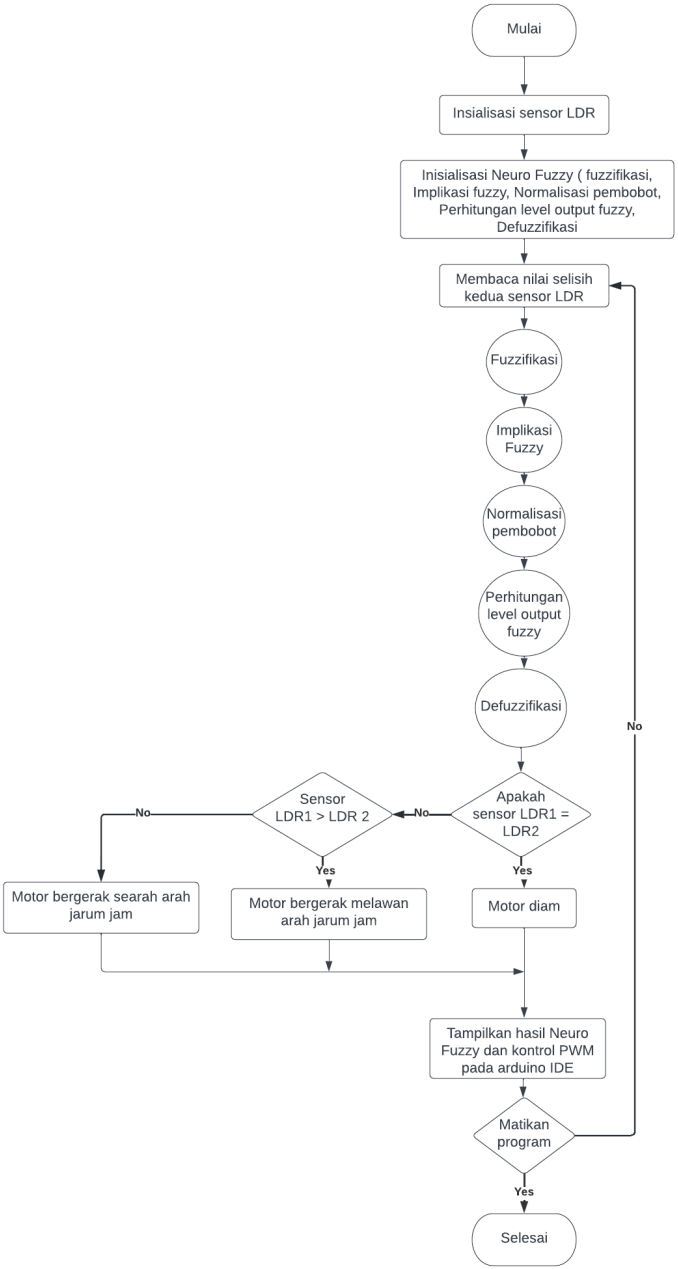
LAMPIRAN



Gambar diagram alir program arduino

```
#include <Wire.h> //library sensor

#define ldrPin1     A0    //pin ldr 1

#define ldrPin3     A2    //pin ldr 3

#define pwmX1       3     //pin pwm sumbu X

#define pwmX2       9     //pin pwm sumbu X

#define voltPin     A6    //PIN SENSOR TEGANGAN

#define currentPin  A7    //PIN SENSOR ARUS

#define GY49        0x4A  //ALAMAT SENSOR GY-49 (INTENSITAS CAHAYA)


float input1, pwm, out;

float S_LDR1,S_LDR2,S_LDR3;

float Lambat,Sedang,Cepat;

float rule1, rule2, rule3;

float X=0, A=0, B=0, AX=0, BX=0; //inisialisasi variabel menyimpan data

float offsetY =-5;

unsigned long lux;              //VARIABLE GY-49

 double wattM2;                 //VARIABLE GY-49

 float volt;                    //VARIABLE SENSOR TEGANGAN

 float current;

 float sensitivity = 66.f;

 int adcCurrent = 0;
```

```
  int offsetCurrent = 2500;
  double power;
  unsigned long currentTime = 50;
  unsigned long otherTime = 50;
  unsigned long kirimSerialTime = 200;
//double offsetY;
unsigned long d1=0,d2;
void SolarTrackerFuzzy() {
  //membaca input ldr
  //float readLdr1 = analogRead(ldrPin1);    //membaca sensor ldr 1
  //float readLdr3 = analogRead(ldrPin3);    //membaca sensor ldr 3
  int16_t readLdr1 = analogRead(ldrPin1);    //MEMBACA NILAI ADC SENSOR LDR 2
  int16_t readLdr3 = analogRead(ldrPin3);    //MEMBACA NILAI ADC SENSOR LDR 4
  //membaca input ldr dan mencari perbandingan antara 2 sensor untuk input fuzzy
 //input1 = ((readLdr3-readLdr1)+offsetX);
 input1 = (((readLdr3-readLdr1)+offsetY)*A);     //MENGHITUNG ERROR PADA SUMBU Y
  //Serial.print(input1);
  //meng absolutkan nilai pembacaan sensor agar tidak muncul niai (-)
  if (input1>=0) {A=1;} //jika input bilangan positif maka A sebagai pengali positif
```

```
  else if (input1<=0) {A=-1;} //jika input bilangan negatif maka A sebagai pengali negatif

  if (input1>=-3 && input1<=3) {input1=0;} //nilai sensor -3 sampai 3 menjadi titik 0 sensor

    //kontrol pwm dan fuzzy dengan perbandingan antara 2 sensor ldr

  X=((((readLdr3-readLdr1+offsetY)/10)*2)*out);


  if (X>=-20 && X<=20){X=0.0;} //nilai pwm -20 sampai 20 dianggap titik 0 pwm

  if (X>=200){X=200;} //nilai maksimal pwm 200

  if (X<=-200){X=-200;} //nilai minimal pwm -200


  // Printing indikator

//  Serial.println("Result: ");

//  Serial.print("\t\t\tSpeed1: ");

//  Serial.println(X);


  AX=X; //membaca pwm jika nilai positif

  BX=(X*-1); //membaca nilai pwm jika niai negatif lalu dipositifkan

  if (AX <=1){AX=1;} //agar nilai pwm yang masuk ke motor/aktuator tidak nilai negatif

  if (BX <=1){BX=1;} //agar nilai pwm yang masuk ke motor/aktuator tidak nilai negatif
```

```
  //loop motor
  analogWrite(pwmX1, AX); //membaca pwm dari perhitungan lalu dikirim ke driver motor
  analogWrite(pwmX2, BX); //membaca pwm dari perhitungan lalu dikirim ke driver motor
  //Serial.print(AX); Serial.print("  "); Serial.println(BX);
  //wait 200 ms
  delay(200);
}

unsigned char selisihKecil(){
  if (input1 <= -143){S_LDR1=0;}
  else if (input1 >=-143 && input1 <=38.03){S_LDR1=(input1+143)/181.03;}
  else if (input1>=38.03 && input1<=219){S_LDR1=(219-input1)/180.97;}
  else if (input1>= 219){S_LDR1=0;}
  return S_LDR1;
}
unsigned char selisihSedang(){
  if (input1<= 43.37){S_LDR2=0;}
  else if (input1 >=43.37 && input1 <=275){S_LDR2=(input1-43.37)/231.63;}
  else if (input1 >=275 && input1 <=380){S_LDR2=(380-input1)/105;}
```

```
  else if (input1 >= 380){S_LDR2=0;}
  return S_LDR2;
}
unsigned char selisihBesar(){
 if (input1 <= 168){S_LDR3 =0;}
  else if (input1 >=168.1 && input1 <=426.3){S_LDR3=(input1-
168.1)/258.2;}
  else if (input1 >=426.3 && input1 <=581){S_LDR3=(581-
input1)/15,7;}
  else if (input1 >= 581){input1 =0;}
  return S_LDR3;
}
/*
unsigned char pwmLambat(){
  if (pwm <= 100){Lambat =1;}
  else if (pwm >=100 && pwm <=150){Lambat=(150-pwm)/50;}
  else if (pwm >= 150){Lambat =0;}
  return Lambat;
}
unsigned char pwmSedang(){
  if (pwm <= 100){Sedang =0;}
  else if (pwm >=100 && pwm <=150){Sedang=(pwm-100)/50;}
  else if (pwm >=150 && pwm <=200){Sedang=(200-pwm)/50;}
```

```
  else if (pwm >= 200){Sedang =0;}
  return Sedang;
}
unsigned char pwmCepat (){
  if (pwm <= 100){Lambat =1;}
  else if (pwm >=150 && pwm <=200){Cepat=(pwm-150)/50;}
  else if (pwm >= 200){Cepat =0;}
  return Cepat;
}
*/
//Fuzzifikasi
void fuzzifikasi(){
  selisihKecil();
  selisihSedang();
  selisihBesar();
  //pwmLambat();
  //pwmSedang();
  //pwmCepat();
}

// Rule
void fuzzy_rule (){
```

```
  fuzzifikasi();
// selisih sedikit motor pelan
rule1 = (S_LDR1*100);
// jika sedang motor sedang
rule2 = (S_LDR2*133.2);
// jika selisih banyak maka motor cepat
rule3 = (S_LDR3*199.9);
//defuzifikasi
out = (rule1+rule2+rule3)/(S_LDR1+S_LDR2+S_LDR3);
}

void setup() {
  // put your setup code here, to run once:
  Wire.begin();                // INISIALISASI I2C
  Serial.begin(9600);
  Wire.beginTransmission(GY49); //INISIALISASI GY-49
  Wire.write(0x02);
  Wire.write(0x00);
  Wire.endTransmission();
  delay(300);
SolarTrackerFuzzy();
fuzzy_rule(); // memanggil fungsi fuzzifikasi untuk menghitung
keanggotaan masing2 variable
```

```
 pinMode(ldrPin1, INPUT);      //inisialisasi pin input ldr 1
 pinMode(ldrPin3, INPUT);      //inisialisasi pin input ldr 3
}
/*
void smon(long int d3){
  if(d2-d1>=d3){
    d1=d2;

    Serial.print("input1: ");
    Serial.println(input1);
    Serial.print("S_LDR1 : ");
    Serial.print(S_LDR1);
    Serial.print("S_LDR2 : ");
    Serial.print(S_LDR2);
    Serial.print("S_LDR3 : ");
    Serial.println(S_LDR3);
    Serial.print("Rule1 : ");
    Serial.println(rule1);
    Serial.print("Rule2 : ");
    Serial.println(rule2);
    Serial.print("Rule3 : ");
```

```
    Serial.println(rule3);
    Serial.print("Hasil DeFuzzy: ");
    Serial.println(out);

  Serial.print("*");
  Serial.print(wattM2);
  Serial.print(";");
  Serial.print(volt);
  Serial.print(";");
  Serial.print(current);
  Serial.print(";");
  Serial.print(power);
  Serial.print("#");
    }
  }
  */
 void loop() {
  //d2=millis();
  if((millis()-otherTime)>=500)
  {
  SolarTrackerFuzzy();
  selisihKecil();
```

```
  selisihSedang();
  selisihBesar();
  fuzzifikasi();
  fuzzy_rule ();
  readGY49();
  readVolt();
  readCurrent();
  otherTime = millis();
  }
  else if((millis()-currentTime)>=500)
  {
   readCurrent();
   currentTime = millis();
  }
  else if((millis()-kirimSerialTime)>=200)
  {
   kirimSerial();
   kirimSerialTime = millis();
  }
//smon(1000);
}
```

```
void readGY49()
{
  unsigned int bufGY49[2];
  Wire.beginTransmission(GY49);
  Wire.write(0x03);
  Wire.endTransmission();

  // Request 2 bytes of data
  Wire.requestFrom(GY49, 2);

  // Read 2 bytes of data luminance msb, luminance lsb
  if (Wire.available() == 2)
  {
    bufGY49[0] = Wire.read();
    bufGY49[1] = Wire.read();
  }

  // Convert the data to lux
  int exponent = (bufGY49[0] & 0xF0) >> 4;
  int mantissa = ((bufGY49[0] & 0x0F) << 4) | (bufGY49[1] & 0x0F);
  float luminance = pow(2, exponent) * mantissa * 0.045;
  lux = luminance;
```

```
  wattM2 = luminance * 0.0079;
  /*
  Serial.print("intensitas: ");
  Serial.println(wattM2);
  */
}

void readVolt()
{
  unsigned int adcVolt = analogRead(voltPin);
  volt = adcVolt/1023.f*5.22f*5;
  /*
  Serial.print("Volt: ");
  Serial.println(volt);
  */
}

void readCurrent()
{
  adcCurrent = (analogRead(currentPin) / 1023.f)*5000.f;
  current = (adcCurrent - offsetCurrent) / sensitivity;
  if(current < 0)
```

```
  {
    if(current > -0.3)
    {
      current = 0;
    }
    else
    {
      current = -current;
    }
  }
  else{}
  power = current*volt;
  /*
  Serial.print("Arus: ");
  Serial.println(current);
  Serial.print("Daya: ");
  Serial.println(power);
  */
}
void kirimSerial()
{
```

```
 Serial.print("*");
 Serial.print(wattM2);
 Serial.print(";");
 Serial.print(volt);
 Serial.print(";");
 Serial.print(current);
 Serial.print(";");
 Serial.print(power);
 Serial.print("#");
 /*
 //Serial.print("intensitas, ");
// Serial.print(wattM2);
 Serial.print("DATA,TIME, ");
 Serial.println(input1);
 Serial.print(",");
 Serial.print(wattM2);
 Serial.print(",");
 Serial.print(volt);
 Serial.print(",");
 Serial.print(current);
 Serial.print(",");
 Serial.println(power);
```

```
  //Serial.print("  ");
  //Serial.print("power");
  //Serial.println(power);
  */
}
```

