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LAMPIRAN

Lampiran 1 : Foto Perkembangan Setiap Minggu

1. Minggu 1 (Tanggal 14/08/2023)

2. Minggu 2 (Tanggal 21/08/2023)

3. Minggu 3 (Tanggal 02/09/2023)

4. Minggu 4 (Tanggal 09/09/2023)

5. Minggu 5 (Tanggal 18/09/2023)

6. Minggu 6 (Tanggal 23/09/2023)

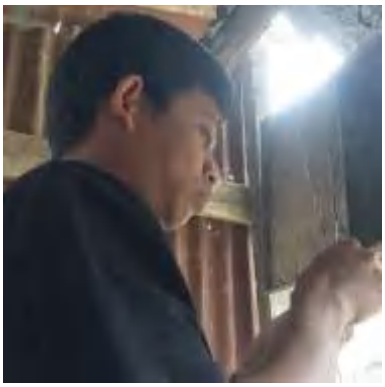
7. Minggu 7 (Tanggal 04/10/2023)

8. Minggu 8 (Tanggal 08/10/2023)

9. Minggu 9 (Tanggal 15/10/2023)

10. Minggu 10 (Tanggal 22/10/2023)

Lampiran 2: Dokumentasi Penelitian

Lampiran 3: Biaya Alat

1. Harga Komponen

NO.	Nama	Satuan	Harga Satuan (Rp.)	Harga Total (Rp.)
1	ESP32	1	55.000, -	55.000, -
2	Panel Box	1	9.000, -	9.000, -
3	Breadboard	1	8.300, -	8.300, -
4	Sensor Kelembapan	3	12.000, -	36.000, -
5	Sensor Hujan	1	6.000, -	6.000, -
6	Sensor Aliran Air	1	26.500, -	26.500, -
7	Solenoid Valve	4	26.000, -	104.000, -
8	LCD I2C 4x20	1	60.000, -	60.000, -
9	Switch	5	3.000, -	15.000, -
10	Bidirectional Level Converter 4 Channel	1	3.500, -	3.500, -

NO.	Nama	Satuan	Harga Satuan (Rp.)	Harga Total (Rp.)
11	Relay 4 Channel	1	20.000, -	20.000, -
12	Relay 1 Channel	1	5.600, -	5.600, -
13	Adaptor 9 volt	1	15.000, -	15.000, -
14	Modem Mi-fi 4G	1	130.000, -	130.000, -
15	Kabel Jumper 40 Pin	3	18.500 -	55.500, -
16	Kabel Listrik 30 meter	1	40.500, -	40.500, -
Total				589.900, -

2. Harga Sistem Perpipaan

NO.	Nama	Satuan	Harga Satuan (Rp.)	Harga Total (Rp.)
1	Pipa ½ Inch 4 m	9	25.000, -	225.000, -
2	Nozzle Sprinkler	3	6.500, -	19.500, -
3	Sambungan Pipa L	4	2.000, -	8.000, -
4	Sambungan Pipa T	5	2.000, -	10.000, -
5	Keran Air ½ Inch	1	5.000, -	5.000, -
6	Check Valve ½ Inch	2	26.500, -	53.000, -
7	Pompa Air	1	300.000, -	300.000, -
Total				620.500, -

