LAMPIRAN

Lampiran 1: Program Ardoino

```
#include <Wire.h>
#include <Adafruit_ADS1X15.h>    // Adafruit ADS1115
#include <OneWire.h>
#include <DallasTemperature.h>
#include <NewPing.h>
#include <BTS7960.h>
#include <LiquidCrystal_I2C.h>
#include <AsyncTimer.h>
//
#include <ArduinoOTA.h>
#include <ESPmDNS.h>
#include <WiFiManager.h>
#include <WiFi.h>
#include <WiFiClientSecure.h>
#include <HTTPClient.h>
#include <AsyncTelegram2.h>
#include <ArduinoJson.h>
////////////////////////////////////////////////////////////////////////////////////////////
// DEFINE ADS1115
Adafruit_ADS1115 ads;  // Default address 0x48
```

```
// DEFINE TIMER
AsyncTimer timer;
// DEFINE SENSOR DS18B20
#define PIN_SUHU 3
OneWire one_wire(PIN_SUHU);
DallasTemperature sensor_suhu(&one_wire);
// DEFINE SENSOR ULTRASONIK
#define PIN_TRIG 8
#define PIN_ECHO 18
NewPing sonar(PIN_TRIG, PIN_ECHO, 500);
// DEFINE BUZZER
#define PIN_BUZZER 17  //asli
// #define PIN_BUZZER 25
// DEFINE LCD 16X2
LiquidCrystal_I2C lcd(0x27, 16, 2);  // alamat umum LCD I2C
// DEFINE BTS7960 PWM
const uint8_t R_PWM = 14;
const uint8_t R_EN = 13;
const uint8_t L_PWM = 20;
BTS7960 motorController(R_EN, L_PWM, R_PWM);
// DEFINE ENDPOINT
String endpoint = "http://akuaponikiot.my.id/api";
```

```
// DEFINE TELEGRAM
const char* BOT_TOKEN =
    "8149936443:AAGUqrlaHWFTk3C_SvwKX5NHftUxXUKeRlE";
const int64_t CHAT_ID = 6186848676;
WiFiClientSecure secured_client;
AsyncTelegram2 bot(secured_client);
// VARIABEL GLOBAL
float suhu = 0;
float ph = 0;
float ntu = 0;
float level = 0;
int speed = 0;
String status_kualitas_air = "";
int skor = 0;
int kecepatan_pompa = 0;
////////////////////////////////////////////////////////////////////////////////
void setup() {
  Serial.begin(115200);
  // I2C custom untuk ESP32-S3
  Wire.begin(2, 1);  // SDA=2, SCL=1
  // Inisialisasi ADS1115
  if (!ads.begin()) {
    Serial.println("ERROR: ADS1115 not found!");
```

```
  // opsional: hentikan atau beri fallback
} else {
  Serial.println("ADS1115 OK");
}
ads.setGain(GAIN_TWOTHIRDS);  // ±6.144V
// SETUP DS18B20
sensor_suhu.begin();
sensor_suhu.setResolution(9);
sensor_suhu.setWaitForConversion(false);
sensor_suhu.requestTemperatures();
// SETUP DEFAULT
pinMode(PIN_BUZZER, OUTPUT);
motorController.Disable();
// SETUP tampilkan inisialisasi singkat
lcd.init();
lcd.backlight();
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Smart Aquaponics");
lcd.setCursor(0, 1);
lcd.print("Loading...");
//
digitalWrite(PIN_BUZZER, HIGH);
```

```
  delay(100);
  digitalWrite(PIN_BUZZER, LOW);
  /// SETUP WIFI
WiFiManager wifisetup;
  wifisetup.setConnectTimeout(10);
  bool respon;
  respon = wifisetup.autoConnect("aquaponik_iot", "internetofthings");
  if (!respon) {
    Serial.println("WiFi gagal terhubung!");
  } else {
    Serial.println("WiFi Terhubung!");
    Serial.println(WiFi.localIP());
    // bunyi notifikasi singkat
    digitalWrite(PIN_BUZZER, HIGH);
    delay(40);
    digitalWrite(PIN_BUZZER, LOW);
    delay(40);
    digitalWrite(PIN_BUZZER, HIGH);
    delay(40);
    digitalWrite(PIN_BUZZER, LOW);
  }
  // SETUP BOT TELE
  secured_client.setInsecure();
```

```
bot.setUpdateTime(1000);
bot.setTelegramToken(BOT_TOKEN);
if (bot.begin()) {
  Serial.println("Telegram bot connected!");
  bot.sendTo(CHAT_ID, "Halo, perangkat sudah terhubung!");
} else {
  Serial.println("Telegram bot failed!");
}
HANDLE_TELEGRAM_COMMAND();
// Tampilkan IP sekali di LCD (masih di setup, delay singkat diizinkan)
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("WiFi OK:");
lcd.setCursor(0, 1);
lcd.print(WiFi.localIP().toString());
delay(2000);
lcd.clear();
// SETUP OTA
RUN_OTA();
// SETUP SYSTEM dalam satuan ms
timer.setInterval(BACA_SENSOR, 1000);
timer.setInterval(KONTROL_FUZZY, 1000);
timer.setInterval(POST_DATA, 1000);
```

```
  timer.setInterval(SAVE_DATA, 60000);
  timer.setInterval(OUTPUT_SERIAL, 300);
  timer.setInterval(OUTPUT_LCD, 500);
  timer.setInterval(HANDLE_TELEGRAM_COMMAND, 1000);
}
void loop() {
  ArduinoOTA.handle();
  timer.handle();
}
```