Lanjutan data ANFIS

TIME	Intensitas	Tegangan	Arus	Daya
08.00	123.77	17.63	1.74	30.6762
08.01	123.77	17.63	1.86	32.7918
08.02	136.15	17.32	1.61	27.8852
08.03	148.52	18.04	1.53	27.6012
08.04	148.52	18.76	1.55	29.078
08.05	136.15	17.4	1.57	27.318
08.06	148.52	17.3	1.74	30.102
08.07	148.52	17.56	1.86	32.6616
08.08	148.52	17.56	1.61	28.2716
08.09	148.52	17.02	1.53	26.0406
08.10	148.52	17.43	1.55	27.0165
08.11	148.52	17.4	1.74	30.276
08.12	160.9	17.37	1.86	32.3082
08.13	160.9	17.25	1.61	27.7725
08.14	173.28	17.09	1.53	26.1477
08.15	173.28	17.97	1.55	27.8535
08.16	185.66	19.04	1.57	29.8928
08.17	185.66	17.07	1.74	29.7018
08.18	198.03	19.27	1.86	35.8422
08.19	198.03	19.04	1.81	34.4624
08.20	198.03	19.48	1.53	29.8044
08.21	198.03	19.07	1.74	33.1818
08.22	198.03	18.97	1.86	35.2842
08.23	185.66	18.99	1.61	30.5739
08.24	198.03	18.61	1.53	28.4733
08.25	198.03	18.07	1.55	28.0085

08.26	198.03	18.71	1.57	29.3747
08.27	198.03	18.09	1.74	31.4766
08.28	198.03	18.76	1.86	34.8936
08.29	198.03	19.2	1.61	30.912
08.30	198.03	19.3	1.8	34.74
08.31	222.79	19.31	1.81	34.9511
08.32	222.79	19.31	1.79	34.5649
08.33	222.79	19.31	1.78	34.3718
08.34	198.03	19.29	1.8	34.722
08.35	252.79	19.31	1.79	34.5649
08.36	282.79	19.3	1.82	35.126
08.37	292.79	18.09	1.84	33.2856
08.38	262.79	18.76	1.85	34.706
08.39	247.54	19.2	1.79	34.368
08.40	282.79	19.3	1.8	34.74
08.41	272.79	19.31	1.8	34.758
08.42	292.79	18.09	1.81	32.7429
08.43	252.79	18.76	1.79	33.5804
08.44	232.79	19.2	1.78	34.176
08.45	198.03	19.3	1.8	34.74
08.46	198.03	19.31	1.79	34.5649
08.47	185.66	18.09	1.82	32.9238
08.48	195.66	18.76	1.84	34.5184
08.49	195.66	19.2	1.85	35.52
08.50	205.66	19.3	1.79	34.547
08.51	215.66	19.31	1.8	34.758
08.52	173.28	18.09	1.8	32.562
08.53	173.28	18.76	1.81	33.9556
08.54	173.28	19.2	1.79	34.368

08.55	160.9	19.3	1.78	34.354
08.56	148.52	19.31	1.8	34.758
08.57	148.52	17.12	1.79	30.6448
08.58	148.52	17.04	1.82	31.0128
08.59	148.52	17.02	1.84	31.3168
09.00	148.52	18.89	1.85	34.9465
09.01	148.52	19.02	1.79	34.0458
09.02	148.52	19.09	1.8	34.362
09.03	173.28	19.94	1.74	34.6956
09.04	173.28	18.81	1.74	32.7294
09.05	185.66	18.12	1.81	32.7972
09.06	185.66	19.58	1.73	33.8734
09.07	185.66	19.69	1.75	34.4575
09.08	185.66	18.81	1.61	30.2841
09.09	198.03	18.79	1.65	31.0035
09.10	198.03	18.76	1.69	31.7044
09.11	198.03	18.1	1.79	32.399
09.12	198.03	18.94	1.8	34.092
09.13	222.79	18.99	1.74	33.0426
09.14	198.03	18.92	1.74	32.9208
09.15	222.79	18.53	1.81	33.5393
09.16	222.79	18.1	1.73	31.313
09.17	198.03	18.46	1.75	32.305
09.18	198.03	17.25	1.61	27.7725
09.19	222.79	18.95	1.65	31.2675
09.20	247.54	18.69	1.69	31.5861
09.21	272.3	18.3	1.79	32.757
09.22	272.3	18.12	1.8	32.616
09.23	272.3	18.74	1.74	32.6076

09.24	272.3	18.81	1.74	32.7294
09.25	247.54	18.84	1.81	34.1004
09.26	247.54	18.79	1.73	32.5067
09.27	272.3	18.74	1.75	32.795
09.28	272.3	18.74	1.61	30.1714
09.29	272.3	18.75	1.65	30.9375
09.30	297.05	18.8	1.69	31.772
09.31	297.05	18.88	1.75	33.04
09.32	297.05	18.91	1.79	33.8489
09.33	297.05	19.08	1.82	34.7256
09.34	297.05	19.03	1.81	34.4443
09.36	297.05	19.13	1.85	35.3905
09.37	297.05	19.11	1.83	34.9713
09.38	297.05	18.91	1.79	33.8489
09.39	297.05	19.01	1.8	34.218
09.40	272.3	19.13	1.85	35.3905
09.41	272.3	19.03	1.75	33.3025
09.42	247.54	19.08	1.79	34.1532
09.43	272.3	19.06	1.82	34.6892
09.44	272.3	19.19	1.81	34.7339
09.45	272.3	19.08	1.85	35.298
09.46	272.3	19.03	1.83	34.8249
09.47	247.54	18.91	1.79	33.8489
09.48	247.54	18.93	1.8	34.074
09.49	247.54	19.08	1.85	35.298
09.50	247.54	19.11	1.75	33.4425
09.51	247.54	19.03	1.79	34.0637
09.52	272.3	19.13	1.82	34.8166
09.53	272.3	19.06	1.81	34.4986

