

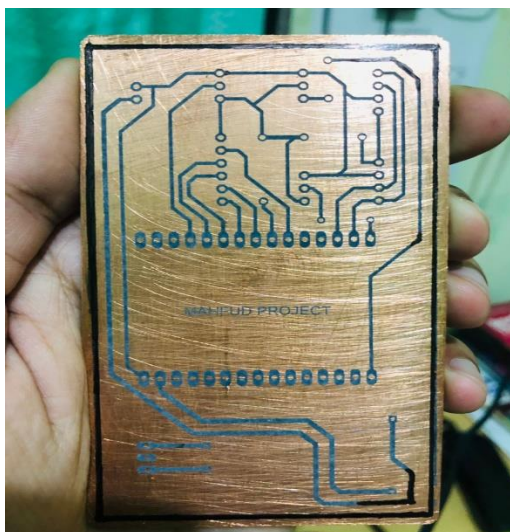
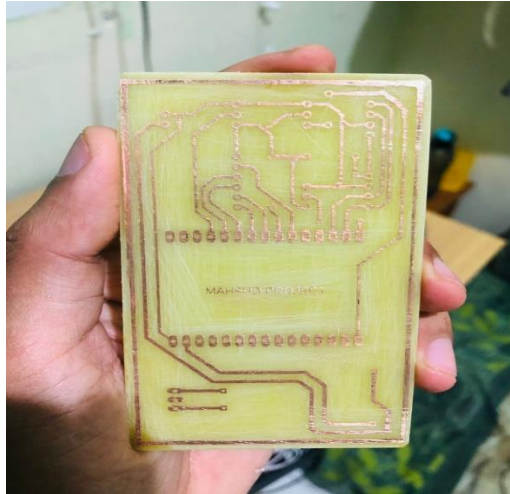
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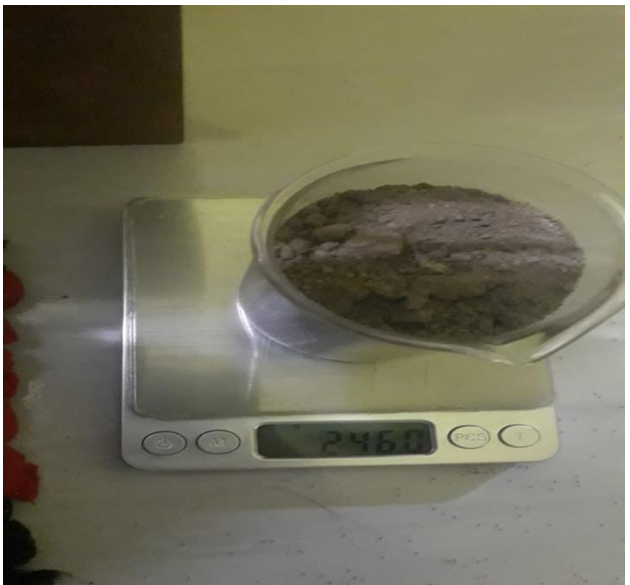
LAMPIRAN

