Mustafa bin Manop Mustapha, who provided invaluable advice, words of wisdom, and patience.

My research would not have been possible without the financial assistance provided by Universiti Teknikal Malaysia Melaka (UTeM). My coworker's eagerness to share his views and opinions about the project is not forgotten.

Thank you to my parents and other family members for their support and prayers while I was in school.

Finally, I'd want to express my gratitude to all of my fellow students, faculty members, and those who aren't included for their cooperation and assistance.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

° - Celcius
-
-
-
-
-
-
-

LIST OF ABBREVIATIONS

IoT	-	Internet on Technology
PWM	-	Pulse Width Modulation
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
	-	
	-	
	-	
	-	

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Background

Normally, the fan's speed must be manually adjusted, however from this concept, the fan's speed will automatically adapt dependent on the surrounding environment. The initiative is going to shift its attention to the (IoT). In this scenario, the temperature is to beregulated, and the emphasis is on the rationale for building an automatic temperature control system. The fan offers comfort for the customer. DHT11 sensors have been used to control temperature. The DHT11 is a low-cost digital temperature sensor. It uses an electrical phenomena and an electronic component to breathe the surrounding air and outputs a transmitted data on the data pin. It is simple to use. However data collection takes longer since the DHT11 sensor data transfer to micro controller circuit, that is comprised of ESP8266. Arduino is a software- controlled open-source electronics board. It increases the accessibility of electronic design to everyone who want to create it in the proper setting. Afterward, the temperature sensor read the temperature. The ESP8266 will control how fast a fan can run. The temperature and speed will be shown on the Blynk App and Thingspeak after that.

1.2 Problem Statement

When room temperature changes, most people feel it is uncomfortable to change the fan speed manually. Beside that, people right now do not know the effect of their daily action by wasting a lot of electrical consumption. Thus, the automatic ventilator system is

recommended for solving this problem, which automatically modifies the speed levels according to temperature changes.

1.3 Project Objective

The goals of this study are:

1. To measure the temperature and humidity in room
2. To achieve a functional system in terms of hardware and software.
3. To create a smart fan system to monitoring the result using IoT.

1.4 Scope of Project

1. Smart control of energy saving on fan in the room to explore the future development for intelligent home appliances by means of energy saving efficiency.
2. To build and write a programme with Arduino and a hardware component.
3. To see if the system is good for the real world and if it has good things or bad things about it.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will talk about the theory that goes into this project. Beside that, the previous research that I gained has been understudy in order to gain valuable data for this project. It also helps me to finish this project. In this study, a basic design of smart electrical appliances which is smart fan was developed using an ESP8266microcontroller and a DHT11 for the purpose of controlling the fan's speed. A set of people used the prototype and provided feedback after using it. The study's findings reveal that the automation was beneficial to their overall feeling of well-being. The setting and ambiance in the room were said to be fine, since the fan was only quiet and behind the scenes. This has demonstrated that the prototype has a considerable impact in reducing participant's levels of anxiety and nervousness while promoting a feeling of relaxation and comfort, while also contributing to both cost and energy savings [1].

2.2 MICROCONTROLLER BASED SMART FAN SYSTEM

This project revolves around a fan that uses a micro cntroller system to control it. This project is produced using the method of construction, assessment and control of an electric fan that runs on its own. The problem statement from this project is that most people do not feel comfortable to change the fan temperature when the room temperature has changed. As the primary controller, the MC68HC11 has a temperature controller as an input and a DC motor as an output. [2]. The electric fan of this system contains a combination of sensors, controllers, drivers and motors.

The integration of the modules results in the production of a system that can be divided into two main parts. The first is an intelligent fan system, and the second is a monitoring system, which can be divided into two phases. It is the first phase of the system, including microcontroller, sensor, and motor module. It is the second phase, which includes an LCD module for system monitoring. For example, the automatic fan system will provide outputs in four levels with the detected input, as shown in the figure below. The information detects at different levels, triggers the same amount of production, and shows the status of the output and the temperature on the LCD panel for each level felt by the input.

2.3 TEMPERATURE BASED FAN SPEED CONTROLLER

In this project, microcontrollers play a key role in smart systems development. It uses PWM or Pulse Width Modulation as this fan's speed can be controlled by one of the ways that it can do this. In addition, the project uses a temperature sensor to detect the temperature so that the fan speed can rotate according to the set speed and temperature. Knowing how the Arduino controller works is very important because this will control the cooling system, so it's very important to know how it all works together well. [3].

The project uses an LCD shield to display the temperature and speed for the fan. 9V batteries are used to power the fan motors and transistors. In addition, the LM35 temperature sensor and red LED get a power supply of 5V from the Arduino board. The most crucial step is to set the Min and temp variables to the values you want them to have. The minimum temperature is when the fan starts rotating, and the maximum temperature is when the red warning light flashes, indicating that the maximum temperature has indeed been reached.

2.4 PIC SYSTEM TO CONTROL THE ELECTRIC FAN

This project is essential for developing an innovative prototype design for an electric fan that has the ideal combination. The automation feature of this electric fan is connected to the microcontroller. It also boasts a unique dual feature design. It is done to ensure that the cooling process runs better effectively and successfully, especially in significant space uses and in hot weather due to global warming[4]. Humans live a better life and the lives of the circuit's use. It is pretty practical for older folks to simplify their lifestyles in this way. The course is also good for people who are physically disabled and find it hard to switch on the fan the right way. It can also be changed to make it better at detecting things like fires in the house, so it can send out an alarm signal when there is an emergency, like when there is a fire in the house.

2.5 AUTOMOTIVE SYSTEM TO CONTROL THE FAN

In this project, the concept of a microcontroller-based auxiliary fan for automotive use, a prototype is being developed. The fan should operate following the engine's temperature and rpm, and it should be adjusted manually. The Arduino Mega, made of the Atmega1280 microcontroller, was employed in the present study as the controller. Production of the limited scale simulation model, where the microcontroller is verified to guarantee that it interacts with the necessary sensor, will become the objective of this research previous to its conversion into an actual functioning protype. They measure humidity using a humidity sensing component that consists of two electrodes connected by a moisture-retaining substrate[5].

2.6 SMART FAN CONCEPT

Because of its cheap running costs and low power consumption, the electric fan is one of the most popular electric appliances. [6]. It's a common circuit that's seen in a variety of applications[7]. A fan's functioning is now controlled manually by pressing the switch. This additional feature keeps it from automatically turning on in response to temperature changes. For switching in this circuit, an automated temperature control system is employed. Many research focusing on the use of automated temperature control systems in a variety of industries might benefit from its advantages [8]. One of the most complex version include occupancy sensorsand geolocation settings to ensure it only rotates when needed.

Smart ceiling fans, as opposed to regular ceiling fans to operate by Wi-fi rather than a pull cord or electrical wire. This means you can monitor and control your iOS or Android computer to operate according to a predefined schedule even when you're not at home.Older ceiling fans may be converted to smart fans by hardwiring tiny device inside the fan, using a hub and their existing motorised blind ir remote control or replacing their wall switch with a version that linksand controls the fan. Yes, smart fans can help you save energy in your house (and wallet). Instead of having your fans on all day when you far from home, you can use temperaturesensors to make them turn on just when the temperature in your room climbs beyond a specifiedthreshold.

Fan materials are an important consideration when designing and manufacturing a centrifugal fan. The materials chosen in building can have an impact on weight, cost, sanitation,longevity, maintenance, and aesthetics.

CHAPTER 3

METHODOLOGY

3.1 Introduction

An Arduino, temperature sensors, and humidity sensors will be used in this research to adjust the fan speed automatically. If this concept is realise, the fan's speed will be automatically changed in response to the surrounding environment. Every time, the fan speed must be manually adjusted. The project is based on the IoT. It was using a DHT11 sensor, a simple strategy for controlling the fan speed automatically. The resistance of a fan will be changed in response to the temperature and humidity detected by temperature and humidity sensor. It's pretty simple to use, but it does necessitate some careful planning to collect data. The DHT11, ESP8266, by many of the same fan connection, which means less battery power will be required. The proposed system allows for a relatively high fan setting for lower activity levels that require limited body movements, such as sleeping and sitting is used in this example. It takes less time to process data using this proposed system.

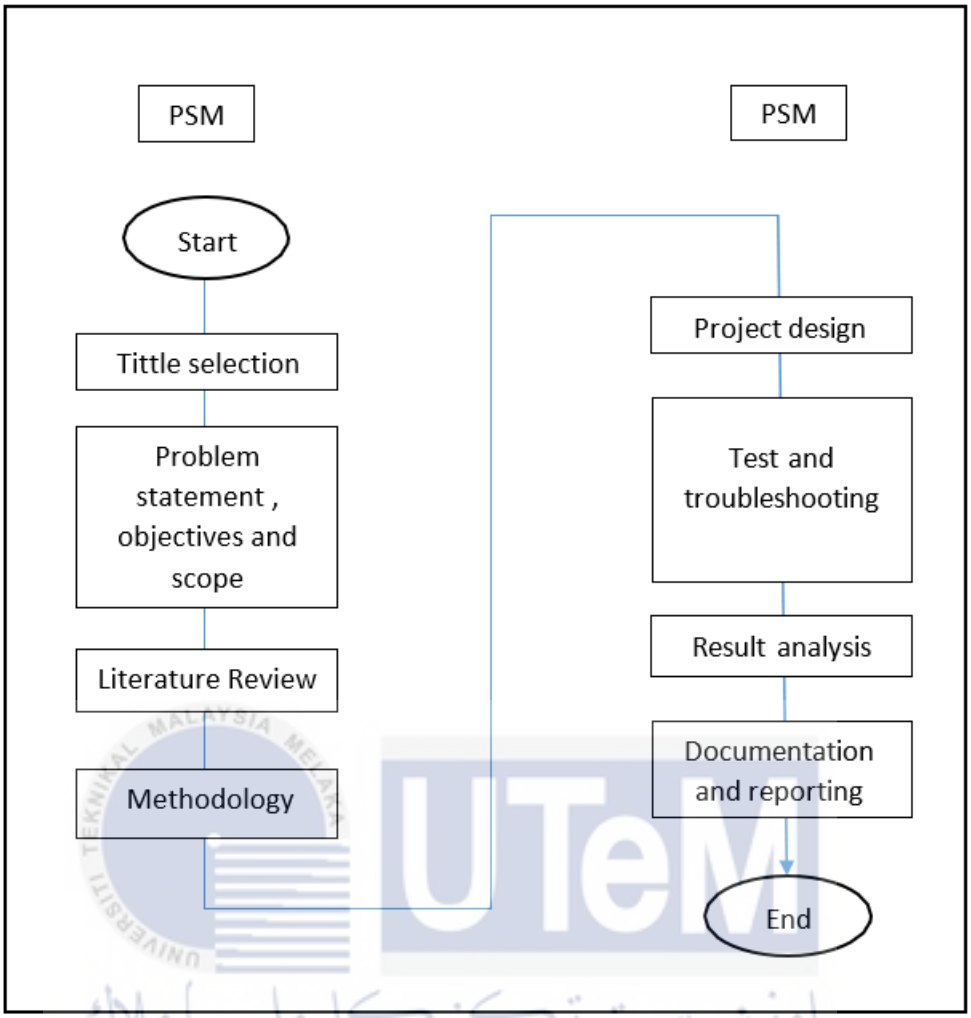


Figure 3.1 Flowchart for PSM1 and PSM2

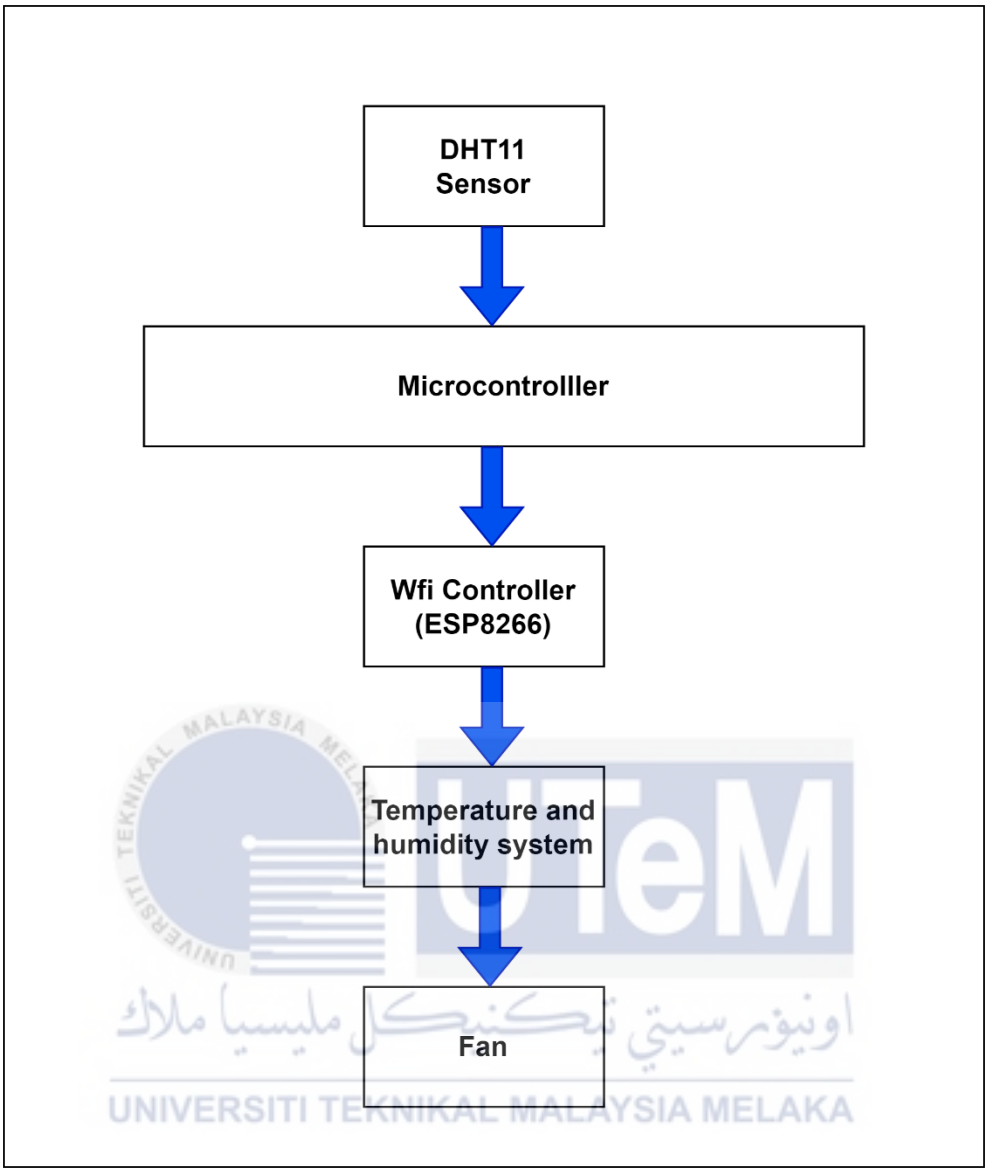


Figure 3.2 System Block Diagram

3.2 Hardware Development

"Control Of Household Fan Smart House Application" is shown in Figure 3.3. A system's inputs and outputs are shown in a block diagram.

