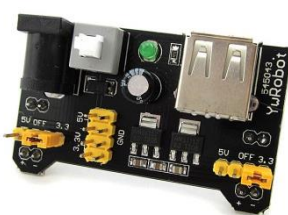
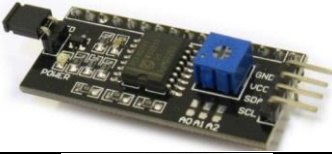


Lampiran 1. Partlist

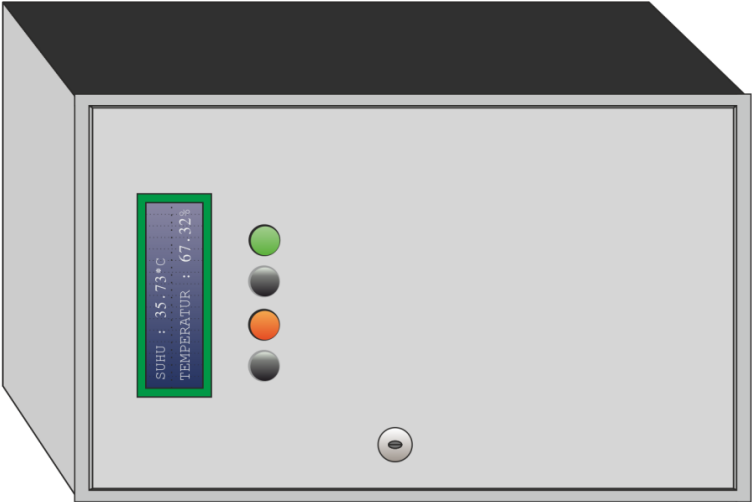
No.	Komponen	Gambar	Jumlah
1	Power supply Supply tegangan 85÷264VAC 120÷VDC, Current consumption 0,6A @230VAC, Daya 60W max, Efisiensi 80%, Output 12V DC, 5A.		1 unit
2	Wemos D1 mini 3,3V input, 11 digital I/O, 1 analog pin, Micro USB connection.		1 unit
3	Sensor DHT-22 Input 3,3 – 6V DC, Range kelembaban 0- 100%RH; suhu -40°C-80°C, Akurasi kelembaban ±2%RH (max ±5%RH); suhu ±0,2°C.		1 unit
4	Sensor pH tanah Input 5V DC, Support arduino dan mikrokontroler lainnya, Toleransi 0,9962, Kedalaman pengukuran 6cm.		1 unit
5	Relay DPDT 1 channel Trigger voltage 5V DC, Trigger current 70mA, AC load current max 10A @250/125V AC, DC load current max 10A @30/28V DC.		2 unit
6	Converter power supply MB102 breadboard Locking ON/OFF switch, Input 6,5 -12V DC, Output 3,3V/5V, Output current max 700mA.		1 unit

7	LCD 16x2 modul <i>Input 4,7 – 5,3V DC, Current consumption 1mA, 16 x 2 characters.</i>		1 unit
8	I2C 1602 serial LCD modul <i>Input 5V DC, 2 x 16 characters, 0x27 addressable.</i>		1 unit
9	Push button switch <i>Rating 6A 125VAC; 3A 250VAC, Kontak resistansi 50mΩ max, Electrcal life 600 cycles</i>		2 unit
10	Lampu indikator panel <i>Tegangan kerja 12VDC, Warna merah, Diameter 1,3cm, Tinggi 4,2cm.</i>		1 unit
11	Lampu indikator panel <i>Tegangan kerja 220VAC, Warna merah, Ukuran 35x15x12mm.</i>		1 unit
12	Fan DC <i>Tegangan kerja 12VDC, Temperature range -10-70°C, Kecepatan 2400rpm, Ukuran 12x12cm.</i>		1 unit
13	Hair dryer <i>Tegangan kerja 220VAC, Daya 250W, Frekuensi 50-60Hz, Ukuran 11x7,5x17cm.</i>		1 unit