PEMBUATAN PCB



KALIBRASI DENGAN METODE GRAVIMETRIS





PEMBUATAN SOFTWARE

```
Project_Mahfuz2 | Arduino 1.8.13
File Edit Sketch Tools Help

Project_Mahfuz2

1 #include <DS.h>
2
3 #define BLUDD_DIOGATE_ID "DIOGateID"
4 #define BLUDD_DEVIC_NAME "Smart Fertipati 1"
5 #define BLUDD_ADDR_COMMS "F01568500C1A9F012080804000000000"
6
7 #define BLUDD_FREQ Serial
8 #include <ESP8266WiFi.h>
9 #include <BlynkSimpleEsp8266.h>
10 #include <Timelib.h>
11 BlynkTimer timer;
12
13 char ssid[] = "blanmillah";
14 char pass[] = "12345678";
15
16 bool isWifiConnect = true;
17 BLUDD_COMMS_TSD() {
18   if (isWifiConnect) {
19     {
20       Blynk.syncAll();
21       isWifiConnect = false;
22     }
23     Blynk.syncVirtual(V0);
24     Blynk.syncVirtual(V4);
25     Blynk.syncVirtual(V5);
26   }
27 }
28
29 void setup() {
30   Blynk.begin();
31   Blynk.begin();
32 }
```

```
Project_Mahfuz2 | Arduino 1.8.13
File Edit Sketch Tools Help

Project_Mahfuz2

1 #include <DS.h>
2
3 #define BLUDD_DIOGATE_ID "DIOGateID"
4 #define BLUDD_DEVIC_NAME "Smart Fertipati 1"
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8 #include <ESP8266WiFi.h>
9 #include <BlynkSimpleEsp8266.h>
10 #include <Timelib.h>
11 BlynkTimer timer;
12
13 char ssid[] = "blanmillah";
14 char pass[] = "12345678";
15
16 bool isWifiConnect = true;
17 BLUDD_COMMS_TSD() {
18   if (isWifiConnect) {
19     {
20       Blynk.syncAll();
21       isWifiConnect = false;
22     }
23     Blynk.syncVirtual(V0);
24     Blynk.syncVirtual(V4);
25     Blynk.syncVirtual(V5);
26   }
27 }
28
29 void setup() {
30   Blynk.begin();
31   Blynk.begin();
32 }
```

SOFTWARE KALIBRASI

```
#include <SD.h>
```

```
#define BLYNK_TEMPLATE_ID "TMPLmmZzaUIf"
```

```
#define BLYNK_DEVICE_NAME "Smart Fertigasi 2"
```

```
#define BLYNK_AUTH_TOKEN "F6l5d8e5krnc41APOXLDQHJE9fYt3AMo"
```

```
#define BLYNK_PRINT Serial
```

```
#include <ESP8266WiFi.h>
```

```
#include <BlynkSimpleEsp8266.h>
```

```
#include <TimeLib.h>
```

```
BlynkTimer timer;
```

```
char ssid[] = "bissmillah";
```

```
char pass[] = "12345678";
```

```
bool isFirstConnect = true;
```

```
BLYNK_CONNECTED() {
```

```
    if (isFirstConnect)
```

```
    {
```

```
        Blynk.syncAll();
```

```
        isFirstConnect = false;
```

```
    }
```

```
Blynk.syncVirtual(V0);
```

```
Blynk.syncVirtual(V4);
```



```
Blynk.syncVirtual(V5);

}

WidgetLED led1(V1);

WidgetLED led2(V2);

WidgetLED led3(V3);

const int chipSelect = 15;

#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);

#include "RTCLib.h"

RTC_DS3231 rtc;

char hari[7][12] = {"Minggu", "Senin", "Selasa", "Rabu", "Kamis", "Jumat", "Sabtu"};

String jam, menit, detik, tanggal, bulan, tahun;

const int soil = A0;

int tanah;

int s;

bool mati = HIGH;

bool hidup = LOW;

bool oto = 0;

bool man = 0;

int i = 0
```

```
const int pump = 16;

unsigned long ulangi1;

int waktu1 = 10000;

float tegangan;

void control(){

    switch(i){

        case 1 :

            Blynk.virtualWrite(V5, LOW);

            oto = 1;

            man = 0;

            break;

        case 2 :

            oto = 0;

            man = 1;

            break;

    }

    if(oto == 1){

        if (s < 30){

            digitalWrite(pump, hidup);

        }

        else if (s > 33){
```

```
digitalWrite(pump, mati);

}}

}

BLYNK_WRITE(V4){

  if (param.asInt() == HIGH) {

    i = 1;

    Blynk.virtualWrite(V5, LOW);

  }else{

    i = 2;

    digitalWrite(pump, HIGH);

    delay(50);

  }

}

BLYNK_WRITE(V5){

  if(man == 1){

    if (param.asInt() == HIGH) {

      digitalWrite(pump, hidup);

    }else{

      digitalWrite(pump, mati);

      Blynk.virtualWrite(V5, LOW);}}

  else{
```

```

    digitalWrite(pump, mati);

    Blynk.virtualWrite(V5, LOW);

}

}

void lcd_init(){

    lcd.begin();

    lcd.backlight();

    lcd.setCursor(3, 0);

    lcd.print("SMART AGRO"); //menampilkan data/value ke dalam lcd

    lcd.setCursor(4, 1);

    lcd.print("INSTIPER");

    delay(5000); //menjeda program

    lcd.clear();

}

void init_rtc() {

    if (! rtc.begin()) {

        while (1);

    }

    if(rtc.lostPower()){

        rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));

        //rtc.adjust(DateTime(2022,7,3,13,38,0)); //kalibrasi waktu

