

BAB VI

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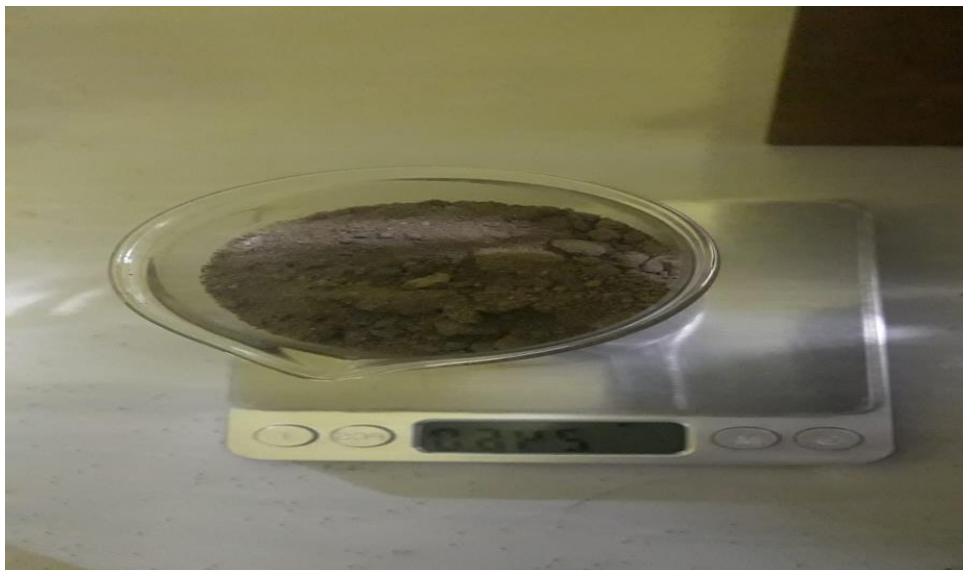
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LAMPIRAN

Pembuatan Instalasi Feritagasi Otomatis



Pengujian Metode Gravimetris



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 gr – 69,9 gr = 199,4 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 gr – 68,7 gr = 200 gr
Kadar air (berdasarkan berat kering) : $55,5 / 200 \times 100\% = 27,75\%$
Kadar air (% volume) : $27,75\% \times 1,5 = 42\%$

PEMBUATAN SOFTWARE

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

Project_Mahfuz2

1 #include <SD.h>
2
3 #define BLYNK_TEMPLATE_ID "BlynkTemplate1"
4 #define BLYNK_DEVICE_NAME "Smart Periscope 2"
5 #define BLYNK_AUTH_TOKEN "F615d6f8m0c1a3P0u0Q0aR5k47v13m0"
6
7 #define BLYNK_PRINT Serial
8 #include <BlynkDevice.h>
9 #include <BlynkSimpleEsp8266.h>
10 #include <TimeLib.h>
11 BlynkTimer timer;
12
13 char ssid[] = "hismallab";
14 char pass[] = "12345678";
15
16 bool isWifiConnect = true;
17 BLYNK_CONNECTED() {
18   if (!isWifiConnect)
19   {
20     Blynk.run();
21     isWifiConnect = false;
22   }
23   Blynk.run();
24   Blynk.syncVirtual(V0);
25   Blynk.syncVirtual(V1);
26 }
27
28 WidgetLED led1(V0);
29 WidgetLED led2(V1);
```

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

Project_Mahfuz2

1 #include <SD.h>
2
3 #define BLYNK_TEMPLATE_ID "BlynkTemplate1"
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7 #define BLYNK_PRINT Serial
8 #include <BlynkDevice.h>
9 #include <BlynkSimpleEsp8266.h>
10 #include <TimeLib.h>
11 BlynkTimer timer;
12
13 char ssid[] = "hismallab";
14 char pass[] = "12345678";
15
16 bool isWifiConnect = true;
17 BLYNK_CONNECTED() {
18   if (!isWifiConnect)
19   {
20     Blynk.run();
21     isWifiConnect = false;
22   }
23   Blynk.run();
24   Blynk.syncVirtual(V0);
25   Blynk.syncVirtual(V1);
26 }
27
28 WidgetLED led1(V0);
29 WidgetLED led2(V1);
```

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){

```

```
ulang1 = 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, hidup);

        }else{

            digitalWrite(pump, mati);

        }

    }

}

```

```

    Blynk.virtualWrite(V8, LOW);}}

else{

    digitalWrite(pump, mati);

    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");  
  
}  
  
}  
  
}
```