

Lampiran 1 Pemrograman pada Arduino IDE

```

#include <WiFi.h>
#include <HTTPClient.h>
#include <WiFiClientSecure.h>
#include <UniversalTelegramBot.h>
#include <ArduinoJson.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <DHT.h>
// WIFI
const char* ssid = "redmi8";
const char* password = "12345678";
// TELEGRAM
#define BOT_TOKEN
"8967294911:AAEu85NZrzvrDhxqzMVKQHjwLOFyRdBHxvY"
String CHAT_ID = "-1003501402424";

WiFiClientSecure client;
UniversalTelegramBot bot(BOT_TOKEN, client);
// GOOGLE SPREADSHEET
String GAS_URL =
  "https://script.google.com/macros/s/AKfycbzn223JFzwWMnkdIT-
ngsAqEMr0EM8FwXeAM_LHnvtuGrYOP1R4cO_Y9zy3gT6wyNeNOQ/ex
ec";

// SENSOR DAN AKTUATOR
#define DHTPIN 4
#define DHTTYPE DHT22

#define MQ135_PIN 34

#define FAN_PIN 26
#define HEATER_PIN 27

DHT dht(DHTPIN, DHTTYPE);
LiquidCrystal_I2C lcd(0x27, 20, 4);

// TIMER
unsigned long lastTelegramCheck = 0;
unsigned long lastSpreadsheetSend = 0;
unsigned long lastDHTRead = 0;

const unsigned long telegramDelay = 3000;
const unsigned long spreadsheetDelay = 300000;
const unsigned long dhtInterval = 2500;

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// VARIABEL
bool fanManual = false;
bool fanState = false;

bool heaterManual = false;
bool heaterState = false;

float temperature = 0;
float humidity = 0;

int mq135Value = 0;
int ldrRawValue = 0;

// MEMBACA DHT22
void bacaDHT() {
    unsigned long sekarang = millis();

    if (lastDHTRead == 0 || sekarang - lastDHTRead >= dhtInterval) {
        float suhuBaru = dht.readTemperature();
        float kelembabanBaru = dht.readHumidity();

        if (!isnan(suhuBaru) && !isnan(kelembabanBaru)) {
            temperature = suhuBaru;
            humidity = kelembabanBaru;
        } else {
            Serial.println("DHT gagal dibaca, memakai data valid terakhir.");
        }

        lastDHTRead = sekarang;
    }
}

// KIRIM DATA KE GOOGLE SHEET
void kirimGoogleSheet() {
    if (WiFi.status() != WL_CONNECTED) {
        Serial.println("WiFi tidak terhubung. Data tidak dikirim.");
        return;
    }

    WiFiClientSecure sheetClient;
    sheetClient.setInsecure();

    HTTPClient http;

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String fan = fanState ? "ON" : "OFF";
String heater = heaterState ? "ON" : "OFF";

String url = GAS_URL;
url += "?suhu=" + String(temperature, 1);
url += "&kelembaban=" + String(humidity, 1);
url += "&gas=" + String(mq135Value);
url += "&fan=" + fan;
url += "&heater=" + heater;

Serial.println();
Serial.println("===== DATA SENSOR =====");
Serial.print("Temperature : ");
Serial.println(temperature, 1);

Serial.print("Humidity   : ");
Serial.println(humidity, 1);

Serial.print("Gas         : ");
Serial.println(mq135Value);

Serial.print("Fan          : ");
Serial.println(fan);

Serial.print("Heater       : ");
Serial.println(heater);

Serial.println("URL:");
Serial.println(url);

http.begin(sheetClient, url);
http.setFollowRedirects(HTTPC_STRICT_FOLLOW_REDIRECTS);

int httpCode = http.GET();

Serial.print("HTTP Code  : ");
Serial.println(httpCode);

if (httpCode > 0) {
    Serial.println("Response:");
    Serial.println(http.getString());
} else {
    Serial.print("Gagal mengirim data: ");
    Serial.println(http.errorToString(httpCode));
}

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    http.end();
}

// TELEGRAM
void handleNewMessages(int numNewMessages) {
    for (int i = 0; i < numNewMessages; i++) {
        String chat_id = String(bot.messages[i].chat_id);
        String text = bot.messages[i].text;

        text.trim();

        Serial.print("Chat ID : ");
        Serial.println(chat_id);

        Serial.print("Pesan  : ");
        Serial.println(text);

        if (text.indexOf("/start") >= 0) {
            String welcome;

            welcome += "📊 Monitoring Pengeriing Ikan Asin\n\n";
            welcome += "/status - Status sensor\n";
            welcome += "/fanon - Kipas ON manual\n";
            welcome += "/fanoff - Kipas OFF manual\n";
            welcome += "/heateron - Heater ON manual\n";
            welcome += "/heateroff - Heater OFF manual\n";
            welcome += "/auto - Kipas dan heater otomatis\n";

            bot.sendMessage(chat_id, welcome, "");
        }

        else if (text.indexOf("/status") >= 0) {
            String msg;

            msg += "📊 STATUS SENSOR\n\n";

            msg += "🌡 Suhu : ";
            msg += String(temperature, 1);