Lampiran 4: Kode Program

```
//wifi
#include <WiFi.h>
#include <WiFiClient.h>
#include <BlynkSimpleEsp32.h>
//lcd
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#define BLYNK_PRINT Serial
#define BLYNK_TEMPLATE_ID "TMPL6_F3Ghaxi"
#define BLYNK_DEVICE_NAME "Smart Irrigation"

char auth[] = "IAMpSqdea2K15ZvFQPlDFRt3_eidP1wX";
char ssid[] = "Smart Irrigation";
     pass[] = "smart_irrigation_123";
      int Sensorkel_A = 32;
      int Sensorkel_B = 35;
      int Sensorkel_C = 34;
      int Sensorhujan = 33;
      int flowSensorPin = 25;
     lowCount = 0;
```

```
float flowRate = 0.0;
const int valve_A = 2;
const int valve_B = 4;
const int valve_C = 16;
const int valve_D = 17;
const int POMPA = 23;
const int oto_manual = 18;
const int tombol_A = 13;
const int tombol_B = 14;
const int tombol_C = 19;

int valueA = 0;
int valueB = 0;
int valueC = 0;
int valhuj = 0;

int kalA = 0;
int kalB = 0;
int kalC = 0;

bool A, B, C, D;

const unsigned long VALVE_RUNTIME = 60*60*1000; // 1 jam
unsigned long valveStartTime = 0;

unsigned long even = 0;
unsigned long even1 = 0;
unsigned long even2 = 0;
BLYNK_WRITE(V3){
 A = param.asInt();
}
BLYNK_WRITE(V4){
 B = param.asInt();
}
BLYNK_WRITE(V5){
 C = param.asInt();
}
BLYNK_WRITE(V8){
 D = param.asInt();
}
BLYNK_WRITE(V9){
 D = param.asInt();
}
LiquidCrystal_I2C lcd(0x27,20,4);

void setup() { // AWAL SETUP ........................
  Serial.begin(115200);
  Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
  Blynk.logEvent("sistem");
  pinMode(valve_A, OUTPUT);
  pinMode(valve_B, OUTPUT);
  pinMode(valve_C, OUTPUT);
  pinMode(valve_D, OUTPUT);
  pinMode(POMPA, OUTPUT);
  pinMode(oto_manual, INPUT);
  pinMode(tombol_A, INPUT);
  pinMode(tombol_B, INPUT);
  pinMode(tombol_C, INPUT);
  pinMode(flowSensorPin, INPUT_PULLUP);

  lcd.begin(20,4);
  lcd.init();
  lcd.init();
  // Print a message to the LCD.
  lcd.backlight();
  lcd.setCursor(7,0);
     lcd.print("WELCOME");
     .setCursor(9,1);
     lcd.print("TO");
     .setCursor(2,2);
     lcd.print("SMART IRRIGATION");
     .setCursor(5,3);
     lcd.print("BY MUKHLIS");
     nk.virtualWrite(V6, "SMART IRRIGATION");
```

```
  Blynk.virtualWrite(V7, "   By Mukhlis");

  attachInterrupt(digitalPinToInterrupt(flowSensorPin), pulseCounter, RISING);
  delay(3500);
  lcd.clear();

}

void loop() { // AWAL LOOP ======================================
  Blynk.run();
  flowCount = 0;  // Reset hitungan aliran
  delay(1000);  // Baca aliran setiap detik
  // Hitung laju aliran (hitungan per detik)
  flowRate = (flowCount / 6.67);//def= 7.5Ubah hitungan menjadi laju aliran
//dalam liter/menit
  Serial.print("Laju aliran: ");
  Serial.print(flowRate);
  Serial.println(" liter/menit");
  //Baca Nilai Sensor Kelembapan dan Sensor Air Hujan
  valueA = analogRead(Sensorkel_A);
  int outA = map(valueA, 2700, 1500, 0, 100);
  valueB = analogRead(Sensorkel_B);
  int outB = map(valueB, 2750, 1400, 0, 100);
  valueC = analogRead(Sensorkel_C);
  int outC = map(valueC, 3800, 1800, 0, 100);
  valhuj = analogRead(Sensorhujan);

  Serial.print("Nilai Sensor Kel. A: ");
     Serial.print(valueA);
     Serial.print("  &  ");
     Serial.print(outA);
     Serial.println("%");
  Serial.print("Nilai Sensor Kel. B: ");
     Serial.print(valueB);
     Serial.print("  &  ");
     Serial.print(outB);
     Serial.println("%");
