LAMPIRAN A
Listing Program ESP32

```
/*------ modbus tcp -----*/
 #include <WiFi.h>
#include <ModbusIP_ESP8266.h>
/*-----------------------*/
const char* ssid = "DemoSeminar";
int ModbusTCP_port = 502;

#include <OneWire.h>
#include <DallasTemperature.h>
#include "DHT.h"

//led
#define LED_1 23
#define LED_2 22
#define LED_3 1

//suhu ds18b20
const int oneWireBusPin = 4;
OneWire oneWire(oneWireBusPin);
DallasTemperature sensors(&oneWire);

//suhu dht22
#define DHTPIN 0    // pin digital GPIO 0 yang terkoneksi
pada ESP32
#define DHTTYPE DHT22   // tipe DHT 22
DHT dht(DHTPIN, DHTTYPE);

//ultra
const int TRIGPIN = 5;
const int ECHOPIN = 18;
long timer;
int jarak;

//ldr
```

```
float voltage; // variable nilai tegangan dalam bentuk
floating
int sensorValue; // variable nilai analog sensor

//l298n
const int in1 = 33; //Declaring where our module is wired
const int in2 = 25;
const int motorENA = 32;// Don't forget this is a PWM
DI/DO
const int pwmChannel = 0;  // Kanal PWM untuk motor
const int pwmFrequency = 5000;  // Frekuensi PWM
const int pwmResolution = 8;

//optocoupler
const int opto = 2;
int rpm = 0;
int pid;
unsigned long millisBefore;
volatile int holes;

//MODBUS REGISTER MAP
const int Reg3 = 2; //40003 analog lDR
const int Reg4 = 3; //40004 tegangan ldr
const int Reg5 = 4; //40005 jarak ultrasonik
const int Reg6 = 5; //40006 kelembaban dht
const int Reg7 = 6; //40007 fahrenheit dht
const int Reg8 = 7; //40008 celcius dht
const int Reg9 = 8; //40009 fahrenheit ds18b20
const int Reg10 = 9; //40010 celcius ds18b20
const int Reg11 = 10; //40011 arah motor
const int Reg12 = 11; //40012 kecepatan pwm
const int Reg13 = 12; //40013 untuk rpm
const int Reg14 = 13; //40014 led1
const int Reg15 = 14; //40015 led2
const int Reg16 = 15; //40016 led3

//ModbusIP object
```

```
ModbusIP mb;

long ts;

void setup()
{
 Serial.begin(115200);

 //===============================
 Serial.println();
 Serial.println("Disconnecting current wifi connection");
 WiFi.disconnect();
 delay(10);

 ts = millis();

 //--------------------------------------------------------
 IPAddress IP(192,168,30,10); //-------
 IPAddress NETMASK(255,255,255,0);
 IPAddress NETWORK(192,168,30,1); //--------
 IPAddress DNS(8,8,8,8);
 WiFi.config(IP, NETWORK, NETMASK, DNS);

 WiFi.mode(WIFI_STA);
 //===============================
 WiFi.begin(ssid);
 Serial.println();
 Serial.println("Waiting.");

 while ((WiFi.status() != WL_CONNECTED))
 {
   Serial.print("."); //cetak . dilayar SerialMonitor
   delay(250);
 }
 //----------------

 Serial.println("Connected ");
```

```
Serial.println("ESP8266 Slave Modbus TCP/IP ");
Serial.print("IP Address: ");
Serial.print(WiFi.localIP());
Serial.print(":");
Serial.println(String(ModbusTCP_port));
Serial.print("MAC Address: ");
Serial.println(WiFi.macAddress());
Serial.println("Modbus TCP/IP Online");
Serial.println(" ");
delay(100);