            msg += " °C\n";

            msg += "💧 Kelembaban : ";
            msg += String(humidity, 1);
            msg += " %\n";

            msg += "🌬 Gas : ";

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msg += String(mq135Value);
msg += "\n";

msg += "🌀 Fan : ";
msg += fanState ? "ON" : "OFF";

msg += "\n🔥 Heater : ";
msg += heaterState ? "ON" : "OFF";

msg += "\n\nMode Fan : ";
msg += fanManual ? "Manual" : "Otomatis";

msg += "\nMode Heater : ";
msg += heaterManual ? "Manual" : "Otomatis";

bot.sendMessage(chat_id, msg, "");
}

else if (text.indexOf("/fanon") >= 0) {
  fanManual = true;
  fanState = true;

  // Relay aktif LOW.
  digitalWrite(FAN_PIN, LOW);

  bot.sendMessage(
    chat_id,
    "🌀 Kipas ON — Mode Manual",
    ""
  );
}

else if (text.indexOf("/fanoff") >= 0) {
  fanManual = true;
  fanState = false;

  // Relay aktif LOW.
  digitalWrite(FAN_PIN, HIGH);

  bot.sendMessage(
    chat_id,
    "🌀 Kipas OFF — Mode Manual",
    ""
  );
}

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else if (text.indexOf("/heateron") >= 0) {
    heaterManual = true;
    heaterState = true;

    // Relay aktif LOW.
    digitalWrite(HEATER_PIN, LOW);

    bot.sendMessage(
        chat_id,
        "🔥 Heater ON — Mode Manual",
        ""
    );
}

else if (text.indexOf("/heateroff") >= 0) {
    heaterManual = true;
    heaterState = false;

    // Relay aktif LOW.
    digitalWrite(HEATER_PIN, HIGH);

    bot.sendMessage(
        chat_id,
        "🔥 Heater OFF — Mode Manual",
        ""
    );
}

else if (text.indexOf("/auto") >= 0) {
    fanManual = false;
    heaterManual = false;

    bot.sendMessage(
        chat_id,
        "✅ Mode otomatis kipas dan heater aktif",
        ""
    );
}
}

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

    pinMode(FAN_PIN, OUTPUT);

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pinMode(HEATER_PIN, OUTPUT);

pinMode(MQ135_PIN, INPUT);

analogReadResolution(12);

analogSetPinAttenuation(MQ135_PIN, ADC_11db);

digitalWrite(FAN_PIN, HIGH);
digitalWrite(HEATER_PIN, HIGH);

fanState = false;
heaterState = false;

Wire.begin(21, 22);

lcd.init();
lcd.backlight();

dht.begin();

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Connecting WiFi");

WiFi.begin(ssid, password);

while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
}
Serial.println();
Serial.println("WiFi Connected");
Serial.print("IP Address: ");
Serial.println(WiFi.localIP());

client.setInsecure();

lcd.clear();
lcd.setCursor(0, 0);
lcd.print("WiFi Connected");

bot.sendMessage(
    CHAT_ID,
    "🔗 ESP32 Monitoring Online",
    ""

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);

delay(1500);
lcd.clear();
}

void loop() {
  bacaDHT();

  mq135Value = analogRead(MQ135_PIN);

  lux = bacaLuxEstimasi();

  // MODE OTOMATIS KIPAS
  if (!fanManual) {
    if (temperature > 40 || mq135Value > 2000) {
      fanState = true;
      digitalWrite(FAN_PIN, LOW);
    }

    else if (temperature < 30 && mq135Value <= 2000) {
      fanState = false;
      digitalWrite(FAN_PIN, HIGH);
    }
  }

  // MODE OTOMATIS HEATER
  if (!heaterManual) {
    if (temperature < 30) {
      heaterState = true;
      digitalWrite(HEATER_PIN, LOW);
    }

    else if (temperature >= 50) {
      heaterState = false;
      digitalWrite(HEATER_PIN, HIGH);
    }
  }

  // LCD
  lcd.setCursor(0, 0);
  lcd.print("T:");
  lcd.print(temperature, 1);
  lcd.print("C H:");
  lcd.print(humidity, 1);
  lcd.print("% ");

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    lcd.setCursor(0, 1);
    lcd.print(" Gas:");
    lcd.print(mq135Value);
    lcd.print("      ");

    lcd.setCursor(0, 3);
    lcd.print("Heat:");
    lcd.print(heaterState ? "ON " : "OFF");

    lcd.setCursor(12, 3);
    lcd.print("Fan:");
    lcd.print(fanState ? "ON " : "OFF");

    // CEK TELEGRAM
    if (millis() - lastTelegramCheck >= telegramDelay) {
        int numNewMessages =
            bot.getUpdates(bot.last_message_received + 1);

        while (numNewMessages) {
            handleNewMessages(numNewMessages);

            numNewMessages =
                bot.getUpdates(bot.last_message_received + 1);
        }

        lastTelegramCheck = millis();
    }

    // KIRIM GOOGLE SHEETS
    if (millis() - lastSpreadsheetSend >= spreadsheetDelay) {
        kirimGoogleSheet();
        lastSpreadsheetSend = millis();
    }

    delay(500);
}