  Serial.print("Nilai Sensor Kel. C: ");
     Serial.print(valueC);
     Serial.print("  &  ");
     Serial.print(outC);
     Serial.println("%");
  Serial.print("Nilai Sensor Hujan : ");
     Serial.println(valhuj);
     Serial.println(" ");
  lcd.clear();
  delay(50);

  lcd.setCursor(0,3);
  lcd.print("Debit Air   : ");
  lcd.setCursor(14,3);
  lcd.print(int(flowRate));
  lcd.setCursor(17, 3);
  lcd.print("L/m");
  data_tampil();
int oto_man = digitalRead(oto_manual);
if(oto_man == 1 || D == 1){
  //Serial.println("Otomatis-HIGH");
  Blynk.virtualWrite(V8, 1);
  if (valhuj > 2000){
  even1 = millis();
  Blynk.virtualWrite(V6, "    -OTOMATIS-");
  Blynk.virtualWrite(V7, "   Tidak Hujan");
  pompa();
  // Cari kelembapan terendah
  int lowestMoisture = min(outA, min(outB, outC));

     Jika selenoid valve sedang aktif
     (millis() - valveStartTime < VALVE_RUNTIME) {

     se{
     lynk.logEvent("pindah");
     ven = millis();
     igitalWrite(valve_A, HIGH);
```

```
    Blynk.virtualWrite(V3, 0);
    digitalWrite(valve_B, HIGH);
    Blynk.virtualWrite(V4, 0);
    digitalWrite(valve_C, HIGH);
    Blynk.virtualWrite(V5, 0);
    // aktifkan valve luar
    digitalWrite(valve_D, LOW);
    Blynk.virtualWrite(V9, 1);
    delay(50);
    // Aktifkan selenoid valve sesuai dengan kelembapan terendah
    if ((lowestMoisture == outA) && (outA <= 65)) {
      activateValve(1);
      digitalWrite(valve_D, HIGH);
      Blynk.virtualWrite(V9, 0);
    } else if ((lowestMoisture == outB) && (outB <= 65)) {
      activateValve(2);
      digitalWrite(valve_D, HIGH);
      Blynk.virtualWrite(V9, 0);
    } else if ((lowestMoisture == outC) && (outC <= 65)) {
      activateValve(3);
      digitalWrite(valve_D, HIGH);
      Blynk.virtualWrite(V9, 0);
    }else {
      if(millis() - even < 2500){
        Blynk.logEvent("kelembapan");
      }else{
      }
     val4();
    }
    // Catat waktu saat selenoid valve diaktifkan
    valveStartTime = millis();
  }
}
   else{
      if(millis() - even1 < 2500){
      Blynk.logEvent("kelembapan");
      }else{
      }
   val4();
   Blynk.virtualWrite(V6, "    -OTOMATIS-");
   Blynk.virtualWrite(V7, "  Sedang Hujan");
   }

} else{
    valveStartTime = -1 * (millis() + VALVE_RUNTIME);
    Blynk.virtualWrite(V8, 0);
    Blynk.virtualWrite(V6, " Sistem Berjalan");
    Blynk.virtualWrite(V7, "     MANUAL");
    int man_A = digitalRead(tombol_A);
    int man_B = digitalRead(tombol_B);
    int man_C = digitalRead(tombol_C);
       if(A == true || man_A == 1){
           digitalWrite(valve_A, LOW);
           Blynk.virtualWrite(V3, 1);
       } else{
           digitalWrite(valve_A, HIGH);
           Blynk.virtualWrite(V3, 0);
         }
       if(B == true || man_B == 1){
           digitalWrite(valve_B, LOW);
           Blynk.virtualWrite(V4, 1);
       } else{
           digitalWrite(valve_B, HIGH);
           Blynk.virtualWrite(V4, 0);
         }
       if(C == true || man_C == 1){
           digitalWrite(valve_C, LOW);
           Blynk.virtualWrite(V5, 1);
       } else{
           digitalWrite(valve_C, HIGH);
           Blynk.virtualWrite(V5, 0);
        }
      // cek semua keadadaan valve
```

```
      if((A == false && man_A == 0) && (B == false && man_B == 0) && (C ==
false && man_C == 0)){
      digitalWrite(valve_D, LOW);
      Blynk.virtualWrite(V9, 1);