09.54	272.3	19.13	1.85	35.3905
09.55	272.3	19.16	1.83	35.0628
09.56	272.3	19.19	1.79	34.3501
09.57	272.3	18.98	1.8	34.164
09.58	272.3	19.13	1.85	35.3905
09.59	272.3	19.16	1.81	34.6796
10.00	297.05	19.24	1.83	35.2092
10.01	297.05	18.55	1.74	32.277
10.02	297.05	19.29	1.85	35.6865
10.03	272.3	19.19	1.84	35.3096
10.04	247.54	19.24	1.82	35.0168
10.05	247.54	19.08	1.81	34.5348
10.06	272.3	19.13	1.84	35.1992
10.07	297.05	19.29	1.86	35.8794
10.08	297.05	19.29	1.86	35.8794
10.09	297.05	19.24	1.85	35.594
10.10	297.05	19.24	1.85	35.594
10.11	297.05	19.42	1.74	33.7908
10.12	297.05	19.34	1.85	35.779
10.13	297.05	19.29	1.84	35.4936
10.14	297.05	20.54	1.82	37.3828
10.15	297.05	19.49	1.81	35.2769
10.16	297.05	19.26	1.84	35.4384
10.17	297.05	19.52	1.86	36.3072
10.18	297.05	19.34	1.86	35.9724
10.19	321.8	19.34	1.85	35.779
10.20	346.56	19.42	1.85	35.927
10.21	346.56	19.29	1.74	33.5646
10.22	346.56	19.26	1.85	35.631

10.23	321.8	19.47	1.84	35.8248
10.24	321.8	19.24	1.82	35.0168
10.25	297.05	19.44	1.81	35.1864
10.26	297.05	19.31	1.84	35.5304
10.27	297.05	19.36	1.86	36.0096
10.28	297.05	19.34	1.86	35.9724
10.29	272.3	19.44	1.85	35.964
10.30	272.3	19.42	1.85	35.927
10.31	272.3	19.29	1.85	35.6865
10.32	272.3	19.39	1.86	36.0654
10.33	247.54	19.19	1.81	34.7339
10.34	272.3	19.39	1.86	36.0654
10.35	272.3	19.29	1.85	35.6865
10.36	272.3	19.42	1.86	36.1212
10.37	272.3	19.24	1.85	35.594
10.38	247.54	19.42	1.86	36.1212
10.39	272.3	19.21	1.85	35.5385
10.40	272.3	19.57	1.87	36.5959
10.41	272.3	19.59	1.85	36.2415
10.42	272.3	19.59	1.86	36.4374
10.43	272.3	19.24	1.81	34.8244
10.44	272.3	19.21	1.86	35.7306
10.45	272.3	20.23	1.85	37.4255
10.46	272.3	20.39	1.86	37.9254
10.47	272.3	20.33	1.85	37.6105
10.48	272.3	20.33	1.86	37.8138
10.49	297.05	18.91	1.85	34.9835
10.50	297.05	18.45	1.87	34.5015
10.51	321.8	18.4	1.85	34.04

10.52	346.56	18.68	1.86	34.7448
10.53	371.31	18.65	1.81	33.7565
10.54	396.07	18.73	1.86	34.8378
10.55	396.07	18.62	1.85	34.447
10.56	396.07	18.6	1.86	34.596
10.57	396.07	18.37	1.85	33.9845
10.58	371.31	18.73	1.86	34.8378
10.59	371.31	18.5	1.85	34.225
11.00	371.31	18.83	1.87	35.2121
11.01	346.56	18.73	1.85	34.6505
11.02	346.56	18.78	1.86	34.9308
11.03	371.31	18.65	1.81	33.7565
11.04	371.31	18.4	1.86	34.224
11.05	371.31	18.24	1.85	33.744
11.06	396.07	18.17	1.86	33.7962
11.07	396.07	18.42	1.85	34.077
11.08	396.07	18.32	1.86	34.0752
11.09	396.07	18.68	1.85	34.558
11.10	396.07	18.75	1.87	35.0625
11.11	396.07	18.57	1.85	34.3545
11.12	396.07	18.5	1.86	34.41
11.13	396.07	18.8	1.81	34.028
11.14	396.07	18.55	1.86	34.503
11.15	371.31	18.78	1.85	34.743
11.16	371.31	18.73	1.86	34.8378
11.17	396.07	18.62	1.85	34.447
11.18	396.07	18.88	1.86	35.1168
11.19	396.07	19.01	1.85	35.1685
11.20	445.58	18.78	1.87	35.1186

11.21	445.58	18.83	1.85	34.8355
11.22	396.07	18.8	1.86	34.968
11.23	445.58	18.85	1.81	34.1185
11.24	445.58	18.75	1.86	34.875
11.25	396.07	18.83	1.85	34.8355
11.26	396.07	18.8	1.86	34.968
11.27	396.07	18.68	1.85	34.558
11.28	396.07	18.91	1.86	35.1726
11.29	396.07	18.96	1.85	35.076
11.30	396.07	18.62	1.87	34.8194
11.31	371.31	18.93	1.88	35.5884
11.32	396.07	19.01	1.89	35.9289
11.33	396.07	18.7	1.87	34.969
11.34	371.31	18.98	1.89	35.8722
11.35	396.07	18.91	1.87	35.3617
11.36	346.56	19.01	1.84	34.9784
11.37	321.8	18.91	1.86	35.1726
11.38	321.8	19.01	1.89	35.9289
11.39	321.8	18.88	1.83	34.5504
11.40	346.56	18.73	1.81	33.9013
11.41	371.31	18.85	1.88	35.438
11.42	346.56	18.96	1.89	35.8344
11.43	297.05	18.75	1.87	35.0625
11.44	272.3	18.96	1.89	35.8344
11.45	247.54	18.91	1.87	35.3617
11.46	247.54	19.13	1.84	35.1992
11.47	247.54	18.52	1.86	34.4472
11.48	247.54	19.24	1.89	36.3636
11.49	247.54	18.83	1.83	34.4589

11.50	272.3	18.34	1.81	33.1954
11.51	247.54	18.5	1.88	34.78
11.52	247.54	18.47	1.89	34.9083
11.53	247.54	18.55	1.87	34.6885
11.54	272.3	18.75	1.89	35.4375
11.55	272.3	18.62	1.87	34.8194
11.56	272.3	18.68	1.84	34.3712
11.57	297.05	18.73	1.86	34.8378
11.58	297.05	18.65	1.89	35.2485
11.59	321.8	18.78	1.83	34.3674
12.00	321.8	18.65	1.81	33.7565
12.01	297.05	18.17	1.73	31.4341
12.02	297.05	18.47	1.75	32.3225
12.03	321.8	18.24	1.8	32.832
12.04	297.05	18.47	1.85	34.1695
12.05	297.05	18.5	1.86	34.41
12.06	297.05	18.73	1.86	34.8378
12.07	321.8	18.7	1.84	34.408
12.08	321.8	18.42	1.85	34.077
12.09	297.05	18.6	1.85	34.41
12.10	297.05	18.27	1.82	33.2514
12.11	321.8	18.04	1.73	31.2092
12.12	346.56	18.29	1.75	32.0075
12.13	321.8	18.68	1.8	33.624
12.14	321.8	18.85	1.85	34.8725
12.15	321.8	18.68	1.86	34.7448
12.16	321.8	18.73	1.86	34.8378
12.17	321.8	18.68	1.84	34.3712
12.18	321.8	18.6	1.85	34.41

12.19	346.56	18.55	1.85	34.3175
12.20	371.31	19.13	1.82	34.8166
12.21	371.31	18.96	1.76	33.3696
12.22	396.07	19.08	1.79	34.1532
12.23	445.58	19.29	1.8	34.722
12.24	445.58	18.85	1.75	32.9875
12.25	495.08	19.16	1.82	34.8712
12.26	445.58	19.11	1.82	34.7802
12.27	445.58	19.16	1.82	34.8712
12.28	445.58	19.21	1.83	35.1543
12.29	396.07	19.19	1.79	34.3501
12.30	396.07	19.26	1.83	35.2458
12.31	396.07	18.98	1.76	33.4048
12.32	371.31	19.13	1.79	34.2427
12.33	445.58	18.98	1.8	34.164
12.34	495.08	19.06	1.75	33.355
12.35	495.08	19.08	1.82	34.7256
12.36	544.59	18.96	1.82	34.5072
12.37	544.59	19.08	1.82	34.7256
12.38	495.08	18.98	1.83	34.7334
12.39	495.08	19.03	1.79	34.0637
12.40	445.58	20.33	1.83	37.2039
12.41	396.07	19.03	1.76	33.4928
12.42	396.07	19.01	1.79	34.0279
12.43	371.31	19.01	1.8	34.218
12.44	396.07	18.83	1.75	32.9525
12.45	371.31	19.01	1.82	34.5982
12.46	371.31	18.93	1.82	34.4526
12.47	371.31	18.75	1.82	34.125