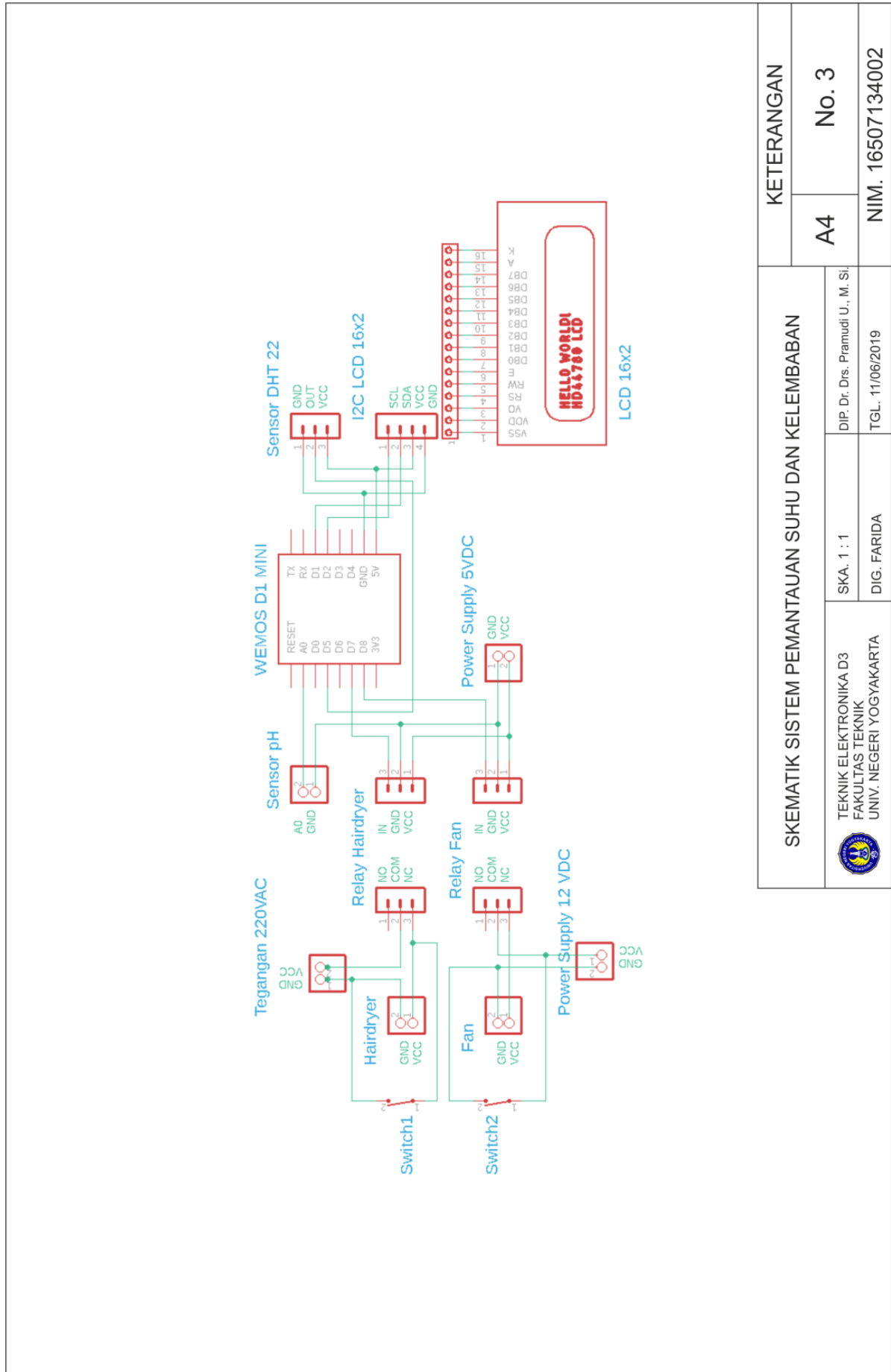
Lampiran 2. Spesifikasi Alat

No.	Bagian	Spesifikasi
1	Ukuran box panel	Panjang 20cm, lebar 12cm, tinggi 30cm Bahan plat besi, ketebalan 1 mm
2	Ukuran ember	Diameter 27cm, tinggi 40cm Bahan plastik
3	<i>Input</i>	Data suhu ruang pengomposan Data kelembaban kompos Data kandungan pH kompos
4	<i>Output</i>	LCD Relay <i>fan</i> Relay <i>hairdryer</i>
5	Sensor	Sensor DHT-22 Sensor pH tanah
6	<i>Software compiler</i>	Arduino IDE <i>Blynk</i>
7	Objek yang dideteksi	Suhu ruang pengomposan Kelembaban kompos Kandungan pH kompos
8	Tegangan input	Tegangan listrik PLN 220VAC Catu daya 12VDC Catu daya 5VDC
9	USB <i>port</i>	<i>Micro USB</i>
10	Pemanas	<i>Hairdryer</i> 220VAC, 250W
11	Pendingin	<i>Fan</i> 12VDC, 12x12cm