```

```
}}
```

```
void setup() {
```

```
  Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
```

```
  timer.setInterval(1000L, sensor);
```

```
  timer.setInterval(800L, control);
```

```
  lcd_init();
```

```
  init_rtc();
```

```
  pinMode(pump, OUTPUT);
```

```
  digitalWrite(pump, mati);
```

```
  Serial.begin(9600);
```

```
  if (!SD.begin(chipSelect)){
```

```
    Serial.println("Kartu gagal, atau tidak ada");
```

```
    // jangan lakukan apa-apa lagi:
```

```
    return;} 
```

```
  Serial.println("kartu diinisialisasi.");
```

```
  File dataFile = SD.open("datalog.csv", FILE_WRITE);
```

```
  dataFile.print("Hari");
```

```
  dataFile.print(", ");
```

```
  dataFile.print("Waktu");
```

```
  dataFile.print(", ");
```

```
  dataFile.print("Jadwal");
```

```

    dataFile.print(", ");

    dataFile.println("Soil");

    dataFile.close();

}

void loop() {

    Blynk.run();

    timer.run();

}

void sensor(){

    tanah = analogRead(soil);

    s = map(tanah, 855, 107, 0, 100);

    tegangan= (tanah*5.00)/1023;

    if(s > 100){

        s = 100;}

    if(s < 0){

        s = 0;}

    Serial.print("ADC:");

    Serial.println(tanah);

    if(s < 28){led1.on(); led2.off(); led3.off();}

    else if(s > 28 && s <35){led1.off(); led2.on(); led3.off();}

    else if(s > 35){led1.off(); led2.off(); led3.on();}

```

```

lcd.setCursor(3, 0);lcd.print("SMART AGRO");

lcd.setCursor(0, 1);lcd.print("A:");lcd.setCursor(2, 1);lcd.print("    ");lcd.setCursor(2,
1);lcd.print(tanah);

lcd.setCursor(8,          1);lcd.print("T:");lcd.setCursor(10,          1);lcd.print("
");lcd.setCursor(10, 1);lcd.print(tegangan);lcd.print("v");

Blynk.virtualWrite(V0, s);

unsigned long currentmillis = millis();

if((currentmillis - ulangi1) > waktu1){

    ulangi1 = millis();

    DateTime now = rtc.now();

    jam=String(now.hour(), DEC);

    menit=String(now.minute(), DEC);

    detik=String(now.second(), DEC);

    tanggal=String(now.day(), DEC);

    bulan=String(now.month(), DEC);

    tahun=String(now.year(), DEC);


    String waktu = String()+jam+": "+menit+": "+detik+" ";

    String kalender = String()+tanggal+"/"+bulan+"/"+tahun+" ";

    String dataString1 = "";

    dataString1 += String(s);

```

```
File dataFile = SD.open("datalog.csv", FILE_WRITE);

if (dataFile) {

    dataFile.print(hari[now.dayOfTheWeek()]);

    dataFile.print(", ");

    dataFile.print(waktu);

    dataFile.print(", ");

    dataFile.print(kalender);

    dataFile.print(", ");

    dataFile.println(dataString1);

    dataFile.close();

    //lcd.setCursor(10, 1);lcd.print("    ");lcd.setCursor(10, 1);lcd.print("SD-ON");

}else {

    Serial.println("error opening datalog.txt");

    //lcd.setCursor(10, 1);lcd.print("    ");lcd.setCursor(10, 1);lcd.print("SD-OFF");

}
```