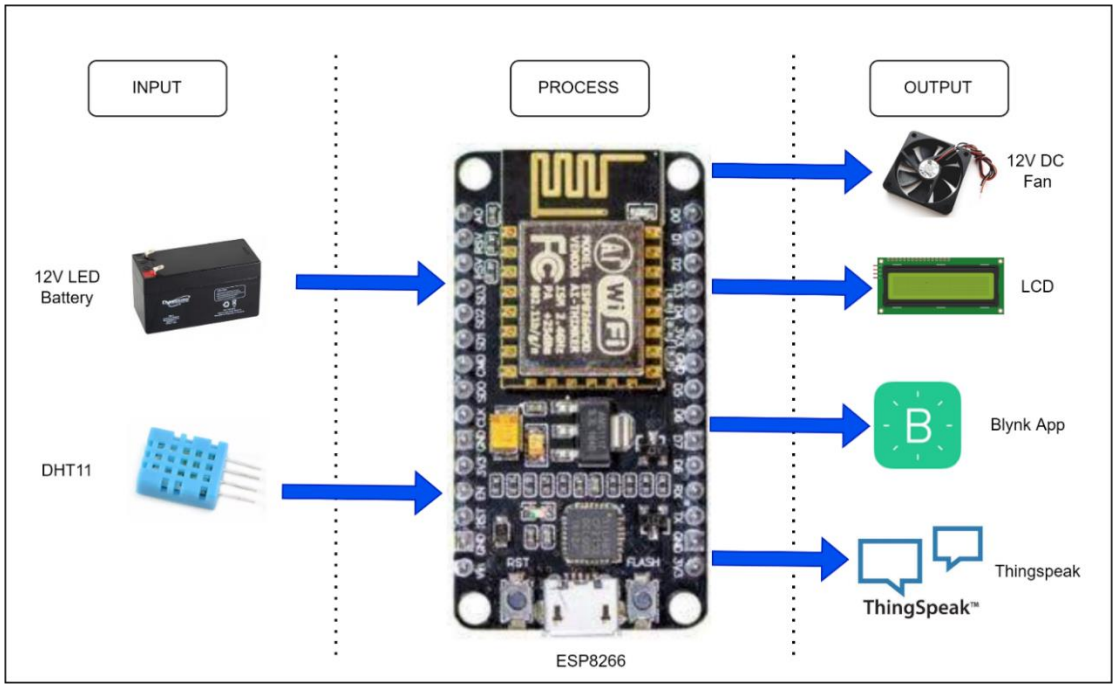


Figure 3.3 Development project input and output

Figure 3.4 overview of how the prototype was made

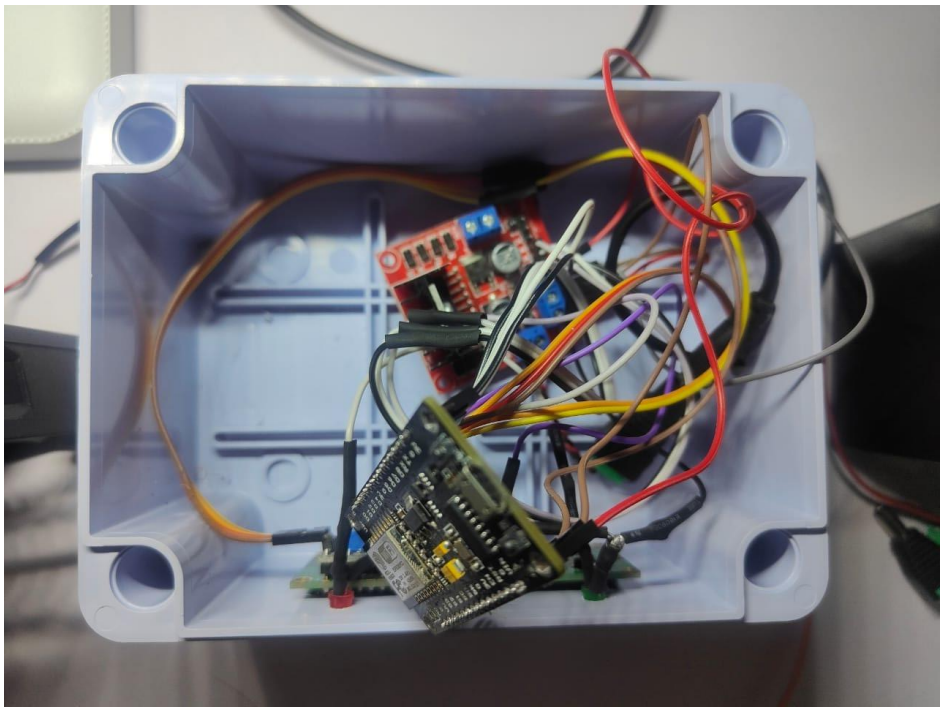


Figure 3.5 Overview for the circuit

3.3 SYSTEM ARCHITECTURE AND DESCRIPTION

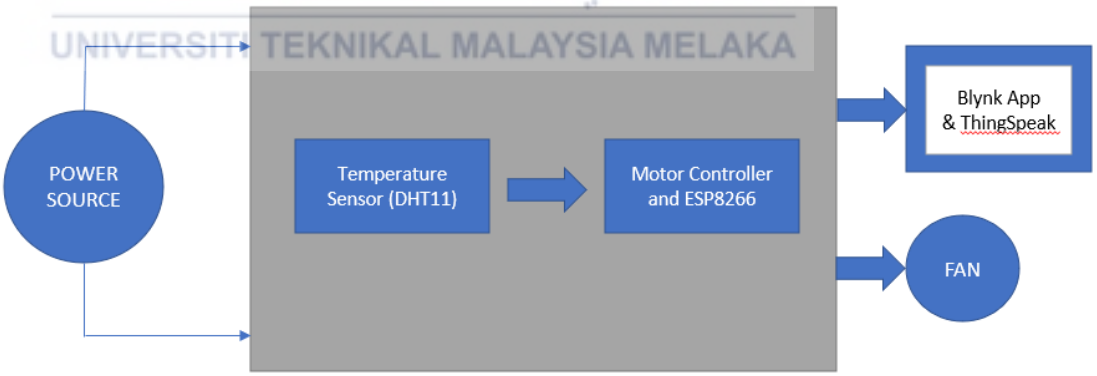


Figure 3.6 System Architecture

This is the architecture modules and architecture is shown in fig 3.2.

Architecture Module	Explanation
Power Source	This is the first module which is going to give power to all the modules like DHT22, ESP8266, Motor Controller, LCD and fan.
Temperature Sensor (DHT22)	This is another module which is will be detecting the temperature and will pass the values of temperature to microcontroller and ESP8266.
ESP8266 and Motor Controller	The fan speed is controlled with the help of programming on the Arduino coding by this module dependent on the ambient temperature received by the sensor.
Blynk App and Thing Speak	This module will be displaying the speed of fan.
Fan	All of the other modules will be used to control this module.

Figure 3.7 Architecture Modules

3.4 FLOW CHART

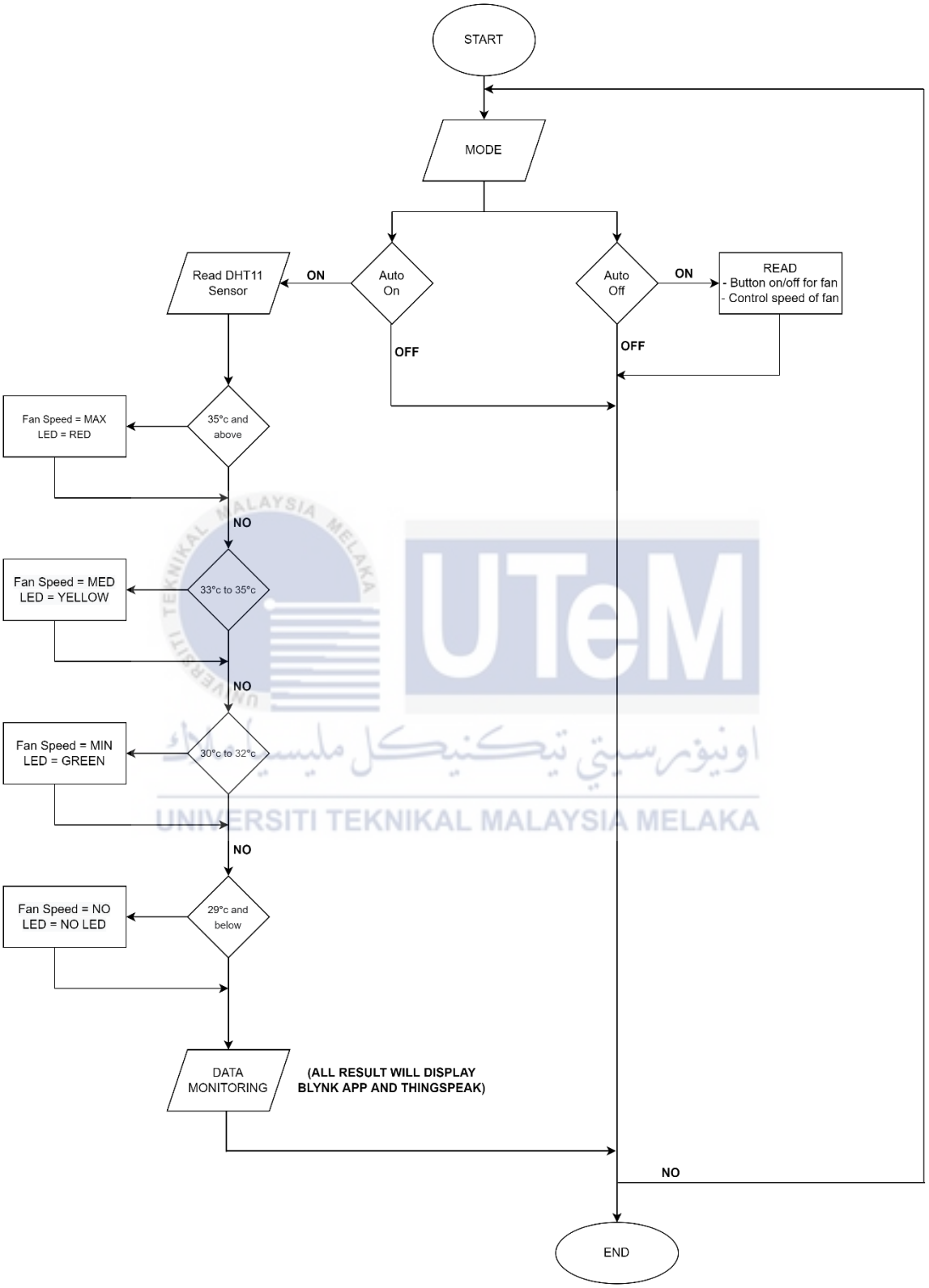


Figure 3.8 Flow Chart of protoype software for the fan

3.5 SYSTEM MODULES

3.5.1 Arduino Programming

Arduino coding for this protoype :

```
/*
  Blynk APP
  Email : iot.controlfan21@gmail.com
  Pswd  : iot@fan21

  ThingSpeak
  Email : iot.controlfan21@gmail.com
  Pswd  : Iot@fan21
*/
#include <DHT.h>              // Including library for dht
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <SimpleTimer.h>      // transfer rate
#include <Wire.h>             // Lib utk lCD Display
#include <LiquidCrystal_I2C.h>
// Set the LCD address to 0x27 for a 16 chars and 2 line display
LiquidCrystal_I2C lcd(0x27, 16, 2);
SimpleTimer timer;

String apiKey      = "XVEQCVYIRU1LDWRW";                //  Enter your Write API key from ThingSpeak
const char *auth   = "7wa896jCTmZWovZh6kDcqq6sxSi7aaf4";
const char *ssid   = "OPPO Find X3 Pro";          // replace with your wifi ssid and wpa2 key
const char *pass   = "123456789";
const char *server = "api.thingspeak.com";
```

```
#define DHTPIN     D3          //pin where the dht11 is connected
#define IN_1       D6
#define IN_2       D7
#define En_A       D5
#define red_led    D8
#define yellow_led D4
#define green_led  D0
int ButtonState1, ButtonState2, state = 0;
const int max_speed = 1024;
const int mid_speed = 500;
const int min_speed = 150;
String Led_val;
String Speed_val;

DHT dht(DHTPIN, DHT11);

WiFiClient client;

void setup()
{
  Serial.begin(115200);
  delay(10);
  dht.begin();
  lcd.begin();                          //initial LCD setup
  lcd.backlight();                      // Turn on the blacklight and print a message.
  Blynk.begin(auth, ssid, pass);
```

```
Blynk.begin(auth, ssid, pass);
pinMode(IN_1, OUTPUT);
pinMode(IN_2, OUTPUT);
pinMode(En_A, OUTPUT);
digitalWrite(IN_1, LOW);
digitalWrite(IN_2, LOW);

pinMode(red_led,    OUTPUT);
pinMode(yellow_led, OUTPUT);
pinMode(green_led,  OUTPUT);
Serial.println("Connecting to ");
lcd.print("Connecting to ");
Serial.println(ssid);
lcd.setCursor(0,1);

WiFi.begin(ssid, pass);

while (WiFi.status() != WL_CONNECTED)
{
  delay(500);
  Serial.print(".");
  lcd.print(".");
}
Serial.println("");
Serial.println("WiFi connected");
lcd.print("WiFi connected");
```

```
  delay(500);
  timer.setInterval(1000L, thingspeak_system);// tranfer data to blynk every 1s
  lcd.setCursor (0, 0);
  lcd.print("   Fan Control  ");
  lcd.setCursor (0, 1);
  lcd.print("     SYSTEM     ");
  delay(2000);                              //set for at least 2s
  lcd.clear();
}
//---------------------Auto Mode----------------------
BLYNK_WRITE(V3) // motor control
{
  ButtonState2 = param.asInt();
  if (ButtonState2 == 1)
  {
    state = 1;
  }
  else if (ButtonState2 == 0)
  {
    state = 0;
  }
}
//--------------------speed varaiable-------------------
BLYNK_WRITE(V4)                 // speed varaiable
```

```
{
  if (state == 1) {
    int speed = param.asInt();
    analogWrite(En_A, speed);

    if (speed <= 60 )              // speed stop
    {
      //Serial.print(" stop ");
      stop();
    }
  }
  else {
    //go to function auto mode
  }
}
//---------------------motor control--------------------
BLYNK_WRITE(V5) // motor control
{
  if (state == 1) {

    ButtonState1 = param.asInt();
    if (ButtonState1 == 1)
    {
      forword();
    }
    else if (ButtonState1 == 0)
```

```
    {
      stop();
    }
  }
  else {
    //go to function auto mode
  }
}
//--------------------Motor direction--------------------
void forword(void) {
  digitalWrite(IN_1, LOW);  // Right Connector motor
  digitalWrite(IN_2, HIGH);
  delay(20);
}
void stop(void) {
  digitalWrite(IN_1, LOW);
  digitalWrite(IN_2, LOW);
  delay(20);
}
void maxFan_speed(void) {
  digitalWrite(IN_1, LOW);  // Right Connector motor
  digitalWrite(IN_2, HIGH);
  analogWrite(En_A, max_speed);
}
void midFan_speed(void) {
  digitalWrite(IN_1, LOW);  // Right Connector motor
  digitalWrite(IN_2, HIGH);
  analogWrite(En_A, mid_speed);
}
void minFan_speed(void) {
  digitalWrite(IN_1, LOW);  // Right Connector motor
  digitalWrite(IN_2, HIGH);
  analogWrite(En_A, min_speed);
}
//----------------------VOID LOOP----------------------
void loop()
{
  Blynk.run(); // project run
  timer.run(); // timer run
}
//------------------thingspeak_system-------------------
//--------------------with Auto mode--------------------
void thingspeak_system() {
  float t = dht.readTemperature();
  float h = dht.readHumidity();

  if (isnan(h) || isnan(t))
  {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }
```

```
 if (client.connect(server, 80))  //   "184.106.153.149" or api.thingspeak.com
 {
   String postStr = apiKey;
   postStr += "&field1=";
   postStr += String(t);
   postStr += "&field2=";
   postStr += String(h);
   postStr += "\r\n\r\n";

   client.print("POST /update HTTP/1.1\n");
   client.print("Host: api.thingspeak.com\n");
   client.print("Connection: close\n");
   client.print("X-THINGSPEAKAPIKEY: " + apiKey + "\n");
   client.print("Content-Type: application/x-www-form-urlencoded\n");
   client.print("Content-Length: ");
   client.print(postStr.length());
   client.print("\n\n");
   client.print(postStr);

   Serial.print("Temperature: ");
   Serial.print(t);
   Serial.print(" degrees Celcius, Humidity: ");
   Serial.print(h);
   Serial.println("%. Send to Thingspeak.");
   Blynk.virtualWrite(V1, String(t, 2));
  Blynk.virtualWrite(V1, String(t, 2));
  Blynk.virtualWrite(V2, String(h));
}
client.stop();

if ((t >= 30) && (t <= 32) && (state == 0)) {  // if temperature in range 30 to 35 & button Auto mode On
  minFan_speed();
  digitalWrite(red_led,    LOW);
  digitalWrite(yellow_led, LOW);
  digitalWrite(green_led, HIGH);
  Speed_val = "MIN";
  Led_val   = "GREEN ";
  lcd.setCursor(0, 0);
  lcd.print("Fan Speed : ");
  lcd.setCursor(12, 0);
  lcd.print(Speed_val);
  lcd.setCursor(0, 1);
  lcd.print("LED : ");
  lcd.setCursor(6, 1);
  lcd.print(Led_val);
  //lcd.clear();
}
if ((t >= 33) && (t <= 35) && (state == 0)) {  // if temperature in range 35 to 40 & button Auto mode On
  midFan_speed();
  digitalWrite(red_led,    LOW);
```

```
  digitalWrite(yellow_led, HIGH);
  digitalWrite(green_led,  LOW);
  Speed_val = "MID";
  Led_val   = "YELLOW";
  lcd.setCursor(0, 0);
  lcd.print("Fan Speed : ");
  lcd.setCursor(12, 0);
  lcd.print(Speed_val);
  lcd.setCursor(0, 1);
  lcd.print("LED : ");
  lcd.setCursor(6, 1);
  lcd.print(Led_val);
  //lcd.clear();
}
if ((t > 35) && (state == 0)) {                // if temperature  Above 40 & button Auto mode On
  maxFan_speed();
  digitalWrite(red_led,  HIGH);
  digitalWrite(yellow_led, LOW);
  digitalWrite(green_led, LOW);
  Speed_val = "MAX";
  Led_val   = "RED   ";
  lcd.setCursor(0, 0);
  lcd.print("Fan Speed : ");
  lcd.setCursor(12, 0);
  lcd.print(Speed_val);
  lcd.print(Speed_val);
  lcd.setCursor(0, 1);
  lcd.print("LED : ");
  lcd.setCursor(6, 1);
  lcd.print(Led_val);
  //lcd.clear();
}
if ((t < 30) && (state == 0)) {                 // if temperature Below 30 & button Auto mode On
  stop();
  digitalWrite(red_led,   LOW);
  digitalWrite(yellow_led, LOW);
  digitalWrite(green_led, LOW);
  Speed_val = "NO ";
  Led_val   = "NO LED";
  lcd.setCursor(0, 0);
  lcd.print("Fan Speed : ");
  lcd.setCursor(12, 0);
  lcd.print(Speed_val);
  lcd.setCursor(0, 1);
  lcd.print("LED : ");
  lcd.setCursor(6, 1);
  lcd.print(Led_val);
  //lcd.clear();
}
if (state == 1) {                               // if button Auto mode off
  //Do decision on blynk write, manually control
```

```
    digitalWrite(red_led,    LOW);
    digitalWrite(yellow_led, LOW);
    digitalWrite(green_led, LOW);
    Speed_val = "    ";
    Led_val   = "      ";
    lcd.setCursor(0, 0);
    lcd.print("Fan Speed : ");
    lcd.setCursor(12, 0);
    lcd.print(Speed_val);
    lcd.setCursor(0, 1);
    lcd.print("LED : ");
    lcd.setCursor(6, 1);
    lcd.print(Led_val);
    //lcd.clear();
  }
  // thingspeak needs minimum 15 sec delay between updates

}
```