Lampiran 3. Desain *Hardware* Sistem Pemantauan

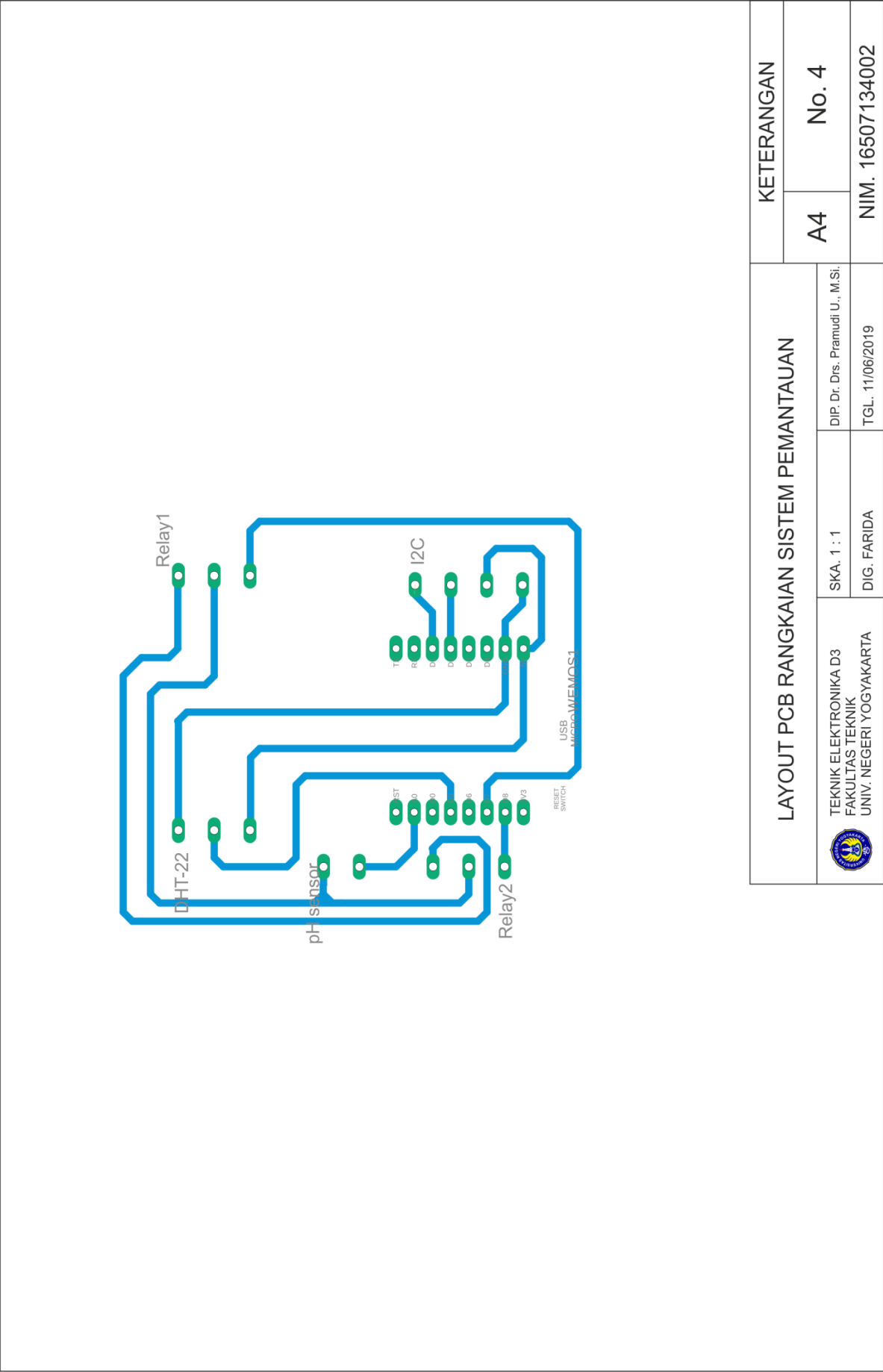
	DESAIN HARDWARE SISTEM PEMANTAUAN SUHU DAN KELEMBABAN				KETERANGAN	
	TEKNIK ELEKTRONIKA D3 FAKULTAS TEKNIK UNIV. NEGERI YOGYAKARTA		SKA. 1 : 30	DIP. Dr. Drs. Pramudi U., M.Si.	A4	No. 1
			DIG. FARIDA	TGL. 10/06/2019	NIM. 16507134002	

Lampiran 5. Skematik Sistem Pemantauan



SKEMATIK SISTEM PEMANTAUAN SUHU DAN KELEMBABAN			KETERANGAN	
 TEKNIK ELEKTRONIKA D3 FAKULTAS TEKNIK UNIV. NEGERI YOGYAKARTA	SKA. 1 : 1	DIP. Dr. Drs. Pramudi U., M. Si.	A4	No. 3
	DIG. FARIDA	TGL. 11/06/2019	NIM. 16507134002	

Lampiran 6. *Layout PCB Sistem Pemantauan*



LAYOUT PCB RANGKAIAN SISTEM PEMANTAUAN			KETERANGAN	
 TEKNIK ELEKTRONIKA D3 FAKULTAS TEKNIK UNIV. NEGERI YOGYAKARTA	SKA. 1 : 1	DIP. Dr. Drs. Pramudi U., M.Si.	A4	No. 4
	DIG. FARIDA	TGL. 11/06/2019	NIM. 16507134002	