SOFTWARE IRIGASI OTOMATIS

```
#include <SD.h>
```

```
#define BLYNK_TEMPLATE_ID "TMPLmmZzaUIf"
```

```
#define BLYNK_DEVICE_NAME "Smart Fertigasi 2"
```

```
#define BLYNK_AUTH_TOKEN "F6l5d8e5krnc41APOXLDQHJE9fYt3AMo"
```

```
#define BLYNK_PRINT Serial
```

```
#include <ESP8266WiFi.h>
```

```
#include <BlynkSimpleEsp8266.h>
```

```
#include <TimeLib.h>
```

```
BlynkTimer timer;
```

```
char ssid[] = "bissmillah";
```

```
char pass[] = "12345678";
```

```
bool isFirstConnect = true;
```

```
BLYNK_CONNECTED() {
```

```
    if (isFirstConnect)
```

```
    {
```

```
        Blynk.syncAll();
```

```
        isFirstConnect = false;
```

```
    }
```

```
Blynk.syncVirtual(V0);

Blynk.syncVirtual(V4);

Blynk.syncVirtual(V5);

}

WidgetLED led1(V1);

WidgetLED led2(V2);

WidgetLED led3(V3);

const int chipSelect = 15;

#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);

#include "RTCLib.h"

RTC_DS3231 rtc;

char hari[7][12] = {"Minggu", "Senin", "Selasa", "Rabu", "Kamis", "Jumat", "Sabtu"};

String jam, menit, detik, tanggal, bulan, tahun;

const int soil = A0;

int tanah;

int s;

bool mati = HIGH;

bool hidup = LOW;

bool oto = 0;
```

```
bool man = 0;

int i = 0;

const int pump = 16;

unsigned long ulangi1;

int waktu1 = 10000;

void control(){

    switch(i){

        case 1 :

            Blynk.virtualWrite(V5, LOW);

            oto = 1;

            man = 0;

            break;

        case 2 :

            oto = 0;

            man = 1;

            break;

    }

    if(oto == 1){

        DateTime now = rtc.now();

        if ( now.hour() == 7 && now.minute() == 59 && now.second() == 59 && s <= 30 ) {

            digitalWrite(pump, hidup);
```

```

    delay(60000);

    digitalWrite(pump, mati);

} else if ( now.hour() == 15 && now.minute() == 59 && now.second() == 59 && s
    <= 30 ) {

    digitalWrite(pump, hidup);

    delay(60000);

    digitalWrite(pump, mati);

}}

}

BLYNK_WRITE(V4){

    if (param.asInt()== HIGH) {

        i = 1;

        Blynk.virtualWrite(V5, LOW);

    }else{

        i = 2;

        digitalWrite(pump, HIGH);

        delay(50);

    }

}

BLYNK_WRITE(V5){

    if(man == 1){

```

```
if (param.asInt() == HIGH) {  
    digitalWrite(pump, HIGH);  
}  
else{  
    digitalWrite(pump, LOW);  
    Blynk.virtualWrite(V8, LOW);  
}  
  
else{  
    digitalWrite(pump, LOW);  
    Blynk.virtualWrite(V8, LOW);  
}  
}  
  
void lcd_init(){  
    lcd.begin();  
    lcd.backlight();  
    lcd.setCursor(3, 0);  
    lcd.print("SMART AGRO"); //menampilkan data/value ke dalam lcd  
    lcd.setCursor(4, 1);  
    lcd.print("INSTIPER");  
    delay(5000); //menjeda program  
    lcd.clear();  
}
```

```

void init_rtc() {

    if (! rtc.begin()) {

        while (1);

    }

    if(rtc.lostPower()){

        rtc.adjust(DateTime(F(__DATE__), F(__TIME__)));

        //rtc.adjust(DateTime(2022,7,3,13,38,0)); //kalibrasi waktu

    }}

void setup() {

    Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);

    lcd_init();

    init_rtc();

    timer.setInterval(1000L, sensor);

    timer.setInterval(800L, control);

    Serial.begin(9600);

    if (!SD.begin(chipSelect)){

        Serial.println("Kartu gagal, atau tidak ada");

        // jangan lakukan apa-apa lagi:

        return;}

    Serial.println("kartu diinisialisasi.");