Appandices 1 Full Coding of Project

3.5.2 DHT11 Sensor for getting atmosphere temperature

This sensor is a simple and inexpensive digital temperature sensor. It lives the surrounding air using an electrical phenomena and a semiconductor device, nd spreads adigital signal upon that pin. It is simple to use, however it takes a little longer to collect data. This sensor is good because new data can only be obtained every two seconds, so when you use the library sensor readings will be up to two seconds old, so this is a good thing.

3.5.3 Blynk for displaying output

Blynk App is an application that is used for display the result such as the temperature and the speed of the fans.

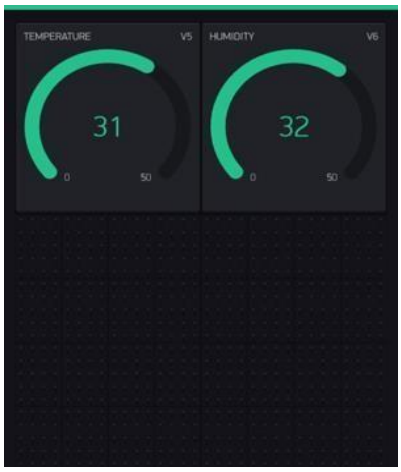


Figure 3.9 Blynk App display

3.5.4 Fan speed will be controlled

The fans is really a tool for air flow production. The blades of the fan are designed to produce air flow. The revolving blade and hub combination is known as something of an impeller. This increases the airflow and also improves safety by eliminating crashes with fan's blades. Fans are often driven by electric motors. In our project, the fan speed is usually dominated.

3.6 SCHEMATIC CIRCUIT

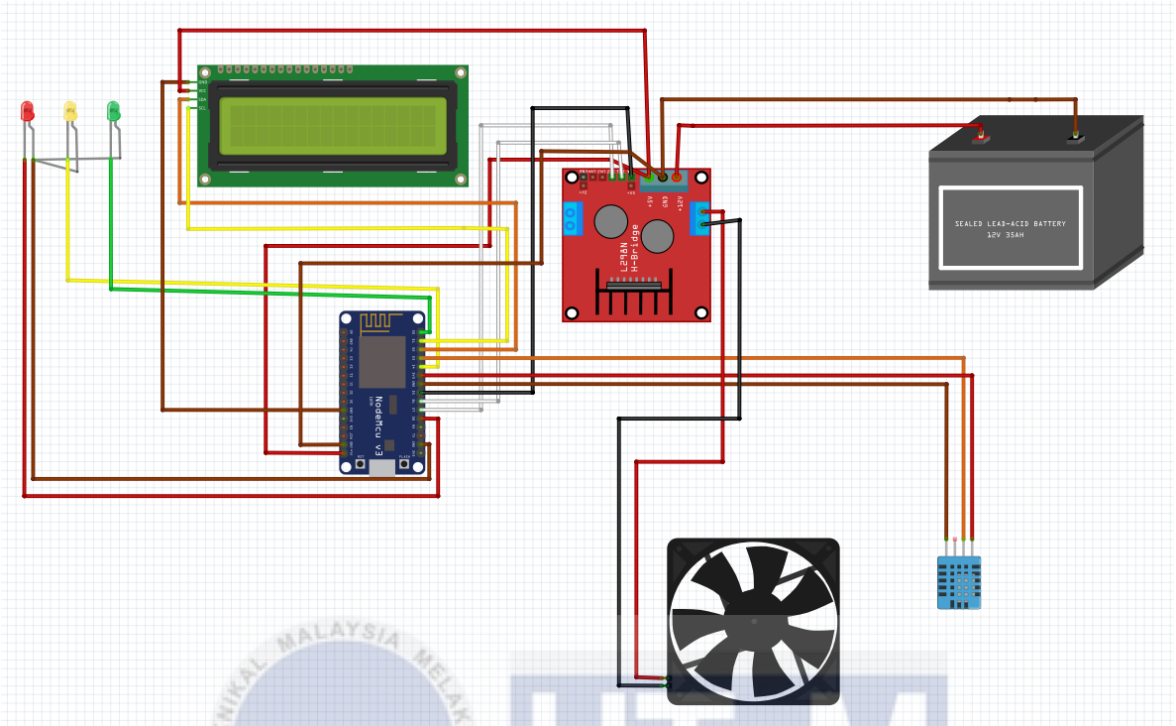


Figure 3.10 Circuit Schematic for the prototype

3.7 PULSE WIDTH MODULATION

The motor's rotational speed may be adjusted using the single-chip microcomputer's PWM. The single-chip microcomputer's software is used to implement PWM-based speed control. PWM is a modulation technique that controls the level of output quantities and waveform by modifying the PWM sequences according to predefined criteria. Rectangular waveform PWM signals are most frequently employed in the regulating system for PWM driving control, and the duty ratio of PWM waves must be adjusted during modulation. Duty ratio is a term that refers to the proportion of time spent at a high level throughout a period of time. When managing the rotation motor speed, the duty ratio determines the rotation speed.

The greater the duty ratio, the faster the rotation speed. When the duty ratio hits 100%, that is, when all PWM waves are at their highest level, the fan rotates at maximum speed.

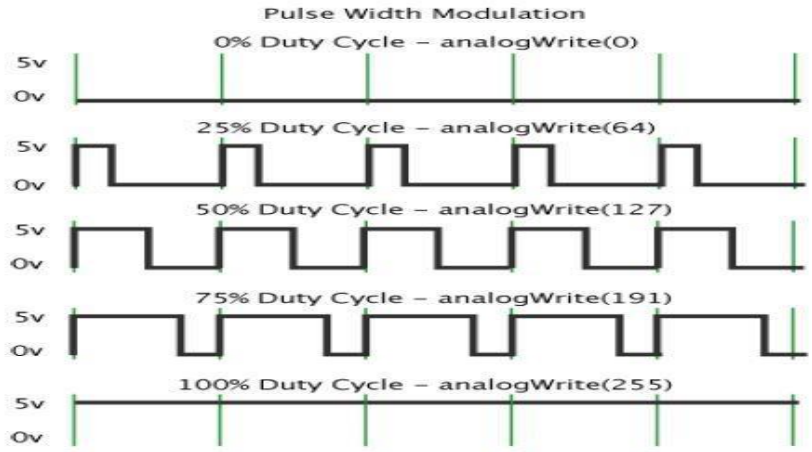


Figure 3.11 PWM

3.8 DHT11 SENSOR

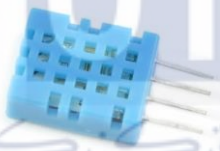


Figure 3.12 Example of DHT11 Sensor

A DHT 11 sensor is made up from two parts which is a capacitive humidity sensor and a thermistor. There is also a small chip inside that transforms analogue to digital and deliver a digital signal containing the temperature and humidity. Any microcontroller can easily interpret the digital signal.

3.9 BLYNK APP

This app is a modern platform that lets you quickly and easily make interfaces to manage and monitor any iOS or Android hardware projects. When you download the Blynk software,

you can design the project dashboard. You can set up buttons, sliders, graphs, and other widgets on the screen to show how the project is going.

Major	Function
Blynk App	helps you to quickly and easily design outstanding user interfaces for any tasks by combining various widgets
Blynkk Server	this server is in charge of all smartphone-to-hardware connection. You may use our Blynk Cloud to host own private Blynk server locally. It is capable of easily managing thousands of appliances, and can even be started on a Raspberry Pi
Blynk Libraries	The Blynk Libraries enable connectivity with the server and handle all incoming commands on all major hardware platforms

Figure 3.13 Table of Major And Function

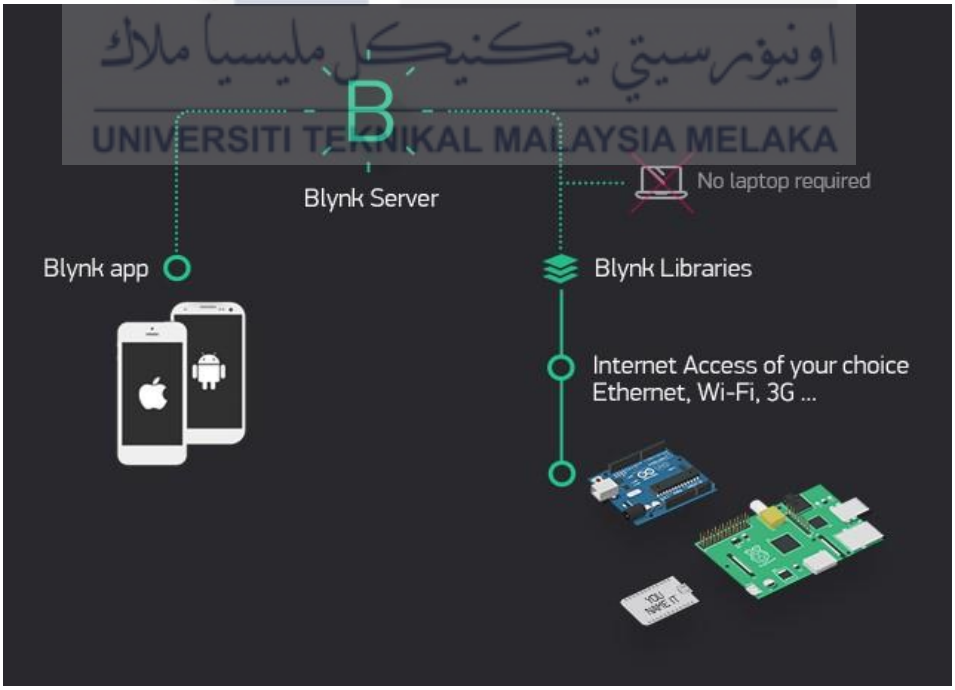


Figure 3.14 Blynk Server

3.10 THINGSPEAK IoT

ThingSpeakTM is an IoT Analytics Cloud platform for aggregating, visualising and analysing live data streams. ThingSpeak offers real-time visualisation of data from your devices submitted to ThingSpeak. By running MATLAB inside ThingSpeak, you can examine and process data in real time. ThingSpeak is often used in prototyping IoT system or proof of concept requiring analysis. IoT sometimes referred to as the Internet of everything and the Industrial Internet is a new technology paradigm envisioned as a worldwide network of interconnected equipment and gadgets. IoT is thought to be an important part of growth technology, and it's getting a lot of attention from a wide range of businesses.

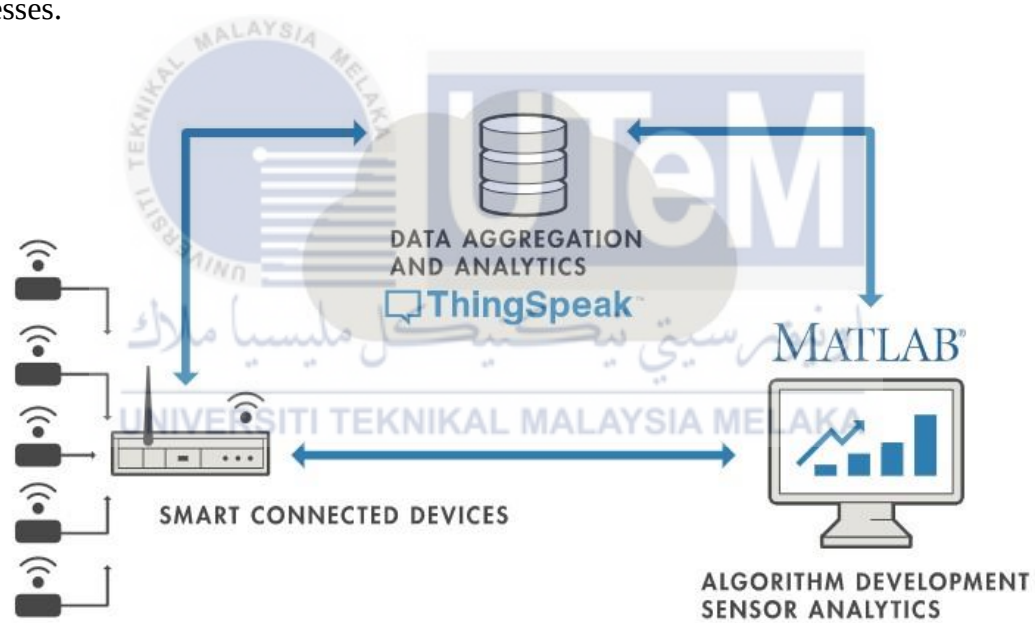


Figure 3.15 Diagram of IoT System

3.11 MOTOR CONTROLLER (L298N)

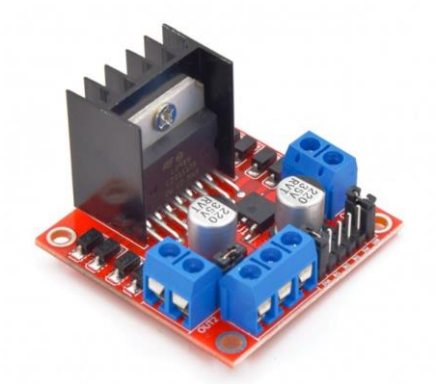


Figure 3.16 Example of Motor Controller

This is a device or combination of devices that may be used to programmatically control the operation of an electric motor. A motor controller is capable of starting and halting the motors, deciding or forward reverse primer, choosing or regulating the speed, controlling or restricting the torque, and guarding against overloads or electrical failures. Motor controllers can employ electromechanical switches or power electronics to regulate both direction and speed of a motor.