```

Lampiran 2 Kesediaan Pembimbing I

SURAT KESEDIAAN MEMBIMBING TUGAS AKHIR

Yang bertanda tangan dibawah ini :

Nama : Rony Darpono, M.T

NIPY : 09.015.282

Jabatan : Ketua Program Studi DIII Teknik Elektronika

Dengan ini dinyatakan bersedia menjadi Pembimbing I Tugas Akhir Mahasiswa berikut :

Nama : Syukron Faqih Afrizal

NIM : 23010004

Judul Tugas Akhir : **"PENGERING IKAN ASIN OTOMATIS
BERBASIS IoT DENGAN SUMBER DAYA
PANEL SURYA"**

Demikian Pernyataan ini di buat agar dapat di laksanakan sebagai mestinya

Mengetahui,

Tegal, 29 Juli 2026

Ka. Prodi DIII Teknik Elektronika

Universitas Harkat Negeri

Dosen Pembimbing I



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Lampiran 3 Kesiadaan Pembimbing II

SURAT KESEDIAAN MEMBIMBING TUGAS AKHIR

Yang bertanda tangan dibawah ini :

Nama : Bahrun Niam, M.T
NIPY : 09.015.277
Jabatan : Dosen Tetap Prodi DIII Teknik Elektronika

Dengan ini dinyatakan bersedia menjadi Pembimbing II Tugas Akhir Mahasiswa berikut :

