LAMPIRAN

A. Kode Program Arduino

- **Mikrokontroler**

```
const int relay = 2;
const int pinAout = A1;
const int com = 5;
const int buzz = 6;
LiquidCrystal_I2C lcd(0x27, 16, 2);

void setup() {
 //Init the serial port communication - to debug the library
 Serial.begin(9600); //Init serial port
 lcd.init();
 lcd.backlight();
 pinMode(relay, OUTPUT);
 pinMode(com, OUTPUT);
 pinMode(buzz, OUTPUT);
 digitalWrite(relay , HIGH);
 digitalWrite(com, HIGH);
 digitalWrite(buzz, LOW);
 lcd.setCursor(0, 0); lcd.print("Standby...");
 //Set math model to calculate the PPM concentration and the value of constants
 MQ2.setRegressionMethod(1); //_PPM =  a*ratio^b
 MQ2.setA(574.25); MQ2.setB(-2.222); // Configure the equation to to calculate
       LPG concentration
 MQ2.init();
 Serial.print("Calibrating please wait.");
 float calcR0 = 0;
 for (int i = 1; i <= 10; i ++)
 {
```

```
  MQ2.update(); // Update data, the arduino will read the voltage from the analog
      pin
  calcR0 += MQ2.calibrate(RatioMQ2CleanAir);
  Serial.print(".");
 }
 MQ2.setR0(calcR0 / 10);
 Serial.println("  done!.");

 if (isinf(calcR0)) {
  Serial.println("Warning: Conection issue, R0 is infinite (Open circuit detected)
      please check your wiring and supply");
  while (1);
 }
 if (calcR0 == 0) {
  Serial.println("Warning: Conection issue found, R0 is zero (Analog pin shorts to
      ground) please check your wiring and supply");
  while (