Lampiran 7. Tampilan *Hardware* Sistem Pemantauan



Lampiran 8. Program/Coding

```
#include <SimpleTimer.h>
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <LiquidCrystal_I2C.h>
#include "DHT.h" // including the library of DHT22 temperature and humidity
sensor

SimpleTimer timer;

#define DHTTYPE DHT22 // DHT 22
#define dht_dpin D5
#define analogInPin A0 //sambungkan kabel hitam (output) ke pin A0

DHT dht(dht_dpin, DHTTYPE);
LiquidCrystal_I2C lcd(0x27,16,2);

int sensorValue = 0; //nilai ADC dari sensor
float outputValue = 0.0; //nilai pH setelah dikonversikan
// pendeklarsian variabel
float t; //t adalah temperature (suhu)
float h; // h adalah humidity (kelembaban)
int relay1= D7; //relay1 pada pin D7
int relay2= D8; //relay2 pada pin D8
byte simbolDerajat = B11011111; //menampilkan simbol derajat pada LCD

// token auth dari aplikasi blynk yang dikirim melalui email.
char auth[] = "c6cffdca2c074768b1b07cd24282fbfc";

// mengintegrasikan wifi
// pengaturan password sesuai hotspot android.
char ssid[] = "vivo 1603";
char pass[] = "faridaaaa";

void sensorDHT(){
  float h = dht.readHumidity(); //pembacaan untuk data kelembaban
  float t = dht.readTemperature(); //pembacaan untuk data suhu
  Serial.println("Humidity and temperature\n\n");
  Serial.print("Current humidity = ");
  Serial.print(h);
  Serial.print("% ");
  Serial.print("temperature = ");
  Serial.print(t);
  Blynk.virtualWrite(V0, t); //pin V0 pada blynk berarti nilai suhu
  Blynk.virtualWrite(V1, h); //pin V1 pada blynk berarti nilai kelembaban
```

```

    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Humidity: ");
    lcd.print(h);
    lcd.print("%");
    lcd.setCursor(0,1);
    lcd.print("suhu: ");
    lcd.print(t);
    lcd.write(simbolDerajat);
    lcd.print("C");
    delay (5000);
}

void sensorPH(){
    sensorValue = analogRead(analogInPin);    //pembacaan nilai ADC
    outputValue = (-0.0693*sensorValue)+7.3855; //pembacaan nilai pH setelah
    dikonversikan
    Serial.print("sensor ADC= ");
    Serial.print(sensorValue);
    Serial.print(" output Ph= ");
    Serial.println(outputValue);
    Blynk.virtualWrite(V2, sensorValue);    //V2 pada blynk berarti nilai
    ADC
    Blynk.virtualWrite(V3, outputValue);    //V3 pada blynk berarti nilai pH

    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("sensor ADC= ");
    lcd.print(sensorValue);
    //lcd.print("%");
    lcd.setCursor(0,1);
    lcd.print("output Ph= ");
    lcd.print(outputValue);
    //lcd.write(simbolDerajat);
    //lcd.print("C");
    delay (5000);
}

void setup()
{
    pinMode (relay1, OUTPUT);
    pinMode (relay2, OUTPUT);

    // Debug console
    Serial.begin(9600);
    Blynk.begin(auth, ssid, pass);
    dht.begin();
    lcd.begin();
    timer.setInterval(1000L, sensorDHT);
}