3.12 ESP8266

Figure 3.17 Example of ESP2866

This is a really Wi-Fi system-on-a-chip (SOC) targeted towards IoT applications. The ESP8266 is widely being used in IoT devices because to its cheap price, small size, and flexibility to embedded devices. Despite being outclassed by the newer ESP32 microcontroller chip, this ESP8266 remains a popular option for IoT designers and users.

3.13 12V DV FAN

Figure 3.18 12V DC Fan

Use less power than AC fans. Most dc fans have low voltage. There are a lot of DC fans that come in five-volt, 12-volt, and 24-volt models. A lot of big DC fans, like the 119mm to 173m fan types, are available at 48V. At 115V, most types of AC fans are available. This is a much higher voltage than the other types of AC fans. The dc fan is less dangerous when the voltage is lower.

3.14 LIQUID CRYSTAL DISPLAY (LCD)

LCD stands for a flat-screen display that can show anything, like a 7-segment digital clock and a digit interface. LCD stands for a type of flat-screen display. During the project's prototype, the 16 x 2 line-LCD screen was used to show the value of the sensor reading. Figure 3.10 shows a 16 x 2-line LCD screen.

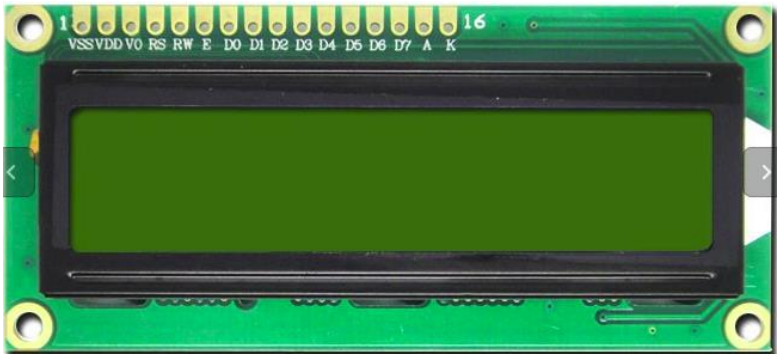


Figure 3.19 LCD Display

3.15 12V LEAD BATTERY

Figure 3.20 12V Lead Battery

In most cars, batteries that have 12 volts are used as the batteries. This is one of the most common ways to use a 12 volt battery, like in cars and boats. In these cases, the battery may be able to be recharged because it only needs to be charged to start the car. In this project requires 3.7V operating voltage to make the all the component functioning.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 RESULT AND ANALYSIS

DHT11sensor detects the environment's temperature and displays the readings on the Blynk. The fan's speed is adjusted in response to the temperature sensed. Analog signals are converted to digital signals using a digital converter.

The microcontroller utilised is used to adjust the duty cycle and speed of the fan. By adjusting fan speed, the duty cycle can automatically changed in response to temperature sensor data. The following table illustrates the relationship:

No.	Temperature (In°□□	Fan Speed	LED
1.	29° □□d □□□□	No	No LED
2.	30° □□ 32°	Minimum	Green
3.	33° □□ 3□°	Medium	Yellow
4.	36° □□d □□□□□	Maximum	Red

Table 4.1 Temperature, Fan Speed and LED

4.2 RESULT DURING THE DAY

For the results I have recorded during the day, there are some humidity differences for the entire temperature. This causes the moisture in the air to dry out as the temperature rises during the day.

4.2.1 RESULT FOR 30° CELCIUS (DAY)

Figure 4.1 Result for 30°C (Days)

When the temperature is 31 degree celcius, the LCD will show that the fan speed is minimum (slow speed) and the LED will turn green light. The result of humidity is 74% is Blynk Application (in smartphone) and 73% in ThingSpeak (in laptop).

4.2.2 RESULT FOR 31° CELCIUS (DAY)

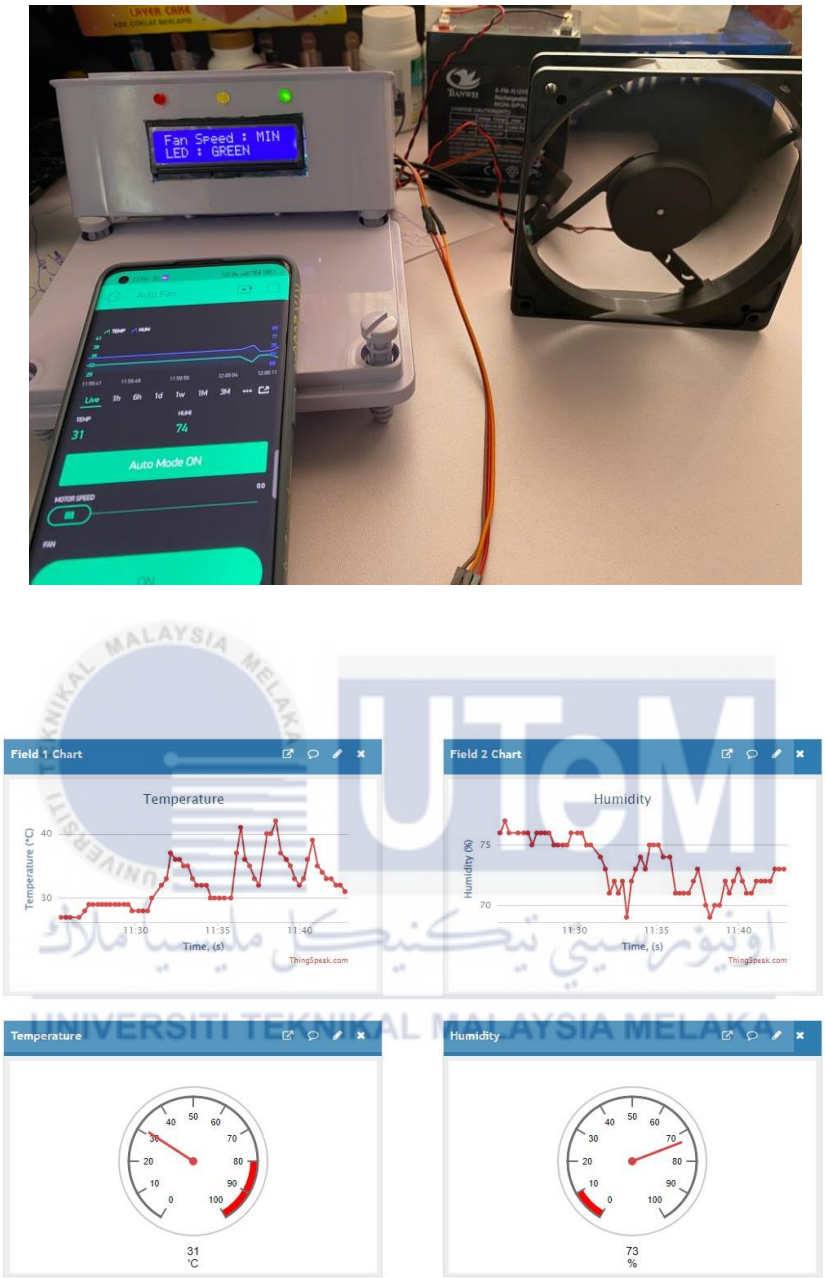


Figure 4.2 Result for 31°C (Days)

When the temperature is 31 degree celcius, the LCD will show that the fan speed is minimum (slow speed) and the LED will turn green light. The result of humidity is 74% is Blynk Application (in smartphone) and 73% in ThingSpeak (in laptop).

4.2.3 RESULT FOR 32° CELCIUS (DAY)

Figure 4.3 Result for 32°C (Days)

When the temperature is 33 degree celcius, the LCD will show that the fan speed is minimum (slow speed) and the LED will turn green light. The result of humidity is 72% is Blynk Application (in smartphone) and 73% in ThingSpeak (in laptop).

4.2.4 RESULT FOR 33° CELCIUS (DAY)

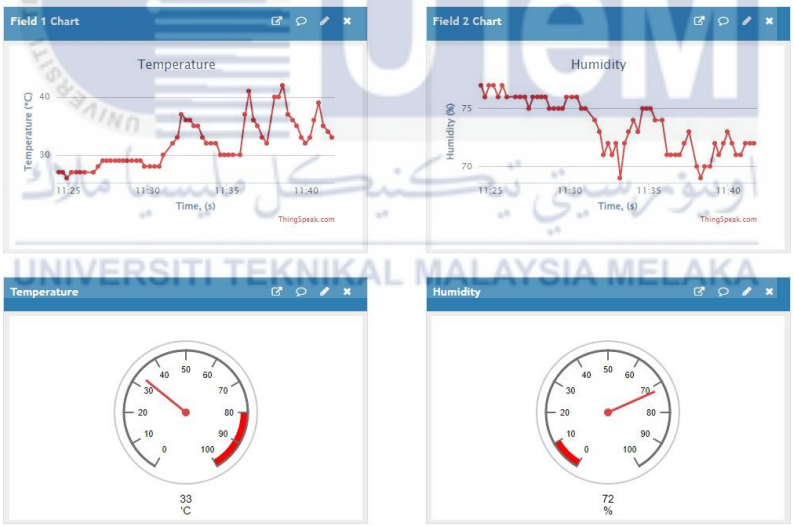


Figure 4.4 Result for 33°C (Days)

When the temperature is 33 degree celcius, the LCD will show that the fan speed is medium (normal speed) and the LED will turn yellow light. The result of humidity is 72% is Blynk Application (in smartphone) and 72% in ThingSpeak (in laptop).

4.2.5 RESULT FOR 35° CELCIUS (DAY)

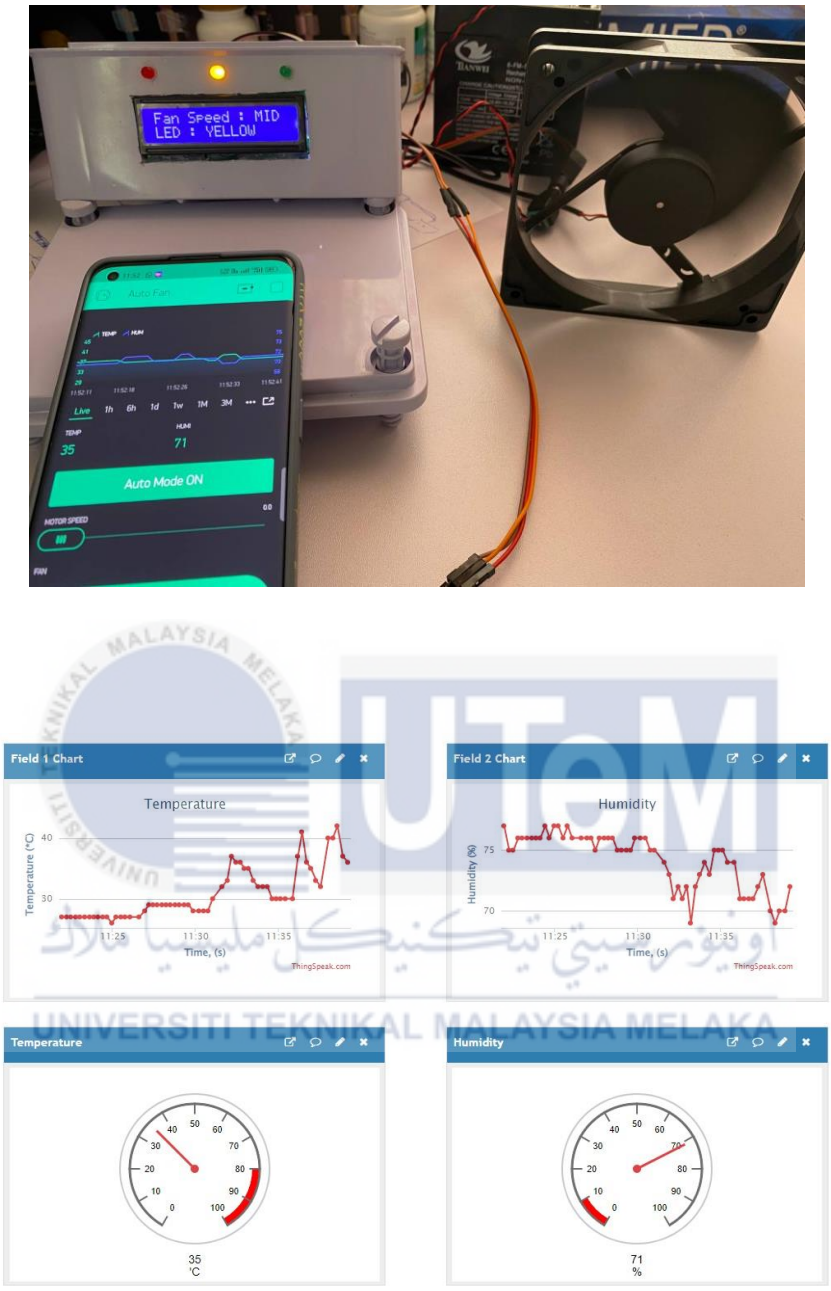


Figure 4.5 Result for 35°C (Days)

When the temperature is 35 degree celcius, the LCD will show that the fan speed is medium (normal speed) and the LED will turn yellow light. The result of humidity is 71% is Blynk Application (in smartphone) and 71% in ThingSpeak (in laptop).

4.2.6 RESULT FOR 36° CELCIUS (DAY)

Figure 4.6 Result for 36°C (Days)

When the temperature is 36 degree celcius, the LCD will show that the fan speed is maximum (fast speed) and the LED will turn red light. The result of humidity is 72% is Blynk Application (in smartphone) and 72% in ThingSpeak (in laptop).

4.2.7 RESULT FOR 37° CELCIUS (DAY)

Figure 4.7 Result for 37°C (Days)

When the temperature is 37 degree celcius, the LCD will show that the fan speed is maximum (fast speed) and the LED will turn red light. The result of humidity is 71% is Blynk Application (in smartphone) and 72% in ThingSpeak (in laptop).

4.3 RESULT DURING THE NIGHT

For the results I have recorded during the time period, there are some humidity differences for the entire temperature. This is because the humidity in the air becomes humid as the temperature gets lower at night.

4.3.1 RESULT FOR 30° CELCIUS (NIGHT)

Figure 4.8 Result for 30°C (Night)

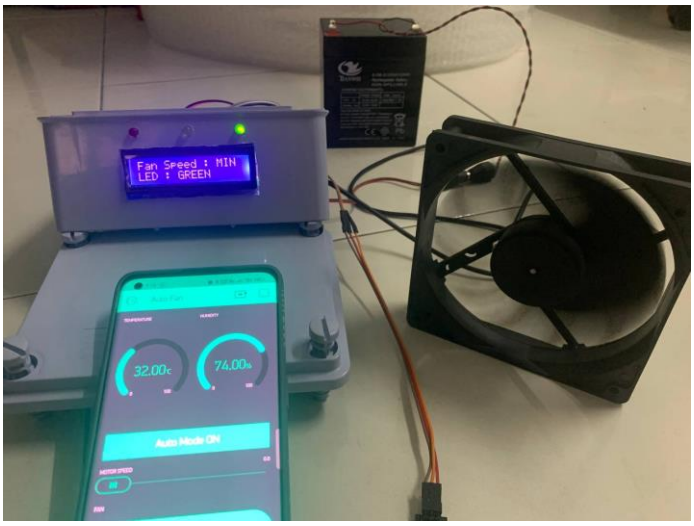
When the temperature is 30 degree celcius, the LCD will show that the fan speed is minimum (slow speed) and the LED will turn green light. The result of humidity is 72% is Blynk Application (in smartphone) and 72% in ThingSpeak (in laptop).

4.3.2 RESULT FOR 31° CELCIUS (NIGHT)

Figure 4.9 Result for 31°C (Night)

When the temperature is 31 degree celcius, the LCD will show that the fan speed is minimum (slow speed) and the LED will turn green light. The result of humidity is 74% is Blynk Application (in smartphone) and 73% in ThingSpeak (in laptop).