12.48	346.56	19.03	1.83	34.8249
12.49	346.56	19.08	1.79	34.1532
12.50	321.8	18.96	1.83	34.6968
12.51	297.05	18.91	1.76	33.2816
12.52	297.05	18.7	1.79	33.473
12.53	321.8	18.83	1.8	33.894
12.54	321.8	18.55	1.75	32.4625
12.55	371.31	18.7	1.82	34.034
12.56	396.07	18.75	1.82	34.125
12.57	396.07	18.85	1.82	34.307
12.58	396.07	18.88	1.83	34.5504
12.59	396.07	18.78	1.79	33.6162
13.00	396.07	18.5	1.83	33.855
13.01	445.58	18.24	1.75	31.92
13.02	445.58	18.7	1.79	33.473
13.03	495.08	18.7	1.79	33.473
13.04	495.08	18.65	1.78	33.197
13.05	495.08	18.55	1.64	30.422
13.06	495.08	18.83	1.81	34.0823
13.07	495.08	18.27	1.79	32.7033
13.08	495.08	18.75	1.79	33.5625
13.09	544.59	18.78	1.79	33.6162
13.10	544.59	18.6	1.78	33.108
13.11	594.1	18.27	1.75	31.9725
13.12	594.1	18.5	1.79	33.115
13.13	643.61	17.91	1.79	32.0589
13.14	643.61	18.47	1.78	32.8766
13.15	643.61	18.32	1.64	30.0448
13.16	693.12	18.01	1.81	32.5981

13.17	693.12	18.22	1.79	32.6138
13.18	693.12	18.65	1.79	33.3835
13.19	643.61	18.8	1.79	33.652
13.20	643.61	18.8	1.78	33.464
13.21	643.61	18.83	1.75	32.9525
13.22	643.61	18.45	1.79	33.0255
13.23	594.1	18.34	1.79	32.8286
13.24	594.1	18.34	1.78	32.6452
13.25	594.1	18.93	1.64	31.0452
13.26	594.1	18.73	1.81	33.9013
13.27	544.59	18.96	1.79	33.9384
13.28	544.59	18.93	1.79	33.8847
13.29	495.08	18.73	1.79	33.5267
13.30	495.08	18.83	1.78	33.5174
13.31	495.08	18.83	1.75	32.9525
13.32	445.58	18.88	1.79	33.7952
13.33	445.58	18.83	1.79	33.7057
13.34	445.58	19.03	1.78	33.8734
13.35	445.58	19.06	1.64	31.2584
13.36	396.07	18.98	1.81	34.3538
13.37	445.58	19.01	1.79	34.0279
13.38	396.07	18.91	1.79	33.8489
13.39	396.07	20.23	1.79	36.2117
13.40	396.07	18.8	1.78	33.464
13.41	396.07	18.83	1.75	32.9525
13.42	371.31	18.75	1.79	33.5625
13.43	371.31	18.8	1.79	33.652
13.44	371.31	18.8	1.78	33.464
13.45	371.31	18.8	1.64	30.832

13.46	371.31	18.65	1.81	33.7565
13.47	371.31	18.57	1.79	33.2403
13.48	371.31	18.75	1.79	33.5625
13.49	371.31	18.91	1.79	33.8489
13.50	321.8	19.01	1.78	33.8378
13.51	321.8	18.75	1.79	33.5625
13.52	321.8	18.96	1.89	35.8344
13.53	346.56	18.78	1.87	35.1186
13.54	321.8	18.47	1.76	32.5072
13.55	321.8	18.96	1.89	35.8344
13.56	321.8	18.88	1.87	35.3056
13.57	371.31	18.85	1.86	35.061
13.58	396.07	18.73	1.79	33.5267
13.59	396.07	18.68	1.76	32.8768
14.00	445.58	18.8	1.74	32.712
14.01	396.07	18.78	1.74	32.6772
14.02	371.31	18.88	1.75	33.04
14.03	371.31	18.62	1.73	32.2126
14.04	396.07	18.8	1.79	33.652
14.05	495.08	18.88	1.78	33.6064
14.06	495.08	18.78	1.77	33.2406
14.07	445.58	18.91	1.79	33.8489
14.08	495.08	19.03	1.8	34.254
14.09	495.08	19.08	1.81	34.5348
14.10	445.58	18.91	1.74	32.9034
14.11	495.08	18.83	1.74	32.7642
14.12	495.08	18.88	1.75	33.04
14.13	495.08	18.96	1.73	32.8008
14.14	495.08	18.5	1.79	33.115

14.15	544.59	18.62	1.78	33.1436
14.16	544.59	18.78	1.77	33.2406
14.17	544.59	18.57	1.79	33.2403
14.18	544.59	18.32	1.8	32.976
14.19	544.59	18.55	1.81	33.5755
14.20	544.59	18.17	1.74	31.6158
14.21	495.08	18.11	1.74	31.5114
14.22	495.08	17.66	1.75	30.905
14.23	445.58	17.09	1.73	29.5657
14.24	495.08	17.71	1.79	31.7009
14.25	495.08	18.17	1.78	32.3426
14.26	445.58	18.22	1.77	32.2494
14.27	495.08	17.78	1.79	31.8262
14.28	495.08	18.6	1.8	33.48
14.29	495.08	18.34	1.81	33.1954
14.30	495.08	18.62	1.74	32.3988
14.31	495.08	18.94	1.72	32.5768
14.32	371.31	17.25	1.73	29.8425
14.33	371.31	17.99	1.74	31.3026
14.34	371.31	18.65	1.81	33.7565
14.35	371.31	18.22	1.79	32.6138
14.36	346.56	18.7	1.83	34.221
14.37	371.31	18.78	1.85	34.743
14.38	346.56	18.37	1.73	31.7801
14.39	346.56	19.5	1.89	36.855
14.40	346.56	19.5	1.89	36.855
14.41	346.56	19.5	1.72	33.54
14.42	371.31	19.5	1.73	33.735
14.43	371.31	19.5	1.74	33.93

14.44	371.31	18.69	1.81	33.8289
14.45	371.31	18.91	1.79	33.8489
14.46	371.31	19.49	1.83	35.6667
14.47	396.07	19.54	1.85	36.149
14.48	396.07	19.52	1.73	33.7696
14.49	396.07	19.16	1.89	36.2124
14.50	445.58	18.78	1.89	35.4942
14.52	445.58	19.36	1.72	33.2992
14.53	445.58	19.47	1.73	33.6831
14.54	445.58	19.5	1.74	33.93
14.55	445.58	19.5	1.81	35.295
14.56	396.07	19.5	1.79	34.905
14.57	396.07	19.5	1.83	35.685
14.58	346.56	19.5	1.85	36.075
14.59	321.8	19.5	1.73	33.735
15.00	346.56	19.5	1.89	36.855
15.01	321.8	19.5	1.89	36.855
15.02	247.54	18.93	1.75	33.1275
15.03	198.03	18.98	1.76	33.4048
15.04	222.79	18.73	1.73	32.4029
15.05	222.79	19.08	1.8	34.344
15.06	198.03	19.08	1.8	34.344
15.07	198.03	18.88	1.78	33.6064
15.08	198.03	18.96	1.79	33.9384
15.09	247.54	18.75	1.77	33.1875
15.10	272.3	18.57	1.75	32.4975
15.11	185.66	18.55	1.89	35.0595
15.12	148.52	18.24	1.75	31.92
15.13	185.66	17.2	1.76	30.272

15.14	222.79	19.6	1.73	33.908
15.15	222.79	19.59	1.8	35.262
15.16	247.54	19.59	1.8	35.262
15.17	247.54	18.73	1.78	33.3394
15.18	198.03	18.73	1.79	33.5267
15.19	136.15	19.61	1.77	34.7097
15.20	123.77	19.62	1.75	34.335
15.21	123.77	19.59	1.89	37.0251
15.22	111.39	18.73	1.75	32.7775
15.23	111.39	18.73	1.76	32.9648
15.24	148.52	19.61	1.73	33.9253
15.25	198.03	19.62	1.8	35.316
15.26	272.3	19.59	1.8	35.262
15.27	321.8	18.73	1.78	33.3394
15.28	346.56	18.73	1.79	33.5267
15.29	297.05	19.61	1.77	34.7097
15.30	247.54	19.62	1.75	34.335
15.31	272.3	19.59	1.89	37.0251
15.32	346.56	18.73	1.75	32.7775
15.33	136.15	18.73	1.76	32.9648
15.34	111.39	19.61	1.73	33.9253
15.35	199.02	19.62	1.8	35.316
15.36	192.83	19.59	1.8	35.262
15.37	192.83	18.73	1.78	33.3394
15.38	192.83	18.73	1.79	33.5267
15.39	192.83	19.61	1.77	34.7097
15.4	199.02	19.62	1.75	34.335
15.41	222.79	19.59	1.89	37.0251
15.42	222.79	18.73	1.75	32.7775

15.43	198.03	18.73	1.76	32.9648
15.44	222.79	19.61	1.73	33.9253
15.45	222.79	19.62	1.8	35.316
15.46	247.54	19.59	1.8	35.262
15.47	222.79	18.73	1.78	33.3394
15.48	222.79	18.73	1.79	33.5267
15.49	198.03	19.61	1.77	34.7097
15.50	198.03	19.62	1.75	34.335
15.51	185.66	19.59	1.89	37.0251
15.52	160.9	18.73	1.75	32.7775
15.53	123.77	18.73	1.76	32.9648
15.54	199.02	19.61	1.73	33.9253
15.55	123.77	19.62	1.8	35.316
15.56	148.52	19.59	1.8	35.262
15.57	123.77	18.73	1.78	33.3394
15.58	199.02	18.73	1.79	33.5267
16.00	192.83	19.61	1.77	34.7097
16.01	199.02	19.62	1.75	34.335
16.02	199.02	19.59	1.89	37.0251
16.03	199.02	18.73	1.75	32.7775
16.04	123.77	18.73	1.76	32.9648
16.05	148.52	19.61	1.73	33.9253
16.06	136.15	19.62	1.8	35.316
16.07	123.77	19.59	1.8	35.262
16.08	123.77	18.73	1.78	33.3394
16.09	111.39	18.73	1.79	33.5267
16.10	199.02	19.61	1.77	34.7097
16.11	199.02	19.62	1.75	34.335
16.12	86.64	4.69	1.3	6.097