```

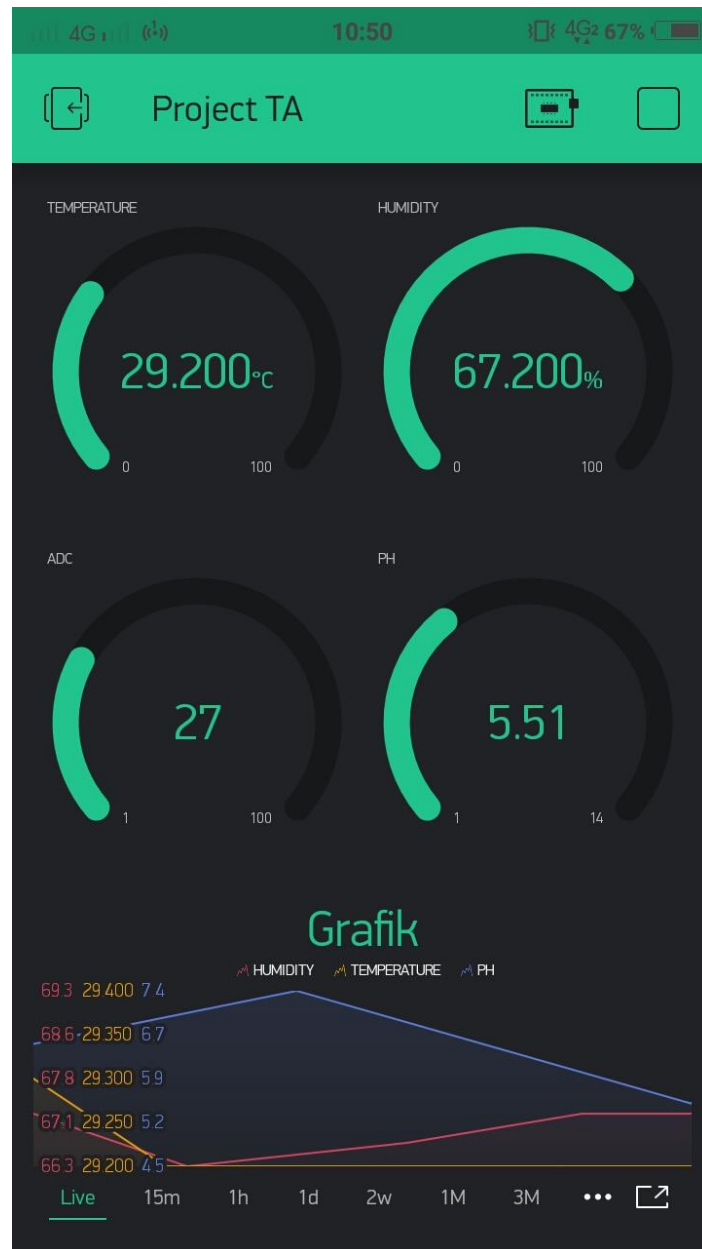
```
void loop()
{
  Blynk.run();
  sensorDHT();
  sensorPH();
  timer.run(); // Initiates BlynkTimer
  delay (1000);

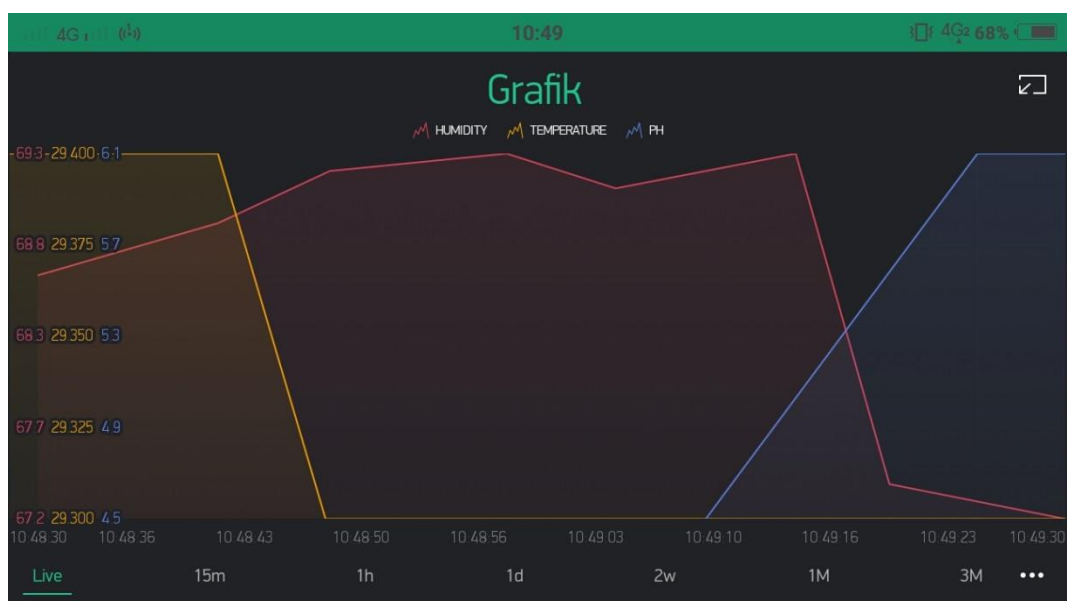
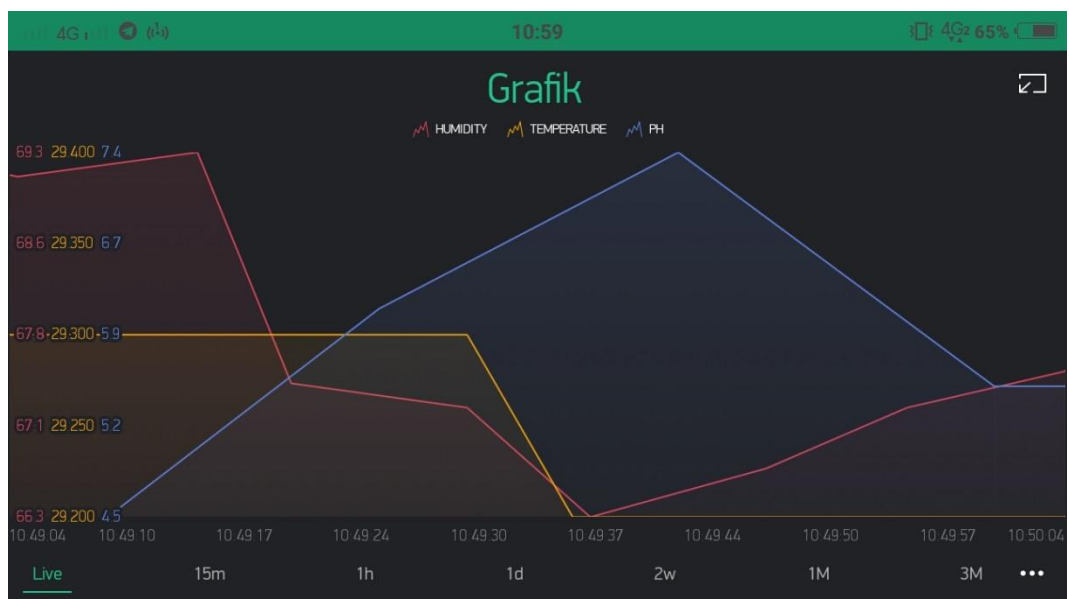
  if ( t < 35){
    digitalWrite(relay1, HIGH); //pemanas nyala
    digitalWrite(relay2, LOW); //kipas mati
  }
  else if( t > 45){
    digitalWrite(relay1, LOW); //pemanas mati
    digitalWrite(relay2, HIGH); //kipas nyala
  }
}
```