4.3.3 RESULT FOR 32° CELCIUS (NIGHT)



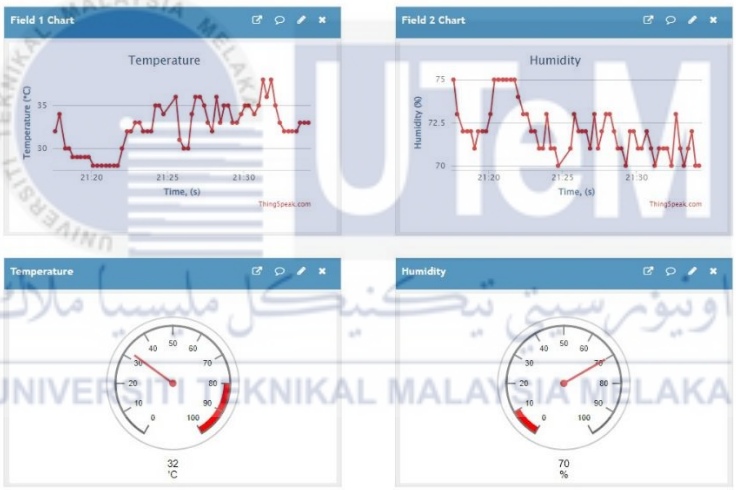


Figure 4.10 Result for 32°C (Night)

When the temperature is 32 degree celcius, the LCD will show that the fan speed is minimum (slow speed) and the LED will turn green light. The result of humidity is 74% is Blynk Application (in smartphone) and 72% in ThingSpeak (in laptop).

4.3.4 RESULT FOR 33° CELCIUS (NIGHT)

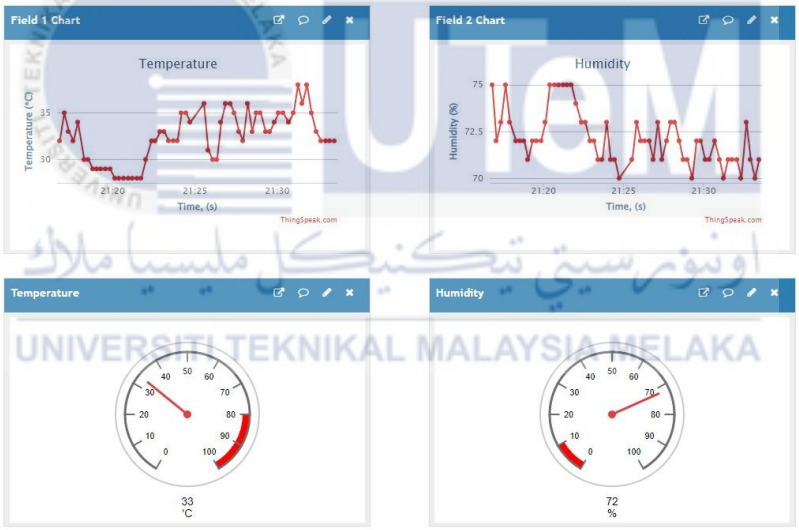


Figure 4.11 Result for 33°C (Night)

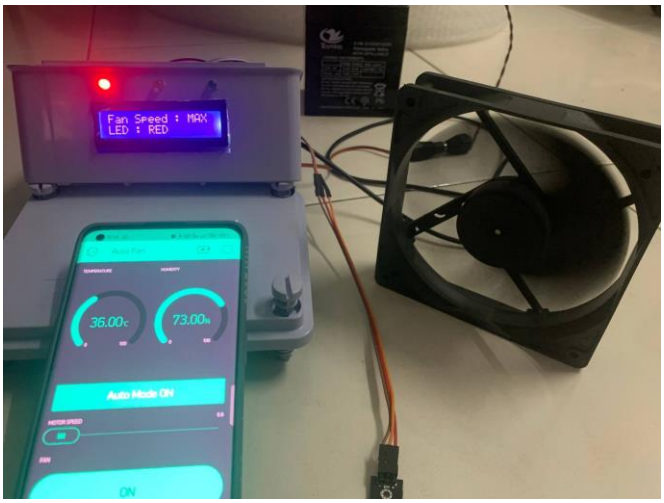
When the temperature is 33 degree celcius, the LCD will show that the fan speed is medium (normal speed) and the LED will turn yellow light. The result of humidity is 73% is Blynk Application (in smartphone) and 72% in ThingSpeak (in laptop).

4.3.5 RESULT FOR 35° CELCIUS (NIGHT)

Figure 4.12 Result for 35°C (Night)

When the temperature is 35 degree celcius, the LCD will show that the fan speed is medium (normal speed) and the LED will turn yellow light. The result of humidity is 72% is Blynk Application (in smartphone) and 71% in ThingSpeak (in laptop).

4.3.6 RESULT FOR 36° CELCIUS (NIGHT)



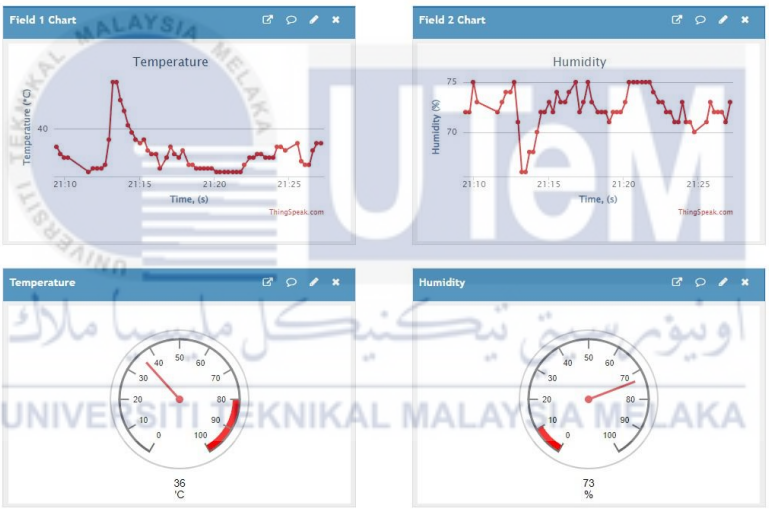


Figure 4.13 Result for 36°C (Night)

When the temperature is 36 degree celcius, the LCD will show that the fan speed is maximum (fast speed) and the LED will turn red light. The result of humidity is 73% is Blynk Application (in smartphone) and 73% in ThingSpeak (in laptop).

4.3.7 RESULT FOR 37° CELCIUS (NIGHT)

Figure 4.14 Result for 37°C (Night)

When the temperature is 37 degree celcius, the LCD will show that the fan speed is maximum (fast speed) and the LED will turn red light. The result of humidity is 72% is Blynk Application (in smartphone) and 70% in ThingSpeak (in laptop).

4.4 DATA COLLECTION IN MONITORING THE TEMPERATURE AND HUMIDITY IN ROOM

When the temperature and humidity in the room change, the control system takes note of it every minute. The storage server keeps track of the temperature and humidity. This is what I did in this case. I used a big storage box that presented as a room to put the prototype in so that I could get data like temperature and humidity. The length is 79cm, weight is 57.7kg and height is 49cm.

Figure 4.15 Front part of storage box

Figure 4.16 Side part of storage box

Figure 4.17 Prototype position in storage box

4.4.1 Data In Morning

Figure 4.18 Chart of Temperature and Humidity In Morning

Time	Temperature (In°C)	Humidity (In %)
2022-01-14T09:05:21+08:00	26	69.00
2022-01-14T09:05:37+08:00	26	69.00
2022-01-14T09:05:53+08:00	26	69.00
2022-01-14T09:06:09+08:00	26	69.00
2022-01-14T09:06:24+08:00	26	69.00
2022-01-14T09:06:40+08:00	26	69.00

2022-01-14T09:06:55+08:00	26	69.00
2022-01-14T09:07:11+08:00	26	69.00
2022-01-14T09:07:26+08:00	26	69.00
2022-01-14T09:07:42+08:00	26	69.00
2022-01-14T09:07:57+08:00	26	69.00
2022-01-14T09:08:12+08:00	26	69.00
2022-01-14T09:08:30+08:00	26	69.00
2022-01-14T09:08:46+08:00	26	70.00
2022-01-14T09:09:01+08:00	26	69.00
2022-01-14T09:09:16+08:00	26	69.00
2022-01-14T09:09:31+08:00	26	69.00
2022-01-14T09:09:47+08:00	26	69.00
2022-01-14T09:10:03+08:00	26	69.00
2022-01-14T09:10:18+08:00	26	70.00
2022-01-14T09:10:34+08:00	26	69.00
2022-01-14T09:10:50+08:00	26	69.00
2022-01-14T09:11:07+08:00	27	68.00
2022-01-14T09:11:22+08:00	26	69.00
2022-01-14T09:11:38+08:00	26	69.00
2022-01-14T09:11:54+08:00	26	69.00
2022-01-14T09:12:11+08:00	26	70.00
2022-01-14T09:12:27+08:00	26	69.00
2022-01-14T09:12:42+08:00	26	70.00
2022-01-14T09:12:59+08:00	26	69.00
2022-01-14T09:13:14+08:00	26	69.00

2022-01-14T09:13:29+08:00	26	70.00
2022-01-14T09:13:46+08:00	26	70.00
2022-01-14T09:14:01+08:00	26	69.00
2022-01-14T09:14:17+08:00	26	70.00
2022-01-14T09:14:33+08:00	26	69.00
2022-01-14T09:14:48+08:00	26	69.00
2022-01-14T09:15:04+08:00	26	69.00
2022-01-14T09:15:19+08:00	26	69.00
2022-01-14T09:15:35+08:00	26	69.00
2022-01-14T09:15:50+08:00	26	69.00
2022-01-14T09:16:06+08:00	26	69.00
2022-01-14T09:16:21+08:00	26	69.00
2022-01-14T09:16:37+08:00	26	69.00
2022-01-14T09:16:54+08:00	26	69.00
2022-01-14T09:17:12+08:00	26	70.00
2022-01-14T09:17:27+08:00	26	69.00
2022-01-14T09:17:43+08:00	26	69.00
2022-01-14T09:17:58+08:00	26	69.00
2022-01-14T09:18:15+08:00	29	68.00
2022-01-14T09:18:31+08:00	26	69.00
2022-01-14T09:18:48+08:00	26	69.00
2022-01-14T09:19:03+08:00	26	69.00
2022-01-14T09:19:19+08:00	26	69.00
2022-01-14T09:19:35+08:00	26	69.00
2022-01-14T09:19:52+08:00	29	67.00

2022-01-14T09:20:08+08:00	26	69.00
2022-01-14T09:20:24+08:00	26	69.00
2022-01-14T09:20:40+08:00	26	69.00
2022-01-14T09:20:57+08:00	26	69.00
2022-01-14T09:21:14+08:00	26	69.00
2022-01-14T09:21:32+08:00	26	69.00
2022-01-14T09:21:47+08:00	26	69.00
2022-01-14T09:22:02+08:00	26	69.00
2022-01-14T09:22:17+08:00	26	69.00
2022-01-14T09:22:32+08:00	26	69.00
2022-01-14T09:22:49+08:00	26	69.00
2022-01-14T09:23:10+08:00	26	69.00
2022-01-14T09:23:26+08:00	26	69.00
2022-01-14T09:23:42+08:00	26	69.00
2022-01-14T09:23:57+08:00	26	69.00
2022-01-14T09:24:13+08:00	26	69.00
2022-01-14T09:24:29+08:00	26	69.00
2022-01-14T09:24:45+08:00	26	69.00
2022-01-14T09:25:01+08:00	26	69.00
2022-01-14T09:25:18+08:00	26	69.00
2022-01-14T09:25:34+08:00	26	69.00
2022-01-14T09:25:50+08:00	26	69.00
2022-01-14T09:26:05+08:00	26	69.00
2022-01-14T09:26:21+08:00	26	69.00
2022-01-14T09:26:37+08:00	26	69.00

2022-01-14T09:26:52+08:00	26	69.00
2022-01-14T09:27:08+08:00	26	69.00
2022-01-14T09:27:24+08:00	26	69.00
2022-01-14T09:27:40+08:00	26	69.00
2022-01-14T09:27:55+08:00	26	69.00
2022-01-14T09:28:10+08:00	26	69.00
2022-01-14T09:28:25+08:00	26	69.00
2022-01-14T09:28:41+08:00	26	69.00
2022-01-14T09:28:57+08:00	26	69.00
2022-01-14T09:29:12+08:00	26	69.00
2022-01-14T09:29:28+08:00	26	69.00
2022-01-14T09:29:43+08:00	26	69.00
2022-01-14T09:29:59+08:00	26	69.00
2022-01-14T09:30:17+08:00	26	69.00
2022-01-14T09:30:33+08:00	26	69.00
2022-01-14T09:30:48+08:00	26	69.00
2022-01-14T09:31:03+08:00	26	69.00
2022-01-14T09:31:19+08:00	26	69.00
2022-01-14T09:31:35+08:00	26	69.00
2022-01-14T09:31:51+08:00	26	69.00
2022-01-14T09:32:07+08:00	26	69.00
2022-01-14T09:32:22+08:00	26	69.00
2022-01-14T09:32:38+08:00	26	69.00
2022-01-14T09:32:53+08:00	26	69.00
2022-01-14T09:33:08+08:00	26	69.00

2022-01-14T09:33:24+08:00	26	69.00
2022-01-14T09:33:40+08:00	26	69.00
2022-01-14T09:33:56+08:00	26	70.00
2022-01-14T09:34:12+08:00	26	69.00
2022-01-14T09:34:29+08:00	26	69.00
2022-01-14T09:34:44+08:00	26	69.00
2022-01-14T09:35:00+08:00	26	70.00
2022-01-14T09:35:16+08:00	26	69.00
2022-01-14T09:35:31+08:00	26	69.00
2022-01-14T09:35:47+08:00	26	69.00
2022-01-14T09:36:02+08:00	26	69.00
2022-01-14T09:36:18+08:00	26	69.00
2022-01-14T09:36:33+08:00	26	69.00
2022-01-14T09:36:48+08:00	26	69.00
2022-01-14T09:37:04+08:00	26	69.00
2022-01-14T09:37:20+08:00	26	69.00
2022-01-14T09:37:35+08:00	26	69.00
2022-01-14T09:37:50+08:00	26	69.00
2022-01-14T09:38:06+08:00	26	69.00
2022-01-14T09:38:22+08:00	26	69.00
2022-01-14T09:38:39+08:00	27	68.00
2022-01-14T09:38:54+08:00	27	68.00
2022-01-14T09:39:10+08:00	26	69.00
2022-01-14T09:39:25+08:00	26	69.00
2022-01-14T09:39:41+08:00	27	68.00

2022-01-14T09:39:57+08:00	26	69.00
2022-01-14T09:40:12+08:00	27	68.00
2022-01-14T09:40:29+08:00	27	68.00
2022-01-14T09:40:45+08:00	27	68.00
2022-01-14T09:41:00+08:00	27	68.00
2022-01-14T09:41:17+08:00	27	68.00
2022-01-14T09:41:33+08:00	26	69.00
2022-01-14T09:41:48+08:00	27	68.00
2022-01-14T09:42:05+08:00	27	68.00
2022-01-14T09:42:20+08:00	27	68.00
2022-01-14T09:42:35+08:00	27	68.00
2022-01-14T09:42:51+08:00	27	68.00
2022-01-14T09:43:06+08:00	26	69.00
2022-01-14T09:43:22+08:00	27	68.00
2022-01-14T09:43:37+08:00	27	68.00
2022-01-14T09:43:54+08:00	27	68.00
2022-01-14T09:44:09+08:00	27	68.00
2022-01-14T09:44:25+08:00	27	68.00
2022-01-14T09:44:40+08:00	27	68.00
2022-01-14T09:44:56+08:00	27	68.00
2022-01-14T09:45:12+08:00	27	68.00
2022-01-14T09:45:30+08:00	27	68.00
2022-01-14T09:45:46+08:00	27	68.00
2022-01-14T09:46:01+08:00	27	68.00
2022-01-14T09:46:17+08:00	27	68.00

2022-01-14T09:46:33+08:00	27	68.00
2022-01-14T09:46:49+08:00	27	69.00
2022-01-14T09:47:04+08:00	27	68.00
2022-01-14T09:47:19+08:00	27	68.00
2022-01-14T09:47:35+08:00	27	68.00
2022-01-14T09:47:50+08:00	27	68.00
2022-01-14T09:48:06+08:00	27	68.00
2022-01-14T09:48:21+08:00	27	68.00
2022-01-14T09:48:38+08:00	30	68.00
2022-01-14T09:48:53+08:00	27	68.00
2022-01-14T09:49:10+08:00	27	68.00
2022-01-14T09:49:25+08:00	27	68.00
2022-01-14T09:49:41+08:00	27	68.00
2022-01-14T09:49:57+08:00	27	68.00
2022-01-14T09:50:12+08:00	27	68.00
2022-01-14T09:50:28+08:00	27	68.00
2022-01-14T09:50:44+08:00	27	68.00
2022-01-14T09:51:00+08:00	27	67.00
2022-01-14T09:51:17+08:00	27	68.00
2022-01-14T09:51:32+08:00	27	68.00
2022-01-14T09:51:48+08:00	27	68.00
2022-01-14T09:52:04+08:00	27	68.00
2022-01-14T09:52:20+08:00	27	68.00
2022-01-14T09:52:36+08:00	27	68.00
2022-01-14T09:52:51+08:00	27	68.00