16.13	92.83	4.85	1.23	5.9655
16.14	80.45	4.46	1.3	5.798
16.15	61.89	4.29	1.3	5.577
16.16	55.7	4.26	1.23	5.2398
16.17	68.07	4.31	1.3	5.603
16.18	80.45	4.49	1.23	5.5227
16.19	80.45	4.46	1.3	5.798
16.20	55.7	4.24	1.41	5.9784
16.21	46.41	19.47	1.85	36.0195
16.22	43.32	4.11	1.38	5.6718
16.23	40.23	4.11	1.53	6.2883
16.24	43.32	4.11	1.45	5.9595
16.25	40.23	4.11	1.53	6.2883
16.26	34.04	4.08	1.3	5.304
16.27	30.94	4.06	1.38	5.6028
16.28	30.94	4.06	1.38	5.6028
16.29	27.85	4.06	1.45	5.887
16.30	27.85	4.03	1.45	5.8435
16.31	24.75	4.03	1.53	6.1659
16.32	24.75	4.03	1.53	6.1659
16.33	23.21	4.01	1.45	5.8145
16.34	23.21	4.01	1.45	5.8145
16.35	21.66	4.01	1.38	5.5338
16.36	20.11	4.01	1.45	5.8145
16.37	18.57	3.98	1.45	5.771
16.38	18.57	3.98	1.38	5.4924
16.39	17.02	3.98	1.38	5.4924
16.40	17.02	3.98	1.53	6.0894
16.41	15.47	3.98	1.45	5.771

16.42	13.92	3.95	1.45	5.7275
16.43	13.92	3.95	1.3	5.135
16.44	12.38	3.95	1.61	6.3595
16.45	12.38	3.95	1.45	5.7275
16.46	12.38	3.95	1.45	5.7275
16.47	11.6	3.93	1.53	6.0129
16.48	10.83	3.93	1.86	7.3098
16.49	18.57	3.98	1.45	5.771
16.50	18.57	3.98	1.38	5.4924
16.51	17.02	3.98	1.38	5.4924
16.52	17.02	3.98	1.53	6.0894
16.53	15.47	3.98	1.45	5.771
16.54	13.92	3.95	1.45	5.7275
16.55	13.92	3.95	1.3	5.135
16.56	12.38	3.95	1.61	6.3595
16.57	12.38	3.95	1.45	5.7275
16.58	12.38	3.95	1.45	5.7275
16.59	11.6	3.93	1.53	6.0129
17.00	10.83	3.93	1.66	6.5238

Lanjutan data FUZZY

08.00	123.77	16.71	1.55	25.9005
08.01	123.77	16.71	1.55	25.9005
08.02	136.15	16.72	1.56	26.0832
08.03	148.52	10.51	1.15	12.0865
08.04	148.52	10.59	1.19	12.6021
08.05	136.15	10.67	1.17	12.4839
08.06	148.52	11.02	1.35	14.877
08.07	148.52	10.74	1.31	14.0694
08.08	148.52	10.84	1.41	15.2844
08.09	148.52	10.46	1.39	14.5394
08.10	148.52	10.72	1.31	14.0432
08.11	148.52	11.02	1.55	17.081
08.12	160.9	11.66	1.55	18.073
08.13	160.9	12.73	1.56	19.8588
08.14	173.28	18.91	1.15	21.7465
08.15	173.28	18.83	1.19	22.4077
08.16	185.66	19.11	1.17	22.3587
08.17	185.66	19.11	1.35	25.7985
08.18	198.03	19.16	1.31	25.0996
08.19	198.03	19.24	1.41	27.1284
08.20	198.03	19.31	1.39	26.8409
08.21	198.03	18.78	1.31	24.6018
08.22	198.03	18.75	1.15	21.5625
08.23	185.66	18.73	1.19	22.2887
08.24	198.03	18.83	1.17	22.0311
08.25	198.03	18.62	1.35	25.137
08.26	198.03	18.83	1.31	24.6673

08.27	198.03	18.93	1.41	26.6913
08.28	198.03	19.01	1.39	26.4239
08.29	198.03	19.11	1.31	25.0341
08.30	198.03	19.3	1.7	32.81
08.31	222.79	19.06	1.69	32.2114
08.32	222.79	19.16	1.7	32.572
08.33	222.79	18.98	1.69	32.0762
08.34	198.03	18.62	1.65	30.723
08.35	222.79	18.85	1.68	31.668
08.36	232.79	18.91	1.69	31.9579
08.37	252.79	19.19	1.71	32.8149
08.38	252.79	19.03	1.7	32.351
08.39	277.54	19.29	1.72	33.1788
08.40	292.79	18.88	1.69	31.9072
08.41	282.79	19.16	1.75	33.53
08.42	272.79	18.93	1.69	31.9917
08.43	252.79	19.03	1.74	33.1122
08.44	232.79	18.88	1.71	32.2848
08.45	198.03	20.56	1.81	37.2136
08.46	198.03	18.47	1.61	29.7367
08.47	185.66	18.68	1.68	31.3824
08.48	185.66	18.55	1.65	30.6075
08.49	185.66	18.32	1.63	29.8616
08.50	185.66	18.8	1.68	31.584
08.51	185.66	18.85	1.68	31.668
08.52	173.28	18.06	1.61	29.0766
08.53	173.28	18.24	1.64	29.9136
08.54	173.28	18.19	1.67	30.3773
08.55	160.9	18.09	1.61	29.1249

08.56	148.52	12.14	1.24	15.0536
08.57	158.52	12.65	1.26	15.939
08.58	167.52	12.71	1.27	16.1417
08.59	198.52	12.81	1.28	16.3968
09.00	188.52	12.78	1.27	16.2306
09.01	168.52	17.44	1.68	29.2992
09.02	148.52	17.65	1.69	29.8285
09.03	173.28	17.47	1.64	28.6508
09.04	173.28	17.5	1.65	28.875
09.05	185.66	18.45	1.6	29.52
09.06	185.66	18.5	1.62	29.97
09.07	185.66	18.42	1.67	30.7614
09.08	185.66	17.32	1.63	28.2316
09.09	198.03	17.78	1.7	30.226
09.10	272.3	17.83	1.71	30.4893
09.11	272.3	17.62	1.69	29.7778
09.12	272.3	17.85	1.69	30.1665
09.13	272.3	18.91	1.7	32.147
09.14	297.05	18.52	1.65	30.558
09.15	297.05	18.8	1.68	31.584
09.16	297.05	18.78	1.58	29.6724
09.17	297.05	18.52	1.55	28.706
09.18	297.05	18.73	1.67	31.2791
09.19	321.8	18.91	1.61	30.4451
09.20	351.8	18.83	1.65	31.0695
09.21	371.8	18.13	1.71	31.0023
09.22	361.8	18.19	1.69	30.7411
09.23	351.8	18.52	1.69	31.2988
09.24	331.8	18.96	1.7	32.232

09.25	321.8	18.93	1.65	31.2345
09.26	297.05	18.91	1.68	31.7688
09.27	287.05	18.88	1.58	29.8304
09.28	288.05	18.98	1.55	29.419
09.29	289.05	18.85	1.67	31.4795
09.30	297.05	17.26	1.61	27.7886
09.31	297.05	17.01	1.71	29.0871
09.32	272.3	17.88	1.69	30.2172
09.33	272.3	17.8	1.69	30.082
09.34	297.05	17.85	1.7	30.345
09.36	297.05	17.88	1.65	29.502
09.37	297.05	17.91	1.68	30.0888
09.38	297.05	17.7	1.58	27.966
09.39	297.05	18.88	1.55	29.264
09.40	321.8	18.83	1.67	31.4461
09.41	346.56	18.68	1.61	30.0748
09.42	321.8	18.75	1.71	32.0625
09.43	297.05	18.8	1.69	31.772
09.44	297.05	18.83	1.69	31.8227
09.45	297.05	18.73	1.7	31.841
09.46	272.3	18.8	1.65	31.02
09.47	297.05	18.62	1.68	31.2816
09.48	272.3	18.78	1.58	29.6724
09.49	272.3	18.52	1.55	28.706
09.50	272.3	18.7	1.67	31.229
09.51	222.79	18.7	1.71	31.977
09.52	247.54	18.8	1.69	31.772
09.53	272.79	18.75	1.69	31.6875
09.54	262.79	18.83	1.7	32.011

09.55	282.79	18.91	1.65	31.2015
09.56	212.79	18.83	1.68	31.6344
09.57	222.79	18.98	1.58	29.9884
09.58	247.54	19.31	1.55	29.9305
09.59	272.79	18.93	1.67	31.6131
10.00	262.79	19.13	1.61	30.7993
10.01	282.79	19.11	1.6	30.576
10.02	222.79	19.03	1.59	30.2577
10.03	247.54	18.13	1.61	29.1893
10.04	272.79	17.87	1.65	29.4855
10.05	262.79	17.28	1.65	28.512
10.06	282.79	17.33	1.65	28.5945
10.07	222.79	17.26	1.65	28.479
10.08	247.54	17.31	1.66	28.7346
10.09	272.79	19.59	1.64	32.1276
10.10	262.79	19.57	1.64	32.0948
10.11	282.79	19.57	1.6	31.312
10.12	222.79	19.54	1.59	31.0686
10.13	222.79	19.72	1.61	31.7492
10.14	222.79	19.65	1.65	32.4225
10.15	346.56	19.62	1.65	32.373
10.16	346.56	19.75	1.65	32.5875
10.17	371.31	19.72	1.65	32.538
10.18	346.56	19.65	1.66	32.619
10.19	346.56	19.8	1.64	32.472
10.20	346.56	19.87	1.64	32.5868
10.21	321.8	19.75	1.6	31.6
10.22	321.8	19.57	1.59	31.1163
10.23	321.8	19.52	1.61	31.4272