Lampiran 9. Tampilan LCD



Lampiran 10. Tampilan Aplikasi



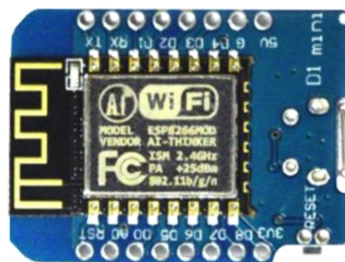


Lampiran 11. Datasheet Wemos D1 Mini

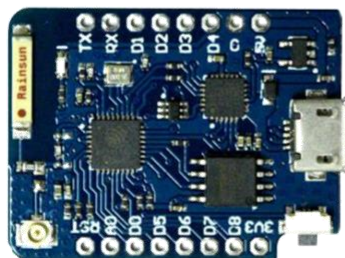
WeMos is a company that develops low cost-effective Internet of Things (IoT) devices for various projects and products.

WeMos D1 Mini series are one of the products developed by the company to enable wireless connectivity, simple data traffic and electronic controlling to electronic projects at the same time.

WEMOS



WeMos D1 Mini ESP8266
WiFi Development Board



WeMos D1 Mini PRO ESP8266
WiFi Development Board

Very small-sized and its footprint is breadboard friendly.

Built-in antenna on the ESP8266EX chip.

Uses 802.11b/g/n wireless communication protocol, can be detected and communicated via wireless modem router once powered up.

Many multilevel-stacking shields designed to fit onto the WeMos D1 Mini board application.

Uses micro USB Port so you can use any data carrying cable to power up and program the WeMos D1 Mini.

Arduino IDE compatible, you can use the same Arduino IDE to program this board (add-on extension required and available via Board Manager).

Built-in USB serial communication module (CH340G) so you can use this board similar as using any other Arduino boards with PC.

11 Digital IO pins, all IO pins except D0 are capable of PWM, Interrupt, I2C and 1-wire interfaces. This board also accepts SPI interface.

1 Analog input pin that can accept up to 3.3V signal.

4 MB Flash for WeMos D1 Mini, 16 MB Flash for PRO version.

MAIN BOARD

WEMOS D1 MINI ESP8266 WIFI DEVELOPMENT BOARD



WeMos D1 mini is a mini WiFi board based on ESP8266EX. This board is Arduino IDE compatible, therefore it can be programmed using Arduino or its own Lua compiler. It also supports both serial and OTA programming.

This small development board has 4MB Flash memory, based on the specifications of ESP8266EX, has 11 digital IO pins, all IO pins capable of Interrupt / PWM / I2C / 1-wire except D0 pins. It has 1 Analog input (3.3V max) and a Micro USB port to connect with PC for communication and programming.