2022-01-14T09:53:07+08:00	27	68.00
2022-01-14T09:53:25+08:00	27	68.00
2022-01-14T09:53:40+08:00	27	68.00
2022-01-14T09:53:56+08:00	27	67.00
2022-01-14T09:54:11+08:00	27	68.00
2022-01-14T09:54:28+08:00	27	68.00
2022-01-14T09:54:43+08:00	27	68.00
2022-01-14T09:54:58+08:00	27	68.00
2022-01-14T09:55:13+08:00	27	68.00
2022-01-14T09:55:29+08:00	27	68.00
2022-01-14T09:55:44+08:00	27	68.00
2022-01-14T09:56:00+08:00	27	67.00
2022-01-14T09:56:16+08:00	27	68.00
2022-01-14T09:56:31+08:00	27	68.00
2022-01-14T09:56:48+08:00	27	68.00
2022-01-14T09:57:03+08:00	27	68.00
2022-01-14T09:57:19+08:00	27	68.00
2022-01-14T09:57:35+08:00	27	68.00
2022-01-14T09:57:51+08:00	27	68.00
2022-01-14T09:58:06+08:00	27	68.00
2022-01-14T09:58:23+08:00	27	67.00
2022-01-14T09:58:39+08:00	26	69.00
2022-01-14T09:58:54+08:00	27	68.00
2022-01-14T09:59:09+08:00	27	68.00
2022-01-14T09:59:25+08:00	27	68.00

2022-01-14T09:59:41+08:00	27	68.00
2022-01-14T09:59:58+08:00	27	68.00
2022-01-14T10:00:13+08:00	27	68.00
2022-01-14T10:00:29+08:00	27	67.00
2022-01-14T10:00:44+08:00	27	68.00
2022-01-14T10:01:00+08:00	27	68.00
2022-01-14T10:01:19+08:00	27	68.00
2022-01-14T10:01:34+08:00	27	68.00
2022-01-14T10:01:50+08:00	27	68.00
2022-01-14T10:02:05+08:00	27	68.00
2022-01-14T10:02:20+08:00	27	68.00
2022-01-14T10:02:36+08:00	27	68.00
2022-01-14T10:02:52+08:00	27	68.00
2022-01-14T10:03:08+08:00	27	68.00
2022-01-14T10:03:25+08:00	27	68.00
2022-01-14T10:03:41+08:00	27	68.00
2022-01-14T10:03:56+08:00	27	68.00
2022-01-14T10:04:13+08:00	27	68.00
2022-01-14T10:04:28+08:00	29	67.00
2022-01-14T10:04:43+08:00	27	68.00
2022-01-14T10:04:59+08:00	27	68.00
2022-01-14T10:05:14+08:00	27	68.00
2022-01-14T10:05:30+08:00	27	68.00

Table 4.2 Data of Temperature and Humidty in Morning

The room is between 67 and 69 percent humid in the morning, with a temperature reading of 26 to 27 degrees Celsius.

4.4.2 DATA IN AFTERNOON

Figure 4.19 Chart of Temperature and Humidity In Afternoon

Time	Temperature (In°C)	Humidity (In %)
2022-01-14T12:23:01+08:00	26	72.00
2022-01-14T12:23:16+08:00	28	68.00
2022-01-14T12:23:32+08:00	33	67.00
2022-01-14T12:23:47+08:00	27	68.00
2022-01-14T12:24:03+08:00	27	68.00
2022-01-14T12:24:18+08:00	27	68.00
2022-01-14T12:24:33+08:00	27	68.00
2022-01-14T12:24:49+08:00	27	68.00
2022-01-14T12:25:05+08:00	27	68.00
2022-01-14T12:25:20+08:00	27	68.00
2022-01-14T12:25:36+08:00	27	68.00

2022-01-14T12:25:51+08:00	27	68.00
2022-01-14T12:26:07+08:00	27	68.00
2022-01-14T12:26:22+08:00	27	68.00
2022-01-14T12:26:38+08:00	27	68.00
2022-01-14T12:26:53+08:00	27	68.00
2022-01-14T12:27:09+08:00	27	68.00
2022-01-14T12:30:11+08:00	28	68.00
2022-01-14T12:30:27+08:00	28	68.00
2022-01-14T12:30:42+08:00	28	68.00
2022-01-14T12:30:58+08:00	28	68.00
2022-01-14T12:31:13+08:00	28	68.00
2022-01-14T12:31:29+08:00	28	68.00
2022-01-14T12:31:44+08:00	28	68.00
2022-01-14T12:32:00+08:00	28	68.00
2022-01-14T12:32:16+08:00	28	68.00
2022-01-14T12:32:31+08:00	28	68.00
2022-01-14T12:32:48+08:00	28	68.00
2022-01-14T12:33:03+08:00	28	68.00
2022-01-14T12:33:19+08:00	28	68.00
2022-01-14T12:33:34+08:00	28	68.00
2022-01-14T12:33:50+08:00	29	67.00
2022-01-14T12:34:05+08:00	29	67.00
2022-01-14T12:34:21+08:00	29	67.00
2022-01-14T12:34:36+08:00	29	67.00
2022-01-14T12:34:52+08:00	32	67.00

2022-01-14T12:35:08+08:00	29	67.00
2022-01-14T12:35:24+08:00	29	67.00
2022-01-14T12:35:39+08:00	29	67.00
2022-01-14T12:35:55+08:00	29	67.00
2022-01-14T12:36:12+08:00	29	67.00
2022-01-14T12:36:29+08:00	29	67.00
2022-01-14T12:36:46+08:00	29	67.00
2022-01-14T12:37:01+08:00	29	67.00
2022-01-14T12:37:17+08:00	29	67.00
2022-01-14T12:37:33+08:00	29	67.00
2022-01-14T12:37:48+08:00	29	67.00
2022-01-14T12:38:04+08:00	29	67.00
2022-01-14T12:38:19+08:00	29	67.00
2022-01-14T12:38:35+08:00	29	67.00
2022-01-14T12:38:50+08:00	29	67.00
2022-01-14T12:39:07+08:00	29	67.00
2022-01-14T12:39:23+08:00	29	67.00
2022-01-14T12:39:38+08:00	29	67.00
2022-01-14T12:39:56+08:00	29	67.00
2022-01-14T12:40:12+08:00	29	67.00
2022-01-14T12:40:27+08:00	29	67.00
2022-01-14T12:40:43+08:00	29	67.00
2022-01-14T12:40:59+08:00	29	67.00
2022-01-14T12:41:15+08:00	29	67.00
2022-01-14T12:41:31+08:00	29	67.00

2022-01-14T12:41:47+08:00	29	67.00
2022-01-14T12:42:02+08:00	29	67.00
2022-01-14T12:42:18+08:00	29	67.00
2022-01-14T12:42:33+08:00	29	67.00
2022-01-14T12:42:48+08:00	29	67.00
2022-01-14T12:43:04+08:00	29	67.00
2022-01-14T12:43:21+08:00	29	67.00
2022-01-14T12:43:36+08:00	30	67.00
2022-01-14T12:43:54+08:00	29	67.00
2022-01-14T12:44:09+08:00	30	67.00
2022-01-14T12:44:24+08:00	30	67.00
2022-01-14T12:44:40+08:00	29	67.00
2022-01-14T12:44:56+08:00	30	67.00
2022-01-14T12:45:11+08:00	30	67.00
2022-01-14T12:45:27+08:00	30	69.00
2022-01-14T12:45:42+08:00	30	67.00
2022-01-14T12:45:57+08:00	30	67.00
2022-01-14T12:46:13+08:00	30	67.00
2022-01-14T12:46:29+08:00	30	67.00
2022-01-14T12:46:44+08:00	30	68.00
2022-01-14T12:46:59+08:00	30	67.00
2022-01-14T12:47:15+08:00	30	67.00
2022-01-14T12:47:31+08:00	30	67.00
2022-01-14T12:47:46+08:00	30	67.00
2022-01-14T12:48:01+08:00	30	67.00

2022-01-14T12:48:17+08:00	30	67.00
2022-01-14T12:48:32+08:00	30	68.00
2022-01-14T12:48:47+08:00	30	67.00
2022-01-14T12:49:03+08:00	30	68.00
2022-01-14T12:49:18+08:00	30	67.00
2022-01-14T12:49:35+08:00	30	67.00
2022-01-14T12:49:51+08:00	30	67.00
2022-01-14T12:50:09+08:00	30	67.00
2022-01-14T12:50:24+08:00	30	68.00
2022-01-14T12:50:40+08:00	30	67.00
2022-01-14T12:50:56+08:00	30	67.00
2022-01-14T12:51:12+08:00	30	67.00
2022-01-14T12:51:28+08:00	30	67.00
2022-01-14T12:51:43+08:00	30	67.00
2022-01-14T12:51:59+08:00	30	67.00
2022-01-14T12:52:16+08:00	30	67.00
2022-01-14T12:52:31+08:00	30	67.00
2022-01-14T12:52:48+08:00	30	67.00
2022-01-14T12:53:03+08:00	30	67.00
2022-01-14T12:53:18+08:00	30	67.00
2022-01-14T12:53:34+08:00	30	67.00
2022-01-14T12:53:50+08:00	30	67.00
2022-01-14T12:54:05+08:00	30	67.00
2022-01-14T12:54:20+08:00	30	67.00
2022-01-14T12:54:36+08:00	30	67.00

2022-01-14T12:54:51+08:00	30	67.00
2022-01-14T12:55:07+08:00	30	68.00
2022-01-14T12:55:23+08:00	30	67.00
2022-01-14T12:55:39+08:00	30	67.00
2022-01-14T12:55:55+08:00	30	67.00
2022-01-14T12:56:10+08:00	30	67.00
2022-01-14T12:56:25+08:00	30	67.00
2022-01-14T12:56:42+08:00	30	68.00
2022-01-14T12:56:58+08:00	30	67.00
2022-01-14T12:57:13+08:00	30	67.00
2022-01-14T12:57:29+08:00	30	68.00
2022-01-14T12:57:44+08:00	30	67.00
2022-01-14T12:58:00+08:00	33	65.00
2022-01-14T12:58:15+08:00	30	68.00
2022-01-14T12:58:31+08:00	30	67.00
2022-01-14T12:58:46+08:00	30	68.00
2022-01-14T12:59:02+08:00	30	68.00
2022-01-14T12:59:18+08:00	30	67.00
2022-01-14T12:59:34+08:00	30	67.00
2022-01-14T12:59:49+08:00	30	67.00
2022-01-14T13:00:04+08:00	30	68.00
2022-01-14T13:00:19+08:00	30	68.00
2022-01-14T13:00:34+08:00	30	67.00
2022-01-14T13:00:49+08:00	30	67.00
2022-01-14T13:01:05+08:00	30	67.00

2022-01-14T13:01:20+08:00	30	68.00
2022-01-14T13:01:36+08:00	30	67.00
2022-01-14T13:01:51+08:00	30	68.00
2022-01-14T13:02:07+08:00	30	68.00
2022-01-14T13:02:22+08:00	30	68.00
2022-01-14T13:02:39+08:00	30	68.00
2022-01-14T13:02:54+08:00	30	68.00
2022-01-14T13:03:10+08:00	30	68.00
2022-01-14T13:03:25+08:00	30	68.00
2022-01-14T13:03:41+08:00	30	68.00
2022-01-14T13:03:57+08:00	30	67.00
2022-01-14T13:04:12+08:00	30	67.00
2022-01-14T13:04:27+08:00	30	68.00
2022-01-14T13:04:42+08:00	30	68.00
2022-01-14T13:04:57+08:00	30	68.00
2022-01-14T13:05:12+08:00	30	67.00
2022-01-14T13:05:27+08:00	30	67.00
2022-01-14T13:05:43+08:00	30	68.00
2022-01-14T13:05:59+08:00	30	67.00
2022-01-14T13:06:14+08:00	30	67.00
2022-01-14T13:06:30+08:00	30	68.00
2022-01-14T13:06:45+08:00	30	68.00
2022-01-14T13:07:00+08:00	30	68.00
2022-01-14T13:07:17+08:00	30	68.00
2022-01-14T13:07:33+08:00	30	67.00

2022-01-14T13:07:48+08:00	30	67.00
2022-01-14T13:08:04+08:00	30	67.00
2022-01-14T13:08:20+08:00	30	68.00
2022-01-14T13:08:36+08:00	30	68.00
2022-01-14T13:08:51+08:00	30	67.00
2022-01-14T13:09:08+08:00	30	67.00
2022-01-14T13:09:23+08:00	30	67.00
2022-01-14T13:09:39+08:00	30	67.00
2022-01-14T13:09:54+08:00	30	67.00
2022-01-14T13:10:11+08:00	30	67.00
2022-01-14T13:10:27+08:00	30	67.00
2022-01-14T13:10:42+08:00	30	67.00
2022-01-14T13:10:58+08:00	30	67.00
2022-01-14T13:11:13+08:00	30	67.00
2022-01-14T13:11:29+08:00	30	67.00
2022-01-14T13:11:44+08:00	30	68.00
2022-01-14T13:12:00+08:00	30	68.00
2022-01-14T13:12:16+08:00	30	67.00
2022-01-14T13:12:31+08:00	30	68.00
2022-01-14T13:12:46+08:00	30	67.00
2022-01-14T13:13:02+08:00	30	67.00
2022-01-14T13:13:17+08:00	30	67.00
2022-01-14T13:13:33+08:00	30	67.00
2022-01-14T13:13:48+08:00	30	67.00
2022-01-14T13:14:03+08:00	30	67.00

2022-01-14T13:14:20+08:00	30	67.00
2022-01-14T13:14:35+08:00	30	67.00
2022-01-14T13:14:50+08:00	30	67.00
2022-01-14T13:15:06+08:00	30	67.00
2022-01-14T13:15:21+08:00	30	67.00
2022-01-14T13:15:37+08:00	30	67.00
2022-01-14T13:15:52+08:00	30	67.00
2022-01-14T13:16:11+08:00	30	67.00
2022-01-14T13:16:26+08:00	30	67.00
2022-01-14T13:16:42+08:00	30	67.00
2022-01-14T13:16:57+08:00	30	66.00
2022-01-14T13:17:14+08:00	30	66.00
2022-01-14T13:17:30+08:00	30	66.00
2022-01-14T13:17:47+08:00	30	66.00
2022-01-14T13:18:04+08:00	30	66.00
2022-01-14T13:18:19+08:00	30	66.00
2022-01-14T13:18:34+08:00	30	66.00
2022-01-14T13:18:49+08:00	30	66.00
2022-01-14T13:19:04+08:00	30	66.00
2022-01-14T13:19:20+08:00	30	66.00
2022-01-14T13:19:39+08:00	30	66.00
2022-01-14T13:19:54+08:00	30	67.00
2022-01-14T13:20:13+08:00	30	67.00
2022-01-14T13:20:28+08:00	30	66.00
2022-01-14T13:20:44+08:00	30	67.00

2022-01-14T13:21:00+08:00	30	66.00
2022-01-14T13:21:15+08:00	30	67.00
2022-01-14T13:21:32+08:00	30	67.00
2022-01-14T13:21:47+08:00	30	67.00
2022-01-14T13:22:03+08:00	30	66.00
2022-01-14T13:22:18+08:00	30	66.00
2022-01-14T13:22:34+08:00	30	66.00
2022-01-14T13:22:50+08:00	30	66.00
2022-01-14T13:23:06+08:00	30	66.00
2022-01-14T13:23:22+08:00	30	67.00
2022-01-14T13:23:38+08:00	30	66.00
2022-01-14T13:23:54+08:00	30	66.00

Table 4.3 Data of Temperature and Humidty inAfternoon

The room is between 66 and 72 percent humid in the afternoon, with a temperature reading of 27 to 30 degrees Celsius.