Nama : Syukron Faqih Afrizal
NIM : 23010004
Judul Tugas Akhir : "PENGERING IKAN ASIN OTOMATIS
BERBASIS IoT DENGAN SUMBER DAYA
PANEL SURYA"

Demikian Pernyataan ini di buat agar dapat di laksanakan sebagai mestinya

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Bahrun Niam, M.T

NIPY. 09.015.277

Lampiran 4 Form Pembimbing I

FORM BIMBINGAN**TUGAS AKHIR**

NAM : Syukron Faqih Afrizal

NIM : 23010004

JUDUL TA : "PENGERING IKAN ASIN OTOMATIS BERBASIS IoT
DENGAN SUMBER DAYA PANEL SURYA"

Pembimbing I : Rony Darpono, M.T

No	Hari/Tanggal	Uraian	Tanda Tangan
1	Selasa / 9 Juni 2026	Bimbingan Desain Alat dan Laporan	
2	Senin/15 juni 2026	Bimbingan laporan Bab 1	
3	Rabu/24 juni 2026	Bimbingan laporan Bab 2	
4	Kamis/2 juli 2026	Bimbingan laporan Bab 3	
5	Senin/20 juli 2026	Bimbingan laporan bab 4	
6	Selasa / 28 Juli 2026	Bimbingan laporan bab 5 	

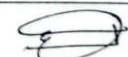
Lampiran 5 Form Pembimbing 2

FORM BIMBINGAN**TUGAS AKHIR**

NAM : Syukron Faqih Afrizal

NIM : 23010004

JUDUL TA : "PENGERING IKAN ASIN OTOMATIS BERBASIS IoT
DENGAN SUMBER DAYA PANEL SURYA"**Pembimbing II : Bahrn Niam, M.T**

No	Hari/Tanggal	Uraian	Tanda Tangan
1	Rabu/6 Mei 2026	Bimbingan Judul	
2	Selasa/12 Mei 2026	Bimbingan Sensor	
3	Rabu/20 Mei 2026	Bimbingan Desain	
4	Senin/8 Juni 2026	Bimbingan Sensor MQ135	
5	Jum'at/12 Juni 2026	Bimbingan Sensor Geiger Muller	
6	Selasa/30 Juni 2026	Bimbingan Bot dan Spreadsheet	
7	Senin/13 Juli 2026	Bimbingan desain Rak	
8	Senin/27 Juli 2026	Bimbingan sensor BH1750	

Lampiran 6 Penilaian Pembimbing

PENILAIAN BIMBINGAN TUGAS AKHIR INDIVIDU

Judul Tugas Akhir : PENERING IKAN ASIN OTOMATIS BERBASIS IoT
DENGAN SUMBER DAYA PANEL SURYA
Nama : Syukron Faqih Afrizal
Nim : 23010004
Kelas : 6A

I. Nilai Bimbingan Tugas Akhir (Pembimbing I)

NO	Unsur yang Dinilai	Nilai
1	Kedisiplinan Dalam Bimbingan	85
2	Kreatifitas Pemecahan Dalam Bimbingan	90
3	Penguasaan Materi Tugas Akhir	90
4	Kelengkapan Dan Referensi Tugas Akhir	90
Total Nilai		86,7

II. Nilai Bimbingan Tugas Akhir (Pembimbing II)

No	Unsur yang Dinilai	Nilai
1	Kedisiplinan Dalam Bimbingan	95
2	Kreatifitas Pemecahan Dalam Bimbingan	90
3	Penguasaan Materi Tugas Akhir	90
4	Kelengkapan Dan Referensi Tugas Akhir	85
Total Nilai		90

$$\begin{aligned}\text{Nilai Bimbingan} &= (86,7 + 90) : 2 \\ &= 89\end{aligned}$$

Tegal, 29 Juli 2026

Dosen Pembimbing I



Rony Darpono, M.T
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Dosen Pembimbing II



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