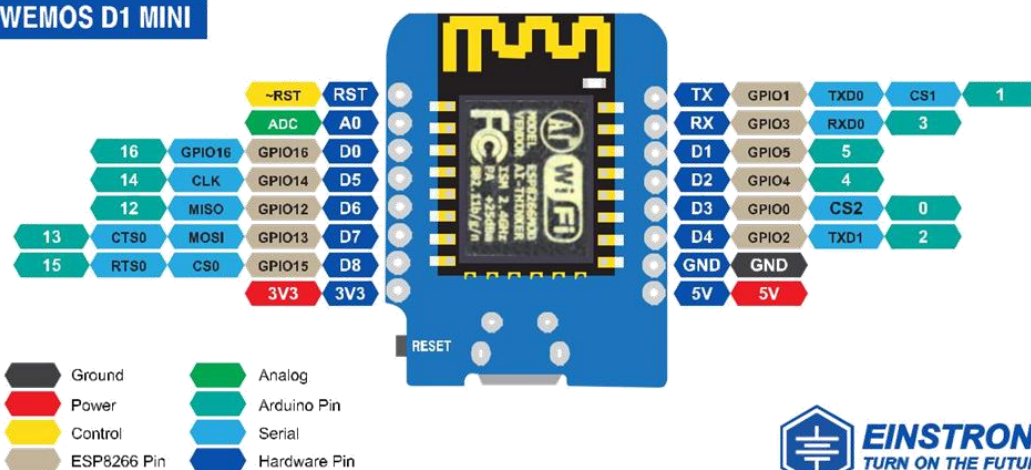
WEMOS D1 MINI PRO ESP8266 WIFI DEVELOPMENT BOARD

WeMos D1 Mini PRO differs from the previous version WeMos D1 Mini by using the new CP2104 USB-to-UART interface circuit. This board is lighter than the WeMos D1 Mini but shares the same footprint.

This board has 16MB Flash memory, external antenna connector and built-in ceramic antenna, has 11 digital IO pins, all pins capable of Interrupt / PWM / I2C / 1-wire except D0 pins. It has 1 Analog input (3.3V max) and a Micro USB port to connect with PC for programming.



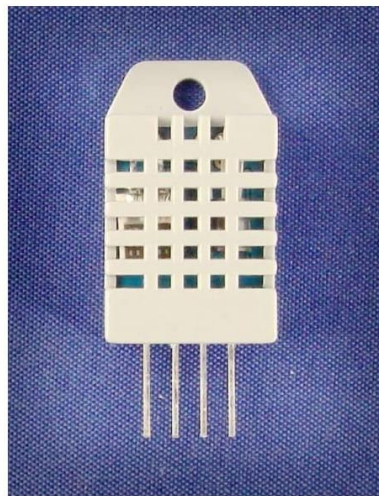
PINOUT DIAGRAM WEMOS D1 MINI



Lampiran 12. *Datasheet* Sensor DHT-22

Aosong Electronics Co.,Ltd

**Digital-output relative humidity & temperature
sensor/module DHT22 (DHT22 also named as AM2302)**



2. Description:

DHT22 output calibrated digital signal. It utilizes exclusive digital-signal-collecting-technique and humidity sensing technology, assuring its reliability and stability. Its sensing elements are connected with 8-bit single-chip computer.

Every sensor of this model is temperature compensated and calibrated in accurate calibration chamber and the calibration-coefficient is saved in type of programme in OTP memory, when the sensor is detecting, it will cite coefficient from memory.

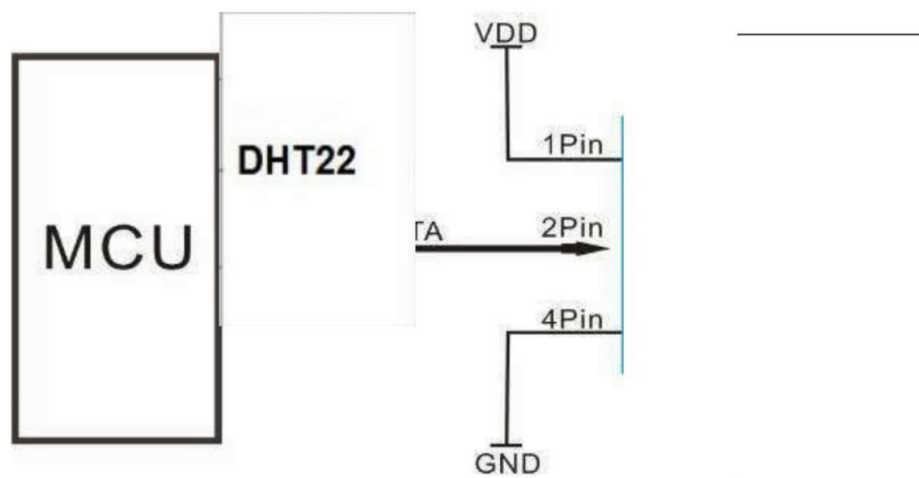
Small size & low consumption & long transmission distance(20m) enable DHT22 to be suited in all kinds of harsh application occasions.

Single-row packaged with four pins, making the connection very convenient.