```

```

File dataFile = SD.open("datalog.csv", FILE_WRITE);

dataFile.print("Hari");

dataFile.print(", ");

dataFile.print("Waktu");

dataFile.print(", ");

dataFile.print("Jadwal");

dataFile.print(", ");

dataFile.println("Soil");

dataFile.close();

pinMode(pump, OUTPUT);

digitalWrite(pump, mati);

}

void loop() {

  Blynk.run();

  timer.run();

}

void sensor(){

  tanah = analogRead(soil);

  s = map(tanah, 855, 107, 0, 100);

  if(s > 100){

    s = 100;}

```

```

if(s < 0){

    s = 0;}

Serial.print("ADC:");

Serial.println(tanah);

if(s < 28){led1.on(); led2.off(); led3.off();}

else if(s > 28 && s <35){led1.off(); led2.on(); led3.off();}

else if(s > 35){led1.off(); led2.off(); led3.on();}

lcd.setCursor(3, 0);lcd.print("SMART AGRO");

lcd.setCursor(0,          1);lcd.print("Soil:");lcd.setCursor(5,          1);lcd.print("
");lcd.setCursor(5, 1);lcd.print(s);lcd.print("%");

Blynk.virtualWrite(V0, s);

unsigned long currentmillis = millis();

if((currentmillis - ulangi1) > waktu1){

    ulangi1 = millis();

    DateTime now = rtc.now();

    jam=String(now.hour(), DEC);

    menit=String(now.minute(), DEC);

    detik=String(now.second(), DEC);

    tanggal=String(now.day(), DEC);

    bulan=String(now.month(), DEC);

    tahun=String(now.year(), DEC);

```



```

String waktu = String()+jam+": "+menit+": "+detik+" ";

String kalender = String()+tanggal+"/"+bulan+"/"+tahun+" ";

String dataString1 = "";

dataString1 += String(s);

File dataFile = SD.open("datalog.csv", FILE_WRITE);

if (dataFile) {

    dataFile.print(hari[now.dayOfTheWeek()]);

    dataFile.print(" ");

    dataFile.print(waktu);

    dataFile.print(" ");

    dataFile.print(kalender);

    dataFile.print(" ");

    dataFile.println(dataString1);

    dataFile.close();

    lcd.setCursor(10, 1);lcd.print("    ");lcd.setCursor(10, 1);lcd.print("SD-ON");

}else {

    Serial.println("error opening datalog.txt");

    lcd.setCursor(10, 1);lcd.print("    ");lcd.setCursor(10, 1);lcd.print("SD-OFF");

}

}

}

```

KEGIATAN DILAPANGAN



Uji Kadar Air Pada Tanah

SAMPEL 1

Wadah kosong	: 68,4 gr	
Berat wadah + sampel	: 280,8 gr	
Berat wadah + sampel setelah di oven	: 261,6 gr	
Jumlah air yang hilang	: 19,2 gr	
Berat tanah setelah dikeringkan	: $261,6 \text{ gr} - 68,4 \text{ gr}$	$= 193,2 \text{ gr}$
Kadar air (berdasarkan berat kering)	: $19,2 / 193,2 \times 100\%$	$= 9,93 \%$
Kadar air (% volume)	: $9,93 \% \times 1,5$	$= 15 \%$

SAMPEL 2

Wadah kosong	: 66,9 gr	
Berat wadah + sampel	: 291,4 gr	
Berat wadah + sampel setelah di oven	: 264,2 gr	
Jumlah air yang hilang	: 27,2 gr	
Berat tanah setelah dikeringkan	: $291,4 \text{ gr} - 66,9 \text{ gr}$	$= 224,5 \text{ gr}$
Kadar air (berdasarkan berat kering)	: $27,2 / 224,5 \times 100\%$	$= 12,11\%$
Kadar air (% volume)	: $12,11\% \times 1,5$	$= 18\%$

SAMPEL 3

Wadah kosong	: 68,6 gr	
Berat wadah + sampel	: 279,8 gr	
Berat wadah + sampel setelah di oven	: 260,7 gr	
Jumlah air yang hilang	: 19,1 gr	
Berat tanah setelah dikeringkan	: $260,7 \text{ gr} - 68,6 \text{ gr}$	$= 192,1 \text{ gr}$