pinMode(LED_1,OUTPUT);
pinMode(LED_2,OUTPUT);
pinMode(LED_3,OUTPUT);
digitalWrite(LED_1,LOW);
digitalWrite(LED_2,LOW);
digitalWrite(LED_3,LOW);

sensors.begin();
dht.begin();
pinMode(ECHOPIN, INPUT);
pinMode(TRIGPIN, OUTPUT);

pinMode(in1, OUTPUT);
pinMode(in2, OUTPUT);
pinMode(motorENA, OUTPUT);
ledcSetup(pwmChannel, pwmFrequency,
pwmResolution);
ledcAttachPin(motorENA, pwmChannel);

pinMode(2, INPUT);
attachInterrupt(digitalPinToInterrupt(2), count,
FALLING);

//---------berhasil koneksi ke wifi router, ---------------
mb.server();
mb.addHreg(Reg3);//40003
```

```
mb.addHreg(Reg4);//40004
mb.addHreg(Reg5);//40005
mb.addHreg(Reg6);//40006
mb.addHreg(Reg7);//40007
mb.addHreg(Reg8);//40008
mb.addHreg(Reg9);//40009
mb.addHreg(Reg10);//40010
mb.addHreg(Reg11);//40011
mb.addHreg(Reg12);//40012
mb.addHreg(Reg13);//40013
mb.addHreg(Reg14); //40014
mb.addHreg(Reg15); //40015
mb.addHreg(Reg16); //40016

}

void loop()
{
 mb.task();
 ts = millis();
   //ds18b20
 sensors.requestTemperatures();  // Minta sensor untuk
membaca suhu

 // Baca suhu dalam Celsius dan Fahrenheit
 float celsius = sensors.getTempCByIndex(0);
 float fahrenheit = sensors.toFahrenheit(celsius);

  //ultrasonik
 digitalWrite(TRIGPIN, LOW);
 delayMicroseconds(2);
 digitalWrite(TRIGPIN, HIGH);
 delayMicroseconds(10);
 digitalWrite(TRIGPIN, LOW);

 timer = pulseIn(ECHOPIN, HIGH);
 jarak = timer*0.5*0.0343;
```

```
//dht22
  float h = dht.readHumidity();
// membaca kelembaban
 float t = dht.readTemperature();
// membaca suhu celcius
 float f = dht.readTemperature(true);
// membaca suhu fahrenheit
 if (isnan(h) || isnan(t) || isnan(f)) {
  Serial.println(F("Failed to read from DHT sensor!"));
  return;
 }
 //ldr
 sensorValue = analogRead(34);   // membaca nilai analog
dari pin GPIO 34 esp32
 voltage = sensorValue * (3.3 / 4095.0);

 int arah = mb.Hreg(10);

if (arah == 1){
 digitalWrite(in1, LOW);
 digitalWrite(in2, HIGH);
} else {
 digitalWrite(in1, HIGH); //Switch between this HIGH and
LOW to change direction
 digitalWrite(in2, LOW);
}

 int kecepatan = mb.Hreg(11);
ledcWrite(pwmChannel, kecepatan);
delay(100);

 if (millis() - millisBefore > 1000) {
  rpm = (holes / 20.0)*16.6;
  holes = 0;
  millisBefore = millis();
 }
```

```
 delay(200);
 int led1 = mb.Hreg(13);
  int led2 = mb.Hreg(14);
  int led3 = mb.Hreg(15);

  if (led1 == 1){
   digitalWrite(LED_1, HIGH);
  } else {
   digitalWrite(LED_1, LOW);
  }
  if (led2 == 1){
   digitalWrite(LED_2, HIGH);
  } else {
   digitalWrite(LED_2, LOW);
  }
  if (led3 == 1){
   digitalWrite(LED_3, HIGH);
  } else {
   digitalWrite(LED_3, LOW);
  }
  delay(100);
 mb.Hreg(Reg3,sensorValue);
 mb.Hreg(Reg4,voltage);
 mb.Hreg(Reg5,jarak);
 mb.Hreg(Reg6,h);
 mb.Hreg(Reg7,f);
 mb.Hreg(Reg8,t);
 mb.Hreg(Reg9,fahrenheit);
 mb.Hreg(Reg10,celsius);
 mb.Hreg(Reg13,rpm);

}
void count() {
 holes++;
}
```

LAMPIRAN B
Konfigurasi USR DR302