3. Technical Specification:

Model	DHT22
Power supply	3.3-6V DC
Output signal	digital signal via single-bus
Sensing element	Polymer capacitor
Operating range	humidity 0-100%RH; temperature -40~80Celsius
Accuracy	humidity +2%RH(Max +-5%RH); temperature <+-0.5Celsius
Resolution or sensitivity	humidity 0.1%RH; temperature 0.1Celsius
Repeatability	humidity +-1%RH; temperature +-0.2Celsius
Humidity hysteresis	+0.3%RH
Long-term Stability	+0.5%RH/year
Sensing period	Average: 2s
Interchangeability	fully interchangeable
Dimensions	small size 14*18*5.5mm; big size 22*28*5mm

5. Electrical connection diagram:



3Pin---NC, AM2302 is another name for DHT22

6. Operating specifications:

(1) Power and Pins

Power's voltage should be 3.3-6V DC. When power is supplied to sensor, don't send any instruction to the sensor within one second to pass unstable status. One capacitor valued 100nF can be added between VDD and GND for wave filtering.

8. Attentions of application:

(1) Operating and storage conditions

We don't recommend the applying RH-range beyond the range stated in this specification. The DHT22 sensor can recover after working in non-normal operating condition to calibrated status, but will accelerate sensors' aging.

(2) Attentions to chemical materials

Vapor from chemical materials may interfere DHT22's sensitive-elements and debase DHT22's sensitivity.

(3) Disposal when (1) & (2) happens

Step one: Keep the DHT22 sensor at condition of Temperature 50~60Celsius, humidity <10%RH for 2 hours;

Step two: After step one, keep the DHT22 sensor at condition of Temperature 20~30Celsius, humidity

>70%RH for 5 hours.

(4) Attention to temperature's affection

Relative humidity strongly depend on temperature, that is why we use temperature compensation technology to ensure accurate measurement of RH. But it's still be much better to keep the sensor at same temperature when sensing.

DHT22 should be mounted at the place as far as possible from parts that may cause change to temperature.

(5) Attentions to light

Long time exposure to strong light and ultraviolet may debase DHT22's performance.

(6) Attentions to connection wires

The connection wires' quality will effect communication's quality and distance, high quality shielding-wire is recommended.

(7) Other attentions

* Welding temperature should be bellow 260Celsius. * Avoid using the sensor under dew condition.

* Don't use this product in safety or emergency stop devices or any other occasion that failure of DHT22 may cause personal injury.

Lampiran 13. *Datasheet* Sensor pH

www.depoinovasi.com

DATASHEET

SENSOR pH TANAH



Spesifikasi :

- Bekerja pada tegangan DC 5 Volt
- Support arduino dan mikrokontroller lainnya
- Koefisien linearitas data pH tanah sebesar 0.9962
- Kedalaman tanah pada saat pengukuran sebesar 6 cm dari ujung sensor
- Rumus persamaan umum konversi data konduktivitas $y = -0.0693x + 7.3855$,
dimana : x = nilai ADC, dan y =pH

DESKRIPSI

SENSOR pH TANAH

PIN	Warna Kabel	Deskripsi
Output	Hitam	Output ke pin A0 arduino
Gnd	Putih	GND arduino

Tabel 1. Pin Sensor

Sensor pH Tanah merupakan sensor pendeteksi tingkat keasaman (acid) atau kebasaan (alkali) tanah. Skala pH yang dapat diukur oleh sensor pH Tanah ini memiliki range 3.5 hingga 8. Sensor ini dapat langsung disambungkan dengan pin analog arduino maupun pin analog mikrokontroller lainnya, tanpa harus memakai modul penguat tambahan.

KARAKTERISTIK

SENSOR pH TANAH

Parameter	Simbol	Min	Max	Units
Tegangan masukan	Vcc	3.0	4.7	V
Tegangan keluaran	Δ Volt	4	45	ADC
Respon Waktu	t	0.1	0.3	S
Sensitivitas	Vcc	0.036	0.234	V

Tabel 2. Karakteristik Sensor

LAMPIRAN TABEL

DATA UJI SENSOR

Percobaan Sensor pH TANAH dengan tanah diberi larutan pH Buffer Asam-Basa

Tanah Asam				Tanah Basa			
Cairan Asam (ml)	pH	AVO Meter (mV)	ADC	CairanBasa (ml)	pH	AVO Meter (mV)	ADC
0	7	49.7	7	0	7	41.5	6
6	6	117.9	20	6	7	36	4
12	4.9	204	35	12	-	-	-
18	4.3	234	45	18	-	-	-

Tabel 5. Data uji sensor pH Tanah

Didapatkan persamaan :

$$y = -0.0693x + 7.3855, \text{ dimana : } x = \text{nilai ADC, dan } y = \text{pH}$$

pH Tanah	AVO Meter (mV)	ADC	Hasil Rumus (pH)
7	36	4	7.1083
7	41.5	6	6.9697
7	49.7	7	6.9004
6	117.9	20	5.9995
4.9	204	35	4.96
4.3	234	45	4.267

Tabel 6. Data uji rumus konversi ADC ke pH

Lampiran 14. Hasil Pengomposan