4.4.3 DATA IN EVENING

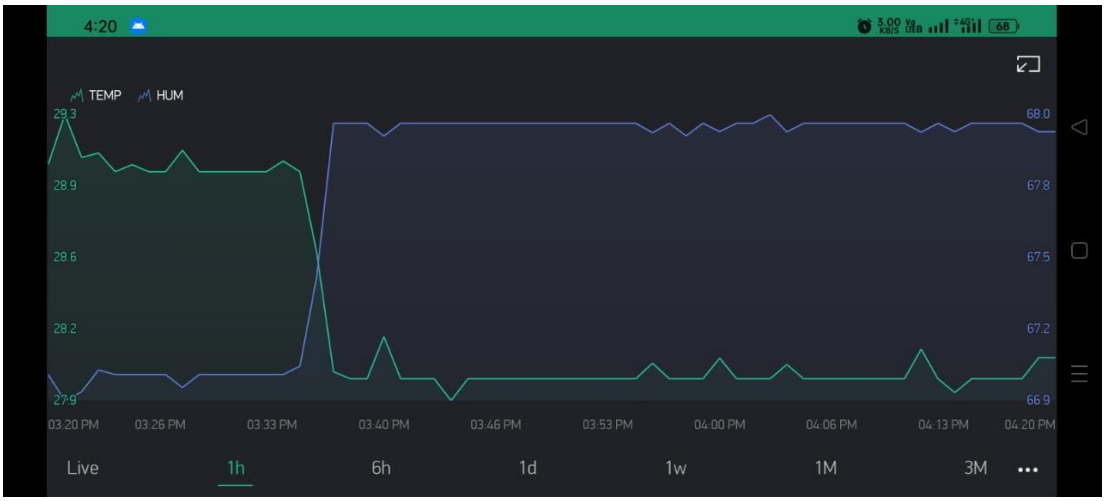


Figure 4.20 Chart of Temperature and Humidity In Evening

Time	Temperature (In°C)	Humidity (In %)
2022-01-14T15:20:02+08:00	29	67.00
2022-01-14T15:20:17+08:00	29	67.00
2022-01-14T15:20:33+08:00	29	67.00
2022-01-14T15:20:49+08:00	29	67.00
2022-01-14T15:21:06+08:00	29	67.00
2022-01-14T15:21:21+08:00	29	67.00
2022-01-14T15:21:36+08:00	29	67.00
2022-01-14T15:21:51+08:00	29	67.00
2022-01-14T15:22:07+08:00	29	67.00
2022-01-14T15:22:23+08:00	29	67.00
2022-01-14T15:22:39+08:00	29	67.00
2022-01-14T15:23:04+08:00	26	68.00
2022-01-14T15:23:19+08:00	29	67.00
2022-01-14T15:23:34+08:00	29	67.00
2022-01-14T15:23:49+08:00	29	67.00
2022-01-14T15:24:05+08:00	29	67.00
2022-01-14T15:24:20+08:00	29	67.00
2022-01-14T15:24:37+08:00	29	67.00
2022-01-14T15:24:53+08:00	29	67.00
2022-01-14T15:25:08+08:00	29	67.00
2022-01-14T15:25:23+08:00	29	67.00
2022-01-14T15:25:39+08:00	29	67.00
2022-01-14T15:25:54+08:00	29	67.00
2022-01-14T15:26:10+08:00	29	67.00

2022-01-14T15:26:28+08:00	29	67.00
2022-01-14T15:26:45+08:00	29	67.00
2022-01-14T15:27:02+08:00	29	67.00
2022-01-14T15:27:19+08:00	29	67.00
2022-01-14T15:27:35+08:00	29	67.00
2022-01-14T15:27:53+08:00	29	67.00
2022-01-14T15:28:10+08:00	29	67.00
2022-01-14T15:28:26+08:00	29	67.00
2022-01-14T15:28:44+08:00	29	67.00
2022-01-14T15:28:59+08:00	29	67.00
2022-01-14T15:29:14+08:00	29	67.00
2022-01-14T15:29:31+08:00	29	67.00
2022-01-14T15:29:46+08:00	29	67.00
2022-01-14T15:30:06+08:00	29	67.00
2022-01-14T15:30:22+08:00	29	67.00
2022-01-14T15:30:38+08:00	29	67.00
2022-01-14T15:30:54+08:00	29	67.00
2022-01-14T15:31:09+08:00	29	67.00
2022-01-14T15:31:24+08:00	29	67.00
2022-01-14T15:31:41+08:00	29	67.00
2022-01-14T15:31:57+08:00	29	67.00
2022-01-14T15:32:14+08:00	29	67.00
2022-01-14T15:32:29+08:00	29	67.00
2022-01-14T15:32:46+08:00	29	67.00
2022-01-14T15:33:02+08:00	29	67.00

2022-01-14T15:33:18+08:00	29	67.00
2022-01-14T15:33:33+08:00	29	67.00
2022-01-14T15:33:50+08:00	29	67.00
2022-01-14T15:34:05+08:00	29	67.00
2022-01-14T15:34:21+08:00	30	67.00
2022-01-14T15:34:36+08:00	29	67.00
2022-01-14T15:34:52+08:00	29	67.00
2022-01-14T15:35:08+08:00	29	67.00
2022-01-14T15:35:24+08:00	29	67.00
2022-01-14T15:35:40+08:00	29	67.00
2022-01-14T15:35:57+08:00	29	67.00
2022-01-14T15:36:13+08:00	29	67.00
2022-01-14T15:36:28+08:00	29	67.00
2022-01-14T15:36:44+08:00	28	68.00
2022-01-14T15:37:02+08:00	28	68.00
2022-01-14T15:37:17+08:00	28	68.00
2022-01-14T15:37:32+08:00	28	68.00
2022-01-14T15:37:48+08:00	28	68.00
2022-01-14T15:38:03+08:00	28	68.00
2022-01-14T15:38:19+08:00	28	68.00
2022-01-14T15:38:35+08:00	28	68.00
2022-01-14T15:38:50+08:00	28	68.00
2022-01-14T15:39:06+08:00	28	68.00
2022-01-14T15:39:21+08:00	28	68.00
2022-01-14T15:39:36+08:00	28	68.00

2022-01-14T15:39:52+08:00	28	68.00
2022-01-14T15:40:08+08:00	28	68.00
2022-01-14T15:40:23+08:00	28	68.00
2022-01-14T15:40:40+08:00	28	68.00
2022-01-14T15:40:55+08:00	28	68.00
2022-01-14T15:41:11+08:00	28	68.00
2022-01-14T15:41:27+08:00	28	68.00
2022-01-14T15:41:43+08:00	28	68.00
2022-01-14T15:41:58+08:00	28	68.00
2022-01-14T15:42:13+08:00	28	68.00
2022-01-14T15:42:29+08:00	28	68.00
2022-01-14T15:42:44+08:00	28	68.00
2022-01-14T15:43:01+08:00	28	68.00
2022-01-14T15:43:16+08:00	28	68.00
2022-01-14T15:43:32+08:00	28	68.00
2022-01-14T15:43:48+08:00	28	68.00
2022-01-14T15:44:04+08:00	28	68.00
2022-01-14T15:44:22+08:00	28	68.00
2022-01-14T15:44:37+08:00	28	68.00
2022-01-14T15:44:53+08:00	28	68.00
2022-01-14T15:45:11+08:00	28	68.00
2022-01-14T15:45:27+08:00	28	68.00
2022-01-14T15:45:42+08:00	28	68.00
2022-01-14T15:45:58+08:00	28	68.00
2022-01-14T15:46:15+08:00	28	68.00

2022-01-14T15:46:31+08:00	28	68.00
2022-01-14T15:46:48+08:00	28	68.00
2022-01-14T15:47:06+08:00	28	68.00
2022-01-14T15:47:22+08:00	28	68.00
2022-01-14T15:47:37+08:00	28	68.00
2022-01-14T15:47:54+08:00	28	68.00
2022-01-14T15:48:09+08:00	28	68.00
2022-01-14T15:48:24+08:00	28	68.00
2022-01-14T15:48:39+08:00	28	68.00
2022-01-14T15:48:57+08:00	28	68.00
2022-01-14T15:49:13+08:00	28	68.00
2022-01-14T15:49:28+08:00	28	68.00
2022-01-14T15:49:45+08:00	28	68.00
2022-01-14T15:50:01+08:00	28	68.00
2022-01-14T15:50:16+08:00	28	68.00
2022-01-14T15:50:33+08:00	28	68.00
2022-01-14T15:50:48+08:00	28	68.00
2022-01-14T15:51:03+08:00	28	68.00
2022-01-14T15:51:19+08:00	28	68.00
2022-01-14T15:51:36+08:00	28	68.00
2022-01-14T15:51:51+08:00	28	68.00
2022-01-14T15:52:06+08:00	28	68.00
2022-01-14T15:52:21+08:00	28	68.00
2022-01-14T15:52:37+08:00	28	68.00
2022-01-14T15:52:53+08:00	28	68.00

2022-01-14T15:53:08+08:00	28	68.00
2022-01-14T15:53:28+08:00	28	68.00
2022-01-14T15:53:43+08:00	28	68.00
2022-01-14T15:53:59+08:00	28	68.00
2022-01-14T15:54:15+08:00	28	68.00
2022-01-14T15:54:31+08:00	28	68.00
2022-01-14T15:54:46+08:00	28	68.00
2022-01-14T15:55:01+08:00	28	68.00
2022-01-14T15:55:16+08:00	28	68.00
2022-01-14T15:55:34+08:00	28	68.00
2022-01-14T15:55:49+08:00	28	68.00
2022-01-14T15:56:07+08:00	28	68.00
2022-01-14T15:56:28+08:00	28	68.00
2022-01-14T15:56:44+08:00	28	68.00
2022-01-14T15:57:00+08:00	28	68.00
2022-01-14T15:57:17+08:00	28	68.00
2022-01-14T15:57:32+08:00	28	68.00
2022-01-14T15:57:47+08:00	28	68.00
2022-01-14T15:58:03+08:00	28	68.00
2022-01-14T15:58:19+08:00	28	68.00
2022-01-14T15:58:37+08:00	28	68.00
2022-01-14T15:58:53+08:00	28	68.00
2022-01-14T15:59:09+08:00	28	68.00
2022-01-14T15:59:25+08:00	28	68.00
2022-01-14T15:59:40+08:00	28	68.00

2022-01-14T15:59:57+08:00	28	68.00
2022-01-14T16:00:12+08:00	28	68.00
2022-01-14T16:00:28+08:00	28	68.00
2022-01-14T16:00:44+08:00	28	68.00
2022-01-14T16:01:00+08:00	28	68.00
2022-01-14T16:01:17+08:00	28	68.00
2022-01-14T16:01:32+08:00	28	68.00
2022-01-14T16:01:51+08:00	28	68.00
2022-01-14T16:02:08+08:00	28	68.00
2022-01-14T16:02:32+08:00	28	68.00
2022-01-14T16:02:47+08:00	28	68.00
2022-01-14T16:03:03+08:00	28	68.00
2022-01-14T16:03:19+08:00	28	68.00
2022-01-14T16:03:34+08:00	28	68.00
2022-01-14T16:03:49+08:00	28	68.00
2022-01-14T16:04:06+08:00	28	68.00
2022-01-14T16:04:22+08:00	28	68.00
2022-01-14T16:04:37+08:00	28	68.00
2022-01-14T16:04:52+08:00	28	68.00
2022-01-14T16:05:08+08:00	28	68.00
2022-01-14T16:05:25+08:00	28	68.00
2022-01-14T16:05:42+08:00	28	68.00
2022-01-14T16:05:58+08:00	28	68.00
2022-01-14T16:06:13+08:00	28	68.00
2022-01-14T16:06:29+08:00	28	68.00

2022-01-14T16:06:44+08:00	28	68.00
2022-01-14T16:07:00+08:00	28	68.00
2022-01-14T16:07:16+08:00	28	68.00
2022-01-14T16:07:32+08:00	28	68.00
2022-01-14T16:07:47+08:00	28	68.00
2022-01-14T16:08:03+08:00	28	68.00
2022-01-14T16:08:18+08:00	28	68.00
2022-01-14T16:08:35+08:00	28	68.00
2022-01-14T16:08:52+08:00	28	68.00
2022-01-14T16:09:08+08:00	28	68.00
2022-01-14T16:09:24+08:00	28	68.00
2022-01-14T16:09:39+08:00	28	68.00
2022-01-14T16:09:55+08:00	28	68.00
2022-01-14T16:10:10+08:00	28	68.00
2022-01-14T16:10:27+08:00	28	68.00
2022-01-14T16:10:43+08:00	28	68.00
2022-01-14T16:10:58+08:00	28	68.00
2022-01-14T16:11:15+08:00	28	68.00
2022-01-14T16:11:31+08:00	28	68.00
2022-01-14T16:11:47+08:00	28	68.00
2022-01-14T16:12:03+08:00	28	68.00
2022-01-14T16:12:18+08:00	28	68.00
2022-01-14T16:12:33+08:00	28	68.00
2022-01-14T16:12:48+08:00	28	68.00
2022-01-14T16:13:04+08:00	28	68.00

2022-01-14T16:13:19+08:00	28	68.00
2022-01-14T16:13:34+08:00	28	68.00
2022-01-14T16:13:50+08:00	28	68.00
2022-01-14T16:14:07+08:00	28	68.00
2022-01-14T16:14:24+08:00	28	68.00
2022-01-14T16:14:40+08:00	28	68.00
2022-01-14T16:14:56+08:00	28	68.00
2022-01-14T16:15:12+08:00	28	68.00
2022-01-14T16:15:28+08:00	28	68.00
2022-01-14T16:15:44+08:00	28	68.00
2022-01-14T16:16:00+08:00	28	68.00
2022-01-14T16:16:15+08:00	28	68.00
2022-01-14T16:16:31+08:00	28	68.00
2022-01-14T16:16:46+08:00	28	68.00
2022-01-14T16:17:02+08:00	28	68.00
2022-01-14T16:17:19+08:00	28	68.00
2022-01-14T16:17:36+08:00	28	68.00
2022-01-14T16:17:52+08:00	28	68.00
2022-01-14T16:18:08+08:00	28	68.00
2022-01-14T16:18:23+08:00	28	68.00
2022-01-14T16:18:39+08:00	28	68.00
2022-01-14T16:18:55+08:00	28	68.00
2022-01-14T16:19:10+08:00	28	68.00
2022-01-14T16:19:26+08:00	28	68.00
2022-01-14T16:19:42+08:00	28	68.00

2022-01-14T16:20:00+08:00	28	68.00
2022-01-14T16:20:15+08:00	28	68.00
2022-01-14T16:20:30+08:00	31	67.00
2022-01-14T16:20:48+08:00	28	68.00
2022-01-14T16:21:03+08:00	28	68.00
2022-01-14T16:21:18+08:00	31	66.00
2022-01-14T16:21:34+08:00	28	68.00
2022-01-14T16:21:50+08:00	28	68.00

Table 4.4 Table of Temperature and Humidty In Evening

The room is between 67 and 68 percent humid in the evening, with a temperature reading of 27 to 28 degrees Celsius.