10.24	321.8	19.44	1.65	32.076
10.25	321.8	19.39	1.65	31.9935
10.26	321.8	19.57	1.65	32.2905
10.27	346.56	19.31	1.65	31.8615
10.28	346.56	19.42	1.66	32.2372
10.29	371.31	19.31	1.64	31.6684
10.30	371.31	19.24	1.64	31.5536
10.31	346.56	19.44	1.64	31.8816
10.32	346.56	19.36	1.63	31.5568
10.33	346.56	19.24	1.61	30.9764
10.34	346.56	19.26	1.62	31.2012
10.35	346.56	19.47	1.7	33.099
10.36	321.8	19.52	1.71	33.3792
10.37	321.8	19.42	1.64	31.8488
10.38	321.8	19.47	1.7	33.099
10.39	321.8	19.52	1.71	33.3792
10.40	321.8	19.57	1.72	33.6604
10.41	321.8	19.49	1.71	33.3279
10.42	321.8	19.39	1.69	32.7691
10.43	321.8	19.44	1.64	31.8816
10.44	321.8	19.47	1.65	32.1255
10.45	321.8	19.44	1.64	31.8816
10.46	321.8	19.52	1.71	33.3792
10.47	321.8	19.65	1.73	33.9945
10.48	321.8	19.62	1.72	33.7464
10.49	396.07	19.59	1.74	34.0866
10.50	371.31	19.75	1.75	34.5625
10.51	371.31	19.8	1.79	35.442
10.52	371.31	19.75	1.79	35.3525

10.53	371.31	19.9	1.8	35.82
10.54	371.31	19.93	1.8	35.874
10.55	346.56	19.07	1.7	32.419
10.56	297.05	19.57	1.72	33.6604
10.57	297.05	19.65	1.73	33.9945
10.58	297.05	19.39	1.69	32.7691
10.59	297.05	19.52	1.79	34.9408
11.00	297.05	19.34	1.8	34.812
11.01	297.05	19.36	1.57	30.3952
11.02	297.05	19.47	1.59	30.9573
11.03	297.05	19.59	1.6	31.344
11.04	297.05	19.75	1.63	32.1925
11.05	297.05	19.44	1.61	31.2984
11.06	297.05	19.47	1.62	31.5414
11.07	297.05	19.52	1.65	32.208
11.08	297.05	19.62	1.67	32.7654
11.09	297.05	19.49	1.62	31.5738
11.10	297.05	19.54	1.64	32.0456
11.11	297.05	19.44	1.57	30.5208
11.12	297.05	19.21	1.59	30.5439
11.13	297.05	19.34	1.6	30.944
11.14	297.05	19.52	1.63	31.8176
11.15	297.05	19.29	1.61	31.0569
11.16	297.05	19.47	1.62	31.5414
11.17	297.05	19.47	1.65	32.1255
11.18	297.05	19.57	1.67	32.6819
11.19	297.05	19.44	1.62	31.4928
11.20	297.05	19.47	1.64	31.9308
11.21	297.05	19.8	1.57	31.086

11.22	297.05	20.95	1.59	33.3105
11.23	297.05	19.72	1.6	31.552
11.24	297.05	19.72	1.63	32.1436
11.25	297.05	19.65	1.61	31.6365
11.26	297.05	19.77	1.62	32.0274
11.27	297.05	19.36	1.65	31.944
11.28	297.05	19.29	1.67	32.2143
11.29	297.05	19.77	1.62	32.0274
11.30	297.05	19.44	1.64	31.8816
11.31	297.05	19.19	1.58	30.3202
11.32	297.05	19.42	1.64	31.8488
11.33	297.05	19.34	1.61	31.1374
11.34	297.05	19.26	1.55	29.853
11.35	297.05	19.13	1.51	28.8863
11.36	297.05	19.11	1.53	29.2383
11.37	297.05	19.01	1.5	28.515
11.38	297.05	18.93	1.51	28.5843
11.39	297.05	19.08	1.58	30.1464
11.40	297.05	19.31	1.59	30.7029
11.41	297.05	19.39	1.58	30.6362
11.42	297.05	19.26	1.64	31.5864
11.43	297.05	19.08	1.61	30.7188
11.44	297.05	18.91	1.55	29.3105
11.45	297.05	18.98	1.51	28.6598
11.46	297.05	18.91	1.53	28.9323
11.47	297.05	18.83	1.5	28.245
11.48	297.05	18.93	1.51	28.5843
11.49	297.05	18.93	1.58	29.9094
11.50	297.05	19.01	1.59	30.2259

11.51	297.05	19.03	1.58	30.0674
11.52	297.05	19.13	1.64	31.3732
11.53	297.05	19.16	1.61	30.8476
11.54	297.05	19.21	1.55	29.7755
11.55	297.05	18.98	1.51	28.6598
11.56	297.05	19.19	1.53	29.3607
11.57	297.05	19.13	1.5	28.695
11.58	297.05	19.39	1.51	29.2789
11.59	297.05	19.13	1.58	30.2254
12.00	297.05	19.19	1.59	30.5121
12.01	297.05	18.98	1.51	28.6598
12.02	297.05	19.03	1.58	30.0674
12.03	297.05	19.21	1.55	29.7755
12.04	297.05	19.08	1.58	30.1464
12.05	297.05	19.52	1.63	31.8176
12.06	297.05	18.91	1.61	30.4451
12.07	297.05	19.57	1.65	32.2905
12.08	297.05	19.26	1.55	29.853
12.09	297.05	19.16	1.53	29.3148
12.10	297.05	19.62	1.58	30.9996
12.11	297.05	19.47	1.51	29.3997
12.12	297.05	19.29	1.58	30.4782
12.13	297.05	19.52	1.55	30.256
12.14	297.05	19.47	1.58	30.7626
12.15	297.05	19.11	1.63	31.1493
12.16	297.05	19.39	1.61	31.2179
12.17	297.05	19.11	1.65	31.5315
12.18	297.05	19.08	1.55	29.574
12.19	297.05	19.34	1.53	29.5902

12.20	297.05	19.29	1.58	30.4782
12.21	297.05	19.62	1.51	29.6262
12.22	297.05	19.16	1.58	30.2728
12.23	297.05	19.26	1.55	29.853
12.24	297.05	19.62	1.58	30.9996
12.25	297.05	19.31	1.63	31.4753
12.26	297.05	19.49	1.61	31.3789
12.27	297.05	19.29	1.65	31.8285
12.28	297.05	19.26	1.55	29.853
12.29	297.05	19.03	1.53	29.1159
12.30	297.05	19.31	1.58	30.5098
12.31	297.05	19.16	1.57	30.0812
12.32	297.05	19.16	1.57	30.0812
12.33	297.05	19.42	1.59	30.8778
12.34	297.05	19.31	1.58	30.5098
12.35	297.05	19.34	1.58	30.5572
12.36	297.05	19.52	1.61	31.4272
12.37	297.05	19.34	1.59	30.7506
12.38	297.05	19.24	1.55	29.822
12.39	297.05	19.29	1.57	30.2853
12.40	297.05	19.06	1.53	29.1618
12.41	297.05	19.06	1.52	28.9712
12.42	297.05	19.08	1.53	29.1924
12.43	297.05	18.96	1.59	30.1464
12.44	297.05	19.06	1.6	30.496
12.45	297.05	19.06	1.6	30.496
12.46	297.05	19.03	1.55	29.4965
12.47	297.05	18.93	1.53	28.9629
12.48	297.05	18.96	1.54	29.1984

12.49	297.05	18.8	1.54	28.952
12.50	297.05	18.83	1.55	29.1865
12.51	297.05	19.06	1.52	28.9712
12.52	297.05	19.03	1.53	29.1159
12.53	297.05	19.21	1.59	30.5439
12.54	297.05	19.29	1.6	30.864
12.55	297.05	19.36	1.6	30.976
12.56	297.05	19.24	1.55	29.822
12.57	297.05	19.16	1.53	29.3148
12.58	297.05	19.67	1.54	30.2918
12.59	297.05	19.39	1.54	29.8606
13.00	297.05	19.7	1.55	30.535
13.01	297.05	19.44	1.57	30.5208
13.02	297.05	19.49	1.58	30.7942
13.03	297.05	19.44	1.54	29.9376
13.04	297.05	19.72	1.59	31.3548
13.05	297.05	19.9	1.61	32.039
13.06	297.05	19.85	1.6	31.76
13.07	297.05	20.03	1.69	33.8507
13.08	297.05	19.95	1.68	33.516
13.09	297.05	20	1.69	33.8
13.10	297.05	19.98	1.57	31.3686
13.11	297.05	19.57	1.58	30.9206
13.12	297.05	19.85	1.54	30.569
13.13	297.05	19.7	1.59	31.323
13.14	297.05	19.54	1.61	31.4594
13.15	297.05	19.39	1.6	31.024
13.16	297.05	19.62	1.69	33.1578
13.17	297.05	19.72	1.68	33.1296