      digitalWrite(POMPA, HIGH);
      if(millis() - even2 < 2500){
      Blynk.logEvent("kelembapan");
      }else{
      }
      }else{
      even2 = millis();
      digitalWrite(valve_D, HIGH);
      Blynk.virtualWrite(V9, 0);
      pompa();
      }
}
delay(50);
}//AKHIR DARI LOOP============================

//Fungsi
void val1(){
  digitalWrite(valve_A, LOW);
  Blynk.virtualWrite(V3, 1);
  digitalWrite(valve_B, HIGH);
  Blynk.virtualWrite(V4, 0);
  digitalWrite(valve_C, HIGH);
  Blynk.virtualWrite(V5, 0);
  }
void val2(){
  digitalWrite(valve_A, HIGH);
  Blynk.virtualWrite(V3, 0);
  digitalWrite(valve_B, LOW);
  Blynk.virtualWrite(V4, 1);
  digitalWrite(valve_C, HIGH);
  Blynk.virtualWrite(V5, 0);
  }
void val3(){
  digitalWrite(valve_A, HIGH);
  Blynk.virtualWrite(V3, 0);
  digitalWrite(valve_B, HIGH);
  Blynk.virtualWrite(V4, 0);
  digitalWrite(valve_C, LOW);
  Blynk.virtualWrite(V5, 1);
  }
void val4(){
  digitalWrite(valve_A, HIGH);
  Blynk.virtualWrite(V3, 0);
  digitalWrite(valve_B, HIGH);
  Blynk.virtualWrite(V4, 0);
  digitalWrite(valve_C, HIGH);
  Blynk.virtualWrite(V5, 0);
  digitalWrite(valve_D, LOW);
  Blynk.virtualWrite(V9, 1);
  digitalWrite(POMPA, HIGH);
  }

void data_tampil(){
  valueA = analogRead(Sensorkel_A);
  int outA = map(valueA, 2700, 1500, 0, 100);
  if(outA >= 65){
  Blynk.virtualWrite(V0, "Kondisi A Basah");
  }
  if(outA < 65 && outA >= 40){
  Blynk.virtualWrite(V0, "Kondisi A Ideal");
  }
  if(outA < 40){
     nk.virtualWrite(V0, "Kondisi A Kering");


     ueB = analogRead(Sensorkel_B);
      outB = map(valueB, 2750, 1400, 0, 100);
     outB >= 65){
     nk.virtualWrite(V1, "Kondisi B Basah");
```

```
  if(outB < 65 && outB >= 40){
  Blynk.virtualWrite(V1, "Kondisi B Ideal");
  }
  if(outB < 40){
  Blynk.virtualWrite(V1, "Kondisi B Kering");
  }

  valueC = analogRead(Sensorkel_C);
  int outC = map(valueC, 3800, 1800, 0, 100);
  if(outC >= 65){
  Blynk.virtualWrite(V2, "Kondisi C Basah");
  }
  if(outC < 65 && outC >= 40){
  Blynk.virtualWrite(V2, "Kondisi C Ideal");
  }
  if(outC < 40){
  Blynk.virtualWrite(V2, "Kondisi C Kering");
  }

  lcd.setCursor(0,0);
  lcd.print("Kelembapan A: ");
  lcd.setCursor(14,0);
  lcd.print(outA);
  lcd.setCursor(18,0);
  lcd.print("%");
  lcd.setCursor(0,1);
  lcd.print("Kelembapan B: ");
  lcd.setCursor(14,1);
  lcd.print(outB);
  lcd.setCursor(18,1);
  lcd.print("%");
  lcd.setCursor(0,2);
  lcd.print("Kelembapan C: ");
  lcd.setCursor(14,2);
  lcd.print(outC);
  lcd.setCursor(18,2);
  lcd.print("%");
}
// Fungsi untuk mengaktifkan selenoid valve yang sesuai
void activateValve(int valveNumber) {
  digitalWrite(valve_A, HIGH);
  Blynk.virtualWrite(V3, 0);
  digitalWrite(valve_B, HIGH);
  Blynk.virtualWrite(V4, 0);
  digitalWrite(valve_C, HIGH);
  Blynk.virtualWrite(V5, 0);

  switch (valveNumber) {
    case 1:
      digitalWrite(valve_A, LOW);
      Blynk.virtualWrite(V3, 1);
      break;
    case 2:
      digitalWrite(valve_B, LOW);
      Blynk.virtualWrite(V4, 1);
      break;
    case 3:
      digitalWrite(valve_C, LOW);
      Blynk.virtualWrite(V5, 1);
      break;
    default:
      break;
  }
}
void pompa(){
if (flowRate <= 5){
     alWrite(POMPA, LOW);
     {
     alWrite(POMPA, HIGH);


     pulseCounter() {
     wCount++;  // Pemanggilan fungsi ini menambah hitungan aliran
```