4.4.4 DATA IN NIGHT

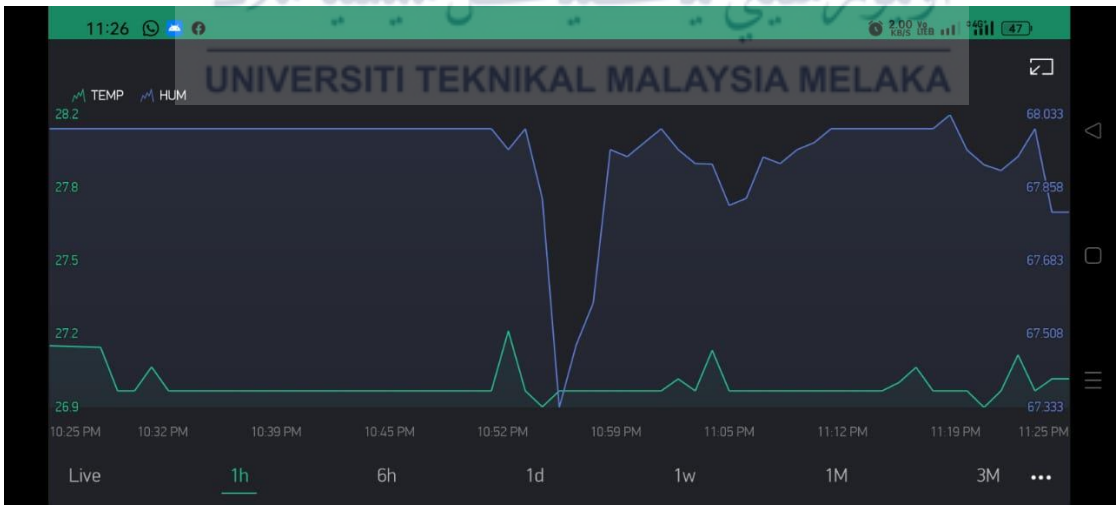


Figure 4.21 Chart of Temperature and Humidity In Night

Time	Temperature (In°C)	Humidity (In %)
2022-01-14T22:29:34+08:00	27	68.00

2022-01-14T22:29:56+08:00	27	68.00
2022-01-14T22:30:14+08:00	27	68.00
2022-01-14T22:30:30+08:00	27	68.00
2022-01-14T22:30:45+08:00	27	68.00
2022-01-14T22:31:01+08:00	27	68.00
2022-01-14T22:31:19+08:00	27	68.00
2022-01-14T22:31:35+08:00	27	68.00
2022-01-14T22:31:51+08:00	27	68.00
2022-01-14T22:32:06+08:00	27	68.00
2022-01-14T22:32:21+08:00	27	68.00
2022-01-14T22:32:36+08:00	27	68.00
2022-01-14T22:32:52+08:00	27	68.00
2022-01-14T22:33:07+08:00	27	68.00
2022-01-14T22:33:23+08:00	27	68.00
2022-01-14T22:33:38+08:00	27	68.00
2022-01-14T22:33:54+08:00	27	68.00
2022-01-14T22:34:09+08:00	27	68.00
2022-01-14T22:34:25+08:00	27	68.00
2022-01-14T22:34:41+08:00	27	68.00
2022-01-14T22:34:56+08:00	27	68.00
2022-01-14T22:35:12+08:00	27	68.00
2022-01-14T22:35:28+08:00	27	68.00
2022-01-14T22:35:43+08:00	27	68.00
2022-01-14T22:35:59+08:00	27	68.00
2022-01-14T22:36:16+08:00	27	68.00

2022-01-14T22:36:32+08:00	27	68.00
2022-01-14T22:36:47+08:00	27	68.00
2022-01-14T22:37:03+08:00	27	68.00
2022-01-14T22:37:18+08:00	27	68.00
2022-01-14T22:37:34+08:00	27	68.00
2022-01-14T22:37:49+08:00	27	68.00
2022-01-14T22:38:05+08:00	27	68.00
2022-01-14T22:38:21+08:00	27	68.00
2022-01-14T22:38:36+08:00	27	68.00
2022-01-14T22:38:52+08:00	27	68.00
2022-01-14T22:39:08+08:00	27	68.00
2022-01-14T22:39:24+08:00	27	68.00
2022-01-14T22:39:39+08:00	27	68.00
2022-01-14T22:39:55+08:00	27	68.00
2022-01-14T22:40:12+08:00	27	68.00
2022-01-14T22:40:27+08:00	27	68.00
2022-01-14T22:40:42+08:00	27	68.00
2022-01-14T22:40:58+08:00	27	68.00
2022-01-14T22:41:14+08:00	27	68.00
2022-01-14T22:41:30+08:00	27	68.00
2022-01-14T22:41:46+08:00	27	68.00
2022-01-14T22:42:02+08:00	27	68.00
2022-01-14T22:42:17+08:00	27	68.00
2022-01-14T22:42:33+08:00	27	68.00
2022-01-14T22:42:49+08:00	27	68.00

2022-01-14T22:43:05+08:00	27	68.00
2022-01-14T22:43:22+08:00	27	68.00
2022-01-14T22:43:37+08:00	27	68.00
2022-01-14T22:43:53+08:00	27	68.00
2022-01-14T22:44:10+08:00	27	68.00
2022-01-14T22:44:25+08:00	27	68.00
2022-01-14T22:44:41+08:00	27	68.00
2022-01-14T22:44:56+08:00	27	68.00
2022-01-14T22:45:12+08:00	27	68.00
2022-01-14T22:45:28+08:00	27	68.00
2022-01-14T22:45:43+08:00	27	68.00
2022-01-14T22:45:59+08:00	27	68.00
2022-01-14T22:46:14+08:00	27	68.00
2022-01-14T22:46:31+08:00	27	68.00
2022-01-14T22:46:46+08:00	27	68.00
2022-01-14T22:47:02+08:00	27	68.00
2022-01-14T22:47:18+08:00	27	68.00
2022-01-14T22:47:33+08:00	27	68.00
2022-01-14T22:47:48+08:00	27	68.00
2022-01-14T22:48:04+08:00	27	68.00
2022-01-14T22:48:20+08:00	27	68.00
2022-01-14T22:48:35+08:00	27	68.00
2022-01-14T22:48:50+08:00	27	68.00
2022-01-14T22:49:05+08:00	27	68.00
2022-01-14T22:49:21+08:00	27	68.00

2022-01-14T22:49:36+08:00	27	68.00
2022-01-14T22:49:53+08:00	27	68.00
2022-01-14T22:50:09+08:00	27	68.00
2022-01-14T22:50:25+08:00	27	68.00
2022-01-14T22:50:40+08:00	27	68.00
2022-01-14T22:50:55+08:00	27	68.00
2022-01-14T22:51:10+08:00	27	68.00
2022-01-14T22:51:26+08:00	27	68.00
2022-01-14T22:51:41+08:00	27	68.00
2022-01-14T22:51:58+08:00	27	68.00
2022-01-14T22:52:13+08:00	27	68.00
2022-01-14T22:52:30+08:00	27	68.00
2022-01-14T22:52:46+08:00	27	68.00
2022-01-14T22:53:02+08:00	27	68.00
2022-01-14T22:53:17+08:00	27	68.00
2022-01-14T22:53:33+08:00	27	68.00
2022-01-14T22:53:48+08:00	27	68.00
2022-01-14T22:54:03+08:00	27	68.00
2022-01-14T22:54:19+08:00	27	68.00
2022-01-14T22:54:34+08:00	27	68.00
2022-01-14T22:54:49+08:00	27	68.00
2022-01-14T22:55:05+08:00	25	68.00
2022-01-14T22:55:21+08:00	27	68.00
2022-01-14T22:55:36+08:00	27	68.00
2022-01-14T22:55:52+08:00	27	68.00

2022-01-14T22:56:07+08:00	27	67.00
2022-01-14T22:56:22+08:00	27	67.00
2022-01-14T22:56:38+08:00	27	68.00
2022-01-14T22:56:53+08:00	27	67.00
2022-01-14T22:57:09+08:00	27	67.00
2022-01-14T22:57:24+08:00	27	68.00
2022-01-14T22:57:41+08:00	27	68.00
2022-01-14T22:57:57+08:00	27	67.00
2022-01-14T22:58:12+08:00	27	68.00
2022-01-14T22:58:27+08:00	27	68.00
2022-01-14T22:58:43+08:00	27	67.00
2022-01-14T22:58:58+08:00	27	68.00
2022-01-14T22:59:17+08:00	27	68.00
2022-01-14T22:59:32+08:00	27	68.00
2022-01-14T22:59:48+08:00	27	68.00
2022-01-14T23:00:04+08:00	27	68.00
2022-01-14T23:00:19+08:00	27	68.00
2022-01-14T23:00:37+08:00	27	68.00
2022-01-14T23:00:53+08:00	27	68.00
2022-01-14T23:01:09+08:00	27	68.00
2022-01-14T23:01:25+08:00	27	68.00
2022-01-14T23:01:40+08:00	27	68.00
2022-01-14T23:01:56+08:00	27	68.00
2022-01-14T23:02:11+08:00	27	68.00
2022-01-14T23:02:28+08:00	27	68.00

2022-01-14T23:02:43+08:00	27	68.00
2022-01-14T23:02:59+08:00	27	68.00
2022-01-14T23:03:15+08:00	27	68.00
2022-01-14T23:03:30+08:00	27	68.00
2022-01-14T23:03:45+08:00	27	68.00
2022-01-14T23:04:01+08:00	27	68.00
2022-01-14T23:04:17+08:00	27	68.00
2022-01-14T23:04:32+08:00	27	68.00
2022-01-14T23:04:48+08:00	27	68.00
2022-01-14T23:05:03+08:00	27	68.00
2022-01-14T23:05:20+08:00	27	68.00
2022-01-14T23:05:36+08:00	27	68.00
2022-01-14T23:05:52+08:00	27	68.00
2022-01-14T23:06:08+08:00	27	68.00
2022-01-14T23:06:23+08:00	27	68.00
2022-01-14T23:06:39+08:00	27	68.00
2022-01-14T23:06:54+08:00	27	67.00
2022-01-14T23:07:10+08:00	27	68.00
2022-01-14T23:07:26+08:00	27	68.00
2022-01-14T23:07:42+08:00	27	68.00
2022-01-14T23:07:57+08:00	27	67.00
2022-01-14T23:08:13+08:00	27	68.00
2022-01-14T23:08:29+08:00	27	68.00
2022-01-14T23:08:45+08:00	27	68.00
2022-01-14T23:09:02+08:00	27	68.00

2022-01-14T23:09:17+08:00	27	68.00
2022-01-14T23:09:32+08:00	27	67.00
2022-01-14T23:09:48+08:00	27	68.00
2022-01-14T23:10:03+08:00	27	68.00
2022-01-14T23:10:18+08:00	27	68.00
2022-01-14T23:10:34+08:00	27	68.00
2022-01-14T23:10:49+08:00	27	68.00
2022-01-14T23:11:04+08:00	27	68.00
2022-01-14T23:11:20+08:00	27	68.00
2022-01-14T23:11:35+08:00	27	68.00
2022-01-14T23:11:51+08:00	27	68.00
2022-01-14T23:12:08+08:00	27	68.00
2022-01-14T23:12:23+08:00	27	68.00
2022-01-14T23:12:40+08:00	27	68.00
2022-01-14T23:12:56+08:00	27	68.00
2022-01-14T23:13:13+08:00	27	68.00
2022-01-14T23:13:29+08:00	27	68.00
2022-01-14T23:13:46+08:00	27	68.00
2022-01-14T23:14:02+08:00	27	68.00
2022-01-14T23:14:17+08:00	27	68.00
2022-01-14T23:14:33+08:00	27	68.00
2022-01-14T23:14:48+08:00	27	68.00
2022-01-14T23:15:03+08:00	27	68.00
2022-01-14T23:15:19+08:00	27	68.00
2022-01-14T23:15:36+08:00	27	68.00

2022-01-14T23:15:52+08:00	27	68.00
2022-01-14T23:16:09+08:00	27	68.00
2022-01-14T23:16:24+08:00	27	68.00
2022-01-14T23:16:40+08:00	27	68.00
2022-01-14T23:16:57+08:00	27	68.00
2022-01-14T23:17:14+08:00	27	68.00
2022-01-14T23:17:36+08:00	27	68.00
2022-01-14T23:17:51+08:00	27	68.00
2022-01-14T23:18:09+08:00	27	68.00
2022-01-14T23:18:26+08:00	27	68.00
2022-01-14T23:18:42+08:00	27	68.00
2022-01-14T23:18:59+08:00	27	68.00
2022-01-14T23:19:15+08:00	27	68.00
2022-01-14T23:19:31+08:00	27	68.00
2022-01-14T23:19:47+08:00	27	68.00
2022-01-14T23:20:02+08:00	27	68.00
2022-01-14T23:20:18+08:00	27	68.00
2022-01-14T23:20:34+08:00	27	68.00
2022-01-14T23:20:49+08:00	27	68.00
2022-01-14T23:21:05+08:00	25	68.00
2022-01-14T23:21:20+08:00	27	68.00
2022-01-14T23:21:35+08:00	27	68.00
2022-01-14T23:21:51+08:00	27	68.00
2022-01-14T23:22:06+08:00	27	68.00
2022-01-14T23:22:21+08:00	27	67.00

2022-01-14T23:22:37+08:00	27	68.00
2022-01-14T23:22:52+08:00	27	68.00
2022-01-14T23:23:08+08:00	27	68.00
2022-01-14T23:23:24+08:00	27	68.00
2022-01-14T23:23:39+08:00	27	68.00
2022-01-14T23:23:55+08:00	27	68.00
2022-01-14T23:24:12+08:00	27	68.00
2022-01-14T23:24:27+08:00	27	68.00
2022-01-14T23:24:43+08:00	27	68.00
2022-01-14T23:24:58+08:00	27	68.00
2022-01-14T23:25:13+08:00	27	68.00
2022-01-14T23:25:28+08:00	27	68.00
2022-01-14T23:25:44+08:00	27	68.00
2022-01-14T23:25:59+08:00	27	68.00

Table 4.5 Table of Temperature and Humidity In Night

The room is between 67 and 68 percent humid in the night, with a temperature reading of 27 degrees Celsius.

4.5 DISCUSSION

The design and deployment of a temperature and humidity monitoring system using an IoT platform to get a clearer picture of temperature and humidity has made it much easier to store and analyse temperature and humidity data. The first step to improving a data center's monitoring system is to learn more about how temperature and humidity are distributed in the data centre. During the experiment, it was found that humidity and temperature didn't change very much.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

An IoT-based fan speed control system has been designed and tested. A computer programme was created to control the fan's speed with the smartphone. It worked well. The Arduino is used to run the fan motor at different rates, and the results of the experiments are recorded. These results show that the smartphone can turn on the fan and change its speed. The user can use this fan even if they are far away. A fan's speed is easy to control when temperature and humidity sensors are used, so it automatically adjusts its speed if it gets warmer or more relaxed than a user's "comfort zone." Thingspeak and the Blynk App also keep an eye on the fan's temperature, humidity, and speed.

5.2 Future Works

For future improvements, there a few thing could be enhanced as follows:

i) More elements such as light and water may be monitored and controlled at the same time.

ii) This device should also control the room’s humidity using one of the instrumentals like sensors and actuators.

iii) We can deliver this information to a distant place via mobile or the internet.

- When the temperature rises over the set point, an automated dialer system will send a request to the specified phone number.

REFERENCES

[1] K. Kanchanasatian, "Automatic Speed Control and TurningON/OFF for Smart Fan byTemperature and Ultrasonic Sensor," 2018.

[2] "Microcontroller Based Smart Fan System", Muhammad Khairi Bin Abd. Ghani, Universiti Malaysia Pahang, 2007

[3] "Temperature based Fan Speed Controller", Mr. Kalyan Biswas, November 2017

[4] Zairi Ismael Rizman, Kim Ho Yeap, Nuraiza Mohamad, Nur Hafizah Rabi'ah Husin, "Design an Automatic Temperature Control System for Smart Electric Fan Using PIC," *Volume 2 Issue 9, September 2013*

[5] I. Lee and K. Lee, "The Internet of Things (IoT): Applications, investments, and challenges for enterprises," *Bus. Horiz.*, vol. 58, no. 4, pp. 431–440, 2015, doi: 10.1016/j.bushor.2015.03.008.

[6] M. B. A. C. A.N. Bahar, "An Intelligent Approach of Regulating Electric-Fan Adaptingto Temperature and Relative Humidity," *International Journal Intelligent Systems and* , 2013.

[7] D. C. H. Vijay, "Parameters Estimation of an Electric Fan Using ANN," *Journal ofIntelligent Learning Systems and Applications,* 2010.for-iot-complete-guide/

[8] Z. I. H. Y. K. I. N. M. N. H. N. H. Rizman, "Design an Automatic Temperature ControlSystem for Smart Electric Fan Using PIC," *International Journal of Science and Research,* vol. 2, no. 9, 2013./

APPENDICES

Appendix A Example of Appendix A

No.	Parameters	No.	Parameters
1.		25.	
2.		26.	
3.		27.	
4.		28.	
5.		29.	
6.		30.	
7.		31.	
8.		32.	
9.		33.	
10.		34.	
11.		35.	
12.		36.	
13.		37.	
14.		38.	
15.		39.	
16.		40.	
17.		41.	
18.		42.	
19.		43.	
20.		44.	
21.		45.	
22.		46.	
23.			
24.			

Appendix B Example of Appendix B

Time	Residential	Industrial	Commercial