Kadar air (berdasarkan berat kering) : $19,1 / 192,1 \times 100\% = 9,94\%$

Kadar air (% volume) : $9,94\% \times 1,5 = 19\%$

SAMPEL 4

Wadah kosong : 66,5 gr

Berat wadah + sampel : 304,6 gr

Berat wadah + sampel setelah di oven : 269,4 gr

Jumlah air yang hilang : 35,2 gr

Berat tanah setelah dikeringkan : $269,4 \text{ gr} - 66,5 \text{ gr} = 202,9 \text{ gr}$

Kadar air (berdasarkan berat kering) : $35,2 / 202,9 \times 100\% = 17,34 \%$

Kadar air (% volume) : $17,34 \% \times 1,5 = 26 \%$

SAMPEL 5

Wadah kosong : 68,9 gr

Berat wadah + sampel : 307,0 gr

Berat wadah + sampel setelah di oven : 266,2 gr

Jumlah air yang hilang : 40,8 gr

Berat tanah setelah dikeringkan : $266,2 \text{ gr} - 68,9 \text{ gr} = 197,3 \text{ gr}$

Kadar air (berdasarkan berat kering) : $40,8 / 197,3 \times 100\% = 20,67 \%$

Kadar air (% volume) : $20,67 \% \times 1,5 = 31 \%$

SAMPEL 6

Wadah kosong : 69,2 gr

Berat wadah + sampel : 310,5 gr

Berat wadah + sampel setelah di oven : 268,5 gr

Jumlah air yang hilang : 42 gr

Berat tanah setelah dikeringkan : $268,5 \text{ gr} - 69,2 \text{ gr} = 199,3 \text{ gr}$
Kadar air (berdasarkan berat kering) : $42 / 21,07 \times 100\% = 21,07 \%$
Kadar air (% volume) : $21,07\% \times 1,5 = 32\%$

SAMPEL 7

Wadah kosong : 66,8 gr
Berat wadah + sampel : 313,2 gr
Berat wadah + sampel setelah di oven : 268,2 gr
Jumlah air yang hilang : 45 gr
Berat tanah setelah dikeringkan : $268,2 \text{ gr} - 66,8 \text{ gr} = 201,4 \text{ gr}$
Kadar air (berdasarkan berat kering) : $45 / 201,4 \times 100\% = 22,34 \%$
Kadar air (% volume) : $22,34\% \times 1,5 = 34\%$

SAMPEL 8

Wadah kosong : 67,7 gr
Berat wadah + sampel : 318,2 gr
Berat wadah + sampel setelah di oven : 268,6 gr
Jumlah air yang hilang : 49,6 gr
Berat tanah setelah dikeringkan : $268,6 \text{ gr} - 67,7 \text{ gr} = 200,9 \text{ gr}$
Kadar air (berdasarkan berat kering) : $49,6 / 200,9 \times 100\% = 24,68 \%$
Kadar air (% volume) : $24,68\% \times 1,5 = 37\%$

SAMPEL 9

Wadah kosong : 69,9 gr
Berat wadah + sampel : 322,1 gr
Berat wadah + sampel setelah di oven : 269,3 gr

Jumlah air yang hilang : 49,5 gr
Berat tanah setelah dikeringkan : $269,3 \text{ gr} - 69,9 \text{ gr} = 199,4 \text{ gr}$
Kadar air (berdasarkan berat kering) : $49,5 / 199,4 \times 100\% = 26,47 \%$
Kadar air (% volume) : $26,47\% \times 1,5 = 40\%$

SAMPEL 10

Wadah kosong : 68,7 gr
Berat wadah + sampel : 324,2 gr
Berat wadah + sampel setelah di oven : 268,7 gr
Jumlah air yang hilang : 55,5 gr
Berat tanah setelah dikeringkan : $268,7 \text{ gr} - 68,7 \text{ gr} = 200 \text{ gr}$
Kadar air (berdasarkan berat kering) : $55,5 / 200 \times 100\% = 27,75\%$
Kadar air (% volume) : $27,75\% \times 1,5 = 42\%$