13.18	297.05	19.47	1.69	32.9043
13.19	297.05	19.24	1.57	30.2068
13.20	297.05	19.03	1.55	29.4965
13.21	297.05	19.21	1.58	30.3518
13.22	297.05	19.13	1.54	29.4602
13.23	297.05	19.08	1.59	30.3372
13.24	297.05	19.52	1.61	31.4272
13.25	297.05	19.13	1.6	30.608
13.26	297.05	19.42	1.69	32.8198
13.27	297.05	19.16	1.68	32.1888
13.28	297.05	19.19	1.69	32.4311
13.29	297.05	19.01	1.57	29.8457
13.30	297.05	18.91	1.55	29.3105
13.31	297.05	18.96	1.58	29.9568
13.32	297.05	18.55	1.54	28.567
13.33	297.05	18.8	1.59	29.892
13.34	297.05	19.03	1.61	30.6383
13.35	297.05	19.06	1.6	30.496
13.36	297.05	18.85	1.69	31.8565
13.37	297.05	18.91	1.68	31.7688
13.38	297.05	18.7	1.69	31.603
13.39	297.05	18.85	1.57	29.5945
13.40	297.05	19.03	1.55	29.4965
13.41	297.05	19.13	1.58	30.2254
13.42	297.05	19.06	1.54	29.3524
13.43	297.05	18.88	1.59	30.0192
13.44	297.05	18.98	1.61	30.5578
13.45	297.05	18.68	1.6	29.888
13.46	297.05	18.91	1.69	31.9579

13.47	297.05	18.85	1.68	31.668
13.48	297.05	18.91	1.69	31.9579
13.49	297.05	19.03	1.57	29.8771
13.50	297.05	19.16	1.55	29.698
13.51	297.05	19.42	1.58	30.6836
13.52	297.05	18.62	1.54	28.6748
13.53	297.05	18.93	1.59	30.0987
13.54	297.05	18.7	1.61	30.107
13.55	297.05	18.52	1.6	29.632
13.56	297.05	18.78	1.69	31.7382
13.57	297.05	19.03	1.68	31.9704
13.58	297.05	19.39	1.69	32.7691
13.59	297.05	19.44	1.57	30.5208
14.00	297.05	19.44	1.55	30.132
14.01	297.05	19.52	1.66	32.4032
14.02	297.05	19.03	1.63	31.0189
14.03	297.05	19.21	1.65	31.6965
14.04	297.05	19.47	1.65	32.1255
14.05	297.05	19.49	1.67	32.5483
14.06	297.05	19.49	1.67	32.5483
14.07	297.05	19.44	1.66	32.2704
14.08	297.05	19.67	1.68	33.0456
14.09	297.05	19.57	1.67	32.6819
14.10	297.05	19.47	1.65	32.1255
14.11	371.31	19.39	1.66	32.1874
14.12	371.31	19.57	1.63	31.8991
14.13	371.31	19.67	1.65	32.4555
14.14	371.31	19.7	1.65	32.505
14.15	371.31	19.72	1.67	32.9324

14.16	371.31	19.7	1.67	32.899
14.17	371.31	19.59	1.66	32.5194
14.18	371.31	19.62	1.68	32.9616
14.19	346.56	19.49	1.67	32.5483
14.20	321.8	19.72	1.65	32.538
14.21	297.05	19.49	1.66	32.3534
14.22	272.3	19.29	1.63	31.4427
14.23	198.03	19.62	1.65	32.373
14.24	222.79	19.7	1.65	32.505
14.25	286.64	19.59	1.67	32.7153
14.26	286.64	19.75	1.67	32.9825
14.27	286.64	19.82	1.66	32.9012
14.28	286.64	19.85	1.68	33.348
14.29	297.05	19.82	1.67	33.0994
14.30	272.3	19.8	1.65	32.67
14.31	272.3	19.67	1.59	31.2753
14.32	272.3	19.21	1.51	29.0071
14.33	272.3	19.19	1.51	28.9769
14.34	272.3	19.31	1.55	29.9305
14.35	272.3	19.52	1.56	30.4512
14.36	272.3	19.24	1.54	29.6296
14.37	272.3	19.24	1.54	29.6296
14.38	272.3	19.44	1.55	30.132
14.39	272.3	19.34	1.55	29.977
14.40	272.3	19.13	1.51	28.8863
14.41	272.3	19.36	1.59	30.7824
14.42	272.3	19.13	1.51	28.8863
14.43	272.3	19.52	1.51	29.4752
14.44	272.3	19.57	1.55	30.3335

14.45	272.3	19.67	1.56	30.6852
14.46	272.3	19.62	1.54	30.2148
14.47	272.3	19.57	1.54	30.1378
14.48	445.58	19.65	1.55	30.4575
14.49	396.07	19.59	1.55	30.3645
14.50	396.07	19.72	1.51	29.7772
14.52	396.07	19.62	1.59	31.1958
14.53	445.58	19.57	1.51	29.5507
14.54	321.8	19.44	1.51	29.3544
14.55	321.8	19.31	1.55	29.9305
14.56	321.8	19.03	1.56	29.6868
14.57	247.54	19.11	1.54	29.4294
14.58	198.03	18.62	1.54	28.6748
14.59	222.79	18.65	1.55	28.9075
15.00	222.79	18.73	1.55	29.0315
15.01	198.03	18.6	1.51	28.086
15.02	198.03	18.8	1.58	29.704
15.03	198.03	17.5	1.51	26.425
15.04	247.54	18.19	1.55	28.1945
15.05	272.3	18.01	1.52	27.3752
15.06	185.66	18.09	1.54	27.8586
15.07	148.52	18.17	1.56	28.3452
15.08	185.66	17.96	1.51	27.1196
15.09	222.79	18.65	1.6	29.84
15.10	222.79	18.8	1.62	30.456
15.11	247.54	17.3	1.51	26.123
15.12	247.54	8.42	1.58	13.3036
15.13	198.03	12.96	1.51	19.5696
15.14	136.15	18.29	1.55	28.3495

15.15	123.77	18.5	1.52	28.12
15.16	123.77	18.91	1.54	29.1214
15.17	111.39	18.88	1.56	29.4528
15.18	111.39	17.66	1.51	26.6666
15.19	148.52	6.25	1.38	8.625
15.20	198.03	5.87	1.38	8.1006
15.21	272.3	5.89	1.61	9.4829
15.22	321.8	5.03	1.38	6.9414
15.23	346.56	5.33	1.45	7.7285
15.24	297.05	6.17	1.45	8.9465
15.25	247.54	12.07	1.47	17.7429
15.26	272.3	19.21	1.59	30.5439
15.27	346.56	19.65	1.61	31.6365
15.28	136.15	19.65	1.61	31.6365
15.29	111.39	19.39	1.59	30.8301
15.30	199.02	18.78	1.55	29.109
15.31	198.83	18.98	1.59	30.1782
15.32	192.83	19.67	1.61	31.6687
15.33	195.83	16.07	1.53	24.5871
15.34	192.83	15.03	1.3	19.539
15.35	199.02	14.52	1.15	16.698
15.36	222.79	14.44	1.3	18.772
15.37	222.79	14.44	1.23	17.7612
15.38	198.03	14.44	1.3	18.772
15.39	222.79	14.41	1.15	16.5715
15.4	222.79	4.49	1.3	5.837
15.41	247.54	19.13	1.59	30.4167
15.42	222.79	18.98	1.57	29.7986
15.43	222.79	18.8	1.56	29.328

15.44	198.03	19.13	1.59	30.4167
15.45	198.03	19.36	1.61	31.1696
15.46	185.66	19.39	1.61	31.2179
15.47	160.9	19.03	1.59	30.2577
15.48	123.77	18.85	1.55	29.2175
15.49	129.02	18.7	1.52	28.424
15.50	123.77	18.6	1.51	28.086
15.51	148.52	18.14	1.54	27.9356
15.52	123.77	18.11	1.55	28.0705
15.53	199.02	15.92	1.45	23.084
15.54	192.83	15.26	1.3	19.838
15.55	195.02	15.92	1.3	20.696
15.56	199.02	17.14	1.53	26.2242
15.57	129.02	15.94	1.45	23.113
15.58	123.77	15.54	1.45	22.533
16.00	148.52	14.57	1.15	16.7555
16.01	136.15	15.6	1.3	20.28
16.02	123.77	15.03	1.3	19.539
16.03	123.77	15.64	1.53	23.9292
16.04	111.39	16.25	1.45	23.5625
16.05	199.02	18.47	1.53	28.2591
16.06	199.02	17.3	1.31	22.663
16.07	321.8	15.94	1.38	21.9972
16.08	321.8	15.94	1.3	20.722
16.09	321.8	15.94	1.3	20.722
16.10	199.02	17.84	1.38	24.6192
16.11	199.02	15.15	1.23	18.6345
16.12	86.64	4.69	1.3	6.097
16.13	92.83	4.85	1.3	6.305

16.14	80.45	4.46	1.23	5.4858
16.15	61.89	4.29	1.3	5.577
16.16	55.7	4.26	1.3	5.538
16.17	68.07	4.31	1.23	5.3013
16.18	80.45	4.49	1.3	5.837
16.19	80.45	4.46	1.23	5.4858
16.20	55.7	4.24	1.3	5.512
16.21	46.41	19.47	1.41	27.4527
16.22	43.32	4.11	1.38	5.6718
16.23	40.23	4.11	1.38	5.6718
16.24	43.32	4.11	1.53	6.2883
16.25	40.23	4.11	1.45	5.9595
16.26	34.04	4.08	1.53	6.2424
16.27	30.94	4.06	1.3	5.278
16.28	30.94	4.06	1.38	5.6028
16.29	27.85	4.06	1.38	5.6028
16.30	27.85	4.03	1.45	5.8435
16.31	24.75	4.03	1.45	5.8435
16.32	24.75	4.03	1.53	6.1659
16.33	23.21	4.01	1.53	6.1353
16.34	23.21	4.01	1.45	5.8145
16.35	21.66	4.01	1.45	5.8145
16.36	20.11	4.01	1.38	5.5338
16.37	18.57	3.98	1.45	5.771
16.38	18.57	3.98	1.45	5.771
16.39	17.02	3.98	1.38	5.4924
16.40	17.02	3.98	1.38	5.4924
16.41	15.47	3.98	1.53	6.0894
16.42	13.92	3.95	1.45	5.7275

16.43	13.92	3.95	1.45	5.7275
16.44	12.38	3.95	1.3	5.135
16.45	12.38	3.95	1.61	6.3595
16.46	12.38	3.95	1.45	5.7275
16.47	11.6	3.93	1.45	5.6985
16.48	10.83	3.93	1.53	6.0129
16.49	18.57	3.98	1.45	5.771
16.50	18.57	3.98	1.38	5.4924
16.51	17.02	3.98	1.38	5.4924
16.52	17.02	3.98	1.53	6.0894
16.53	15.47	3.98	1.45	5.771
16.54	13.92	3.95	1.45	5.7275
16.55	13.92	3.95	1.3	5.135
16.56	12.38	3.95	1.61	6.3595
16.57	12.38	3.95	1.45	5.7275
16.58	12.38	3.95	1.45	5.7275
16.59	11.6	3.93	1.53	6.0129
17.00	10.83	3.93	1.56	6.1308

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LEMBAR PERSETUJUAN PERBAIKAN SKRIPSI

Nama	:	Aries Sowandhana
NIM	:	1812071
Program Studi	:	Teknik Elektro S-1
Peminatan	:	Teknik Energi Listrik
Masa Bimbingan	:	2021-2022
Judul Skripsi	:	Rancang Bangun dan Analisa Unjuk Kerja Solar Tracker Single Axis Dengan Metode Neuro Fuzzy.

Tanggal	Uraian	Paraf
Penguji I (12-08-2022)	1. Perlu dilampirkan program Arduino yang digunakan sebagai objek penelitian 2. Ditambahkan Flowchart pemrograman ke Arduino	

Disetujui,
Dosen Penguji I

Dr. Ir. Widodo Pudji Muljanto, MT.
NIP. 1028700171

Mengetahui,

Dosen Pembimbing I	Dosen Pembimbing II
Awan Uji Krismanto, ST., MT., Ph.D	**Dr. Irrine Budi Sulistiawati, ST., MT**
NIP. 19800301 200501 1 002	**NIP. 19770615 200501 2002**

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LEMBAR PERSETUJUAN PERBAIKAN SKRIPSI

Nama Mahasiswa	:	Aries Sowandhana
NIM	:	1812071
Program Studi	:	Teknik Elektro S-1
Peminatan	:	Teknik Energi Listrik
Masa Bimbingan	:	Semester Genap 2021/2022
Judul Skripsi	:	Rancang Bangun dan Analisa Unjuk Kerja Solar Tracker Single Axis Dengan Metode Neuro Fuzzy

Tanggal	Uraian	Paraf
Penguji II (12-08-2022)	Perbaikan penulisan kalimat dan penambahan rumus perhitungan rata-rata Daya, Tegangan, dan Arus	

Disetujui

Dosen Penguji II

Ir. Ni Putu Agustini, MT
NIP. Y. 1030100371

Mengetahui

Dosen Pembimbing I	Dosen Pembimbing II
Awan Uji Krismanto, ST., MT., Ph.D	**Dr. Irrine Budi Sulistiawati, ST., MT**
NIP. 19800301 200501 1 002	**NIP. 19770615 200501 2002**

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Nomor Surat : ITN-062/EL-FTI/2022 25 Maret 2022
Lampiran : -
Perihal : BIMBINGAN SKRIPSI

Kepada : Yth. Awan Uji Krismanto, ST., MT., Ph.D.
Dosen Teknik Elektro S-1
ITN MALANG

Dengan Hormat,
Sesuai dengan permohonan dan persetujuan dalam Proposal Skripsi untuk mahasiswa:

Nama	: ARIES SOWANDHANA
NIM	: 1812071
Fakultas	: **Teknologi Industri**
Program Studi	: **Teknik Elektro S-1**
Peminatan	: T. Energi Listrik S1

Maka dengan ini pembimbingan tersebut kami serahkan sepenuhnya kepada Saudara/I selama masa waktu :

"Semester Genap Tahun Akademik 2021/2022"

Demikian atas perhatian serta bantuannya kami sampaikan terima kasih

Mengetahui
Ketua Program Studi Teknik Elektro S-1

Dr. Eng. I Komang Somawirata, ST, MT.
NIP. P. 1030100361

PERKUMPULAN PENGELOLA PENDIDIKAN UMUM DAN TEKNOLOGI NASIONAL MALANG
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Nomor Surat : ITN-062/EL-FTI/2022 25 Maret 2022
Lampiran : -
Perihal : BIMBINGAN SKRIPSI

Kepada : Yth. Dr. Irrine Budi Sulistiawati, ST, MT
Dosen Teknik Elektro S-1
ITN MALANG

Dengan Hormat,
Sesuai dengan permohonan dan persetujuan dalam Proposal Skripsi untuk mahasiswa:

Nama	: ARIES SOWANDHANA
NIM	: 1812071
Fakultas	: **Teknologi Industri**
Program Studi	: **Teknik Elektro S-1**
Peminatan	: T. Energi Listrik S1

Maka dengan ini pembimbingan tersebut kami serahkan sepenuhnya kepada Saudara/I selama masa waktu :

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Mengetahui
Ketua Program Studi Teknik Elektro S-1

Dr. Eng. I Komang Somawirata, ST, MT.
NIP. P. 1030100361

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MONITORING BIMBINGAN SKRIPSI
SEMESTER GENAP TAHUN AJARAN 2021/2022

Nama	:	Aries Sowandhana
NIM	:	1812071
Nama Pembimbing	:	Awan Uji Krismanto, ST., MT., Ph.D
Judul Skripsi	:	Rancang Bangun dan Analisa Unjuk Kerja Solar Tracker Single Axis Dengan Metode Neuro Fuzzy.

No	Hari, Tanggal	Waktu Bimbingan	Materi Bimbingan	Paraf
1	Rabu, 17 November 2022	09.30 WIB	Konsultasi Judul, Rumusan Masalah, tujuan, dan flowchart	
2	Kamis, 28 November 2022	10.00 WIB	Konsultasi judul dan flowchart setelah seminar proposal	
3	Jum'at, 7 Januari 2022	09.30 WIB	Bimbingan Flowchart dan Metode yang digunakan	
4	Kamis, 12 Januari 2022	13.00 WIB	Bimbingan konsep metode Neuro Fuzzy	
5	Selasa, 15 Maret 2022	09.00 WIB	Konsultasi program	
6	Senin, 4 April 2022	09.30 WIB	Konsultasi Grafik data yang telah didapatkan	
7	Kamis, 14April 2022	10.00 WIB	Bimbingan dan Konsultasi Hasil Analisa Statis dan Dinamis	

Malang, 31 Agustus 2022
Dosen Pembimbing

Awan Uji Krismanto, ST., MT., Ph.D
NIP. 19800301 200501 1 002

BAN-PT

PERKUMPULAN PENGELOLA PENDIDIKAN UMUM DAN TEKNOLOGI NASIONAL MALANG
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MONITORING BIMBINGAN SKRIPSI
SEMESTER GENAP TAHUN AJARAN 2021/2022

Nama : Aries Sowandhana
NIM : 1812071
Nama Pembimbing : Dr. Irrine Budi Sulistiawati, ST., MT
Judul Skripsi : Rancang Bangun dan Analsia Unjuk Kerja Solar Tracker Single Axis Dengan Metode Neuro Fuzzy.

No	Hari, Tanggal	Waktu Bimbingan	Materi Bimbingan	Paraf
1	Jum'at, 7 Januari 2022	01.00 WIB	Bimbingan Latarbelakang proposal	
2	Senin, 17 Januari 2022	10.00 WIB	Perbaikan format pada buku skripsi	
3	Senin, 24 Januari 2022	11.00 WIB	Bimbingan PPT seminar hasil proposal	
4	Jum'at, 3 Juni 2022	13.00 WIB	Konsultasi Seminar Progres Skripsi	
5	Selasa, 14 Juni 2022	13.00 WIB	Bimbingan laporan hasil skripsi	
6	Selasa, 21 Juni 2022	11.00 WIB	Bimbingan dan Konsultasi Jurnal	
7	Rabu, 13 Juli 2022	08.30 WIB	Bimbingan buku skripsi	

Malang, 31 Agustus 2022
Dosen Pembimbing

Dr. Irrine Budi Sulistiawati, ST., MT
NIP. 197[illegible]0615 200501 2002

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Penulis lahir di Dusun donorejo, Desa Martopuro, Kecamatan Purwosari, Kabupaten Pasuruan, Jawa Timur, pada 30 Mei 2000 Putra dari Bapak Sujatno dan Ibu Suwarni. Penulis menempuh Pendidikan di SMPN 1 Purwosari, Kabupaten Pasuruan, Jawa Timur dan lulus tahun 2015, lalu penulis melanjutkan pendidikan di SMAN 1 Purwosari, Kabupaten Pasuruan, Jawa Timur dan mengambil jurusan IPA dan lulus pada tahun 2018. Lalu, penulis melanjutkan pendidikan di Institut Teknologi Nasional Malang pada tahun 2018, dengan memilih Fakultas Teknik Industri, Program Studi Teknik Elektro S-1, Kosentrasi Energi Listrik. Selama menjadi mahasiswa diperguruan tinggi penulis aktif dalam berorganisasi. Antara lain Komunitas Radio Elite FM dan menjabat sebagai teknisi dan menjabat sebagai General Manager (GM) Periode 2020/2021. Pada tahun 2021 penulis melaksanakan Kerja Praktek di PT PAL INDONESIA (PERSERO) selama satu bulan dan dapat menyelesaikan laporan Kerja Praktek yang berjudul Menganalisa Sistem Kelistrikan Pada Kapal Perang Halasan (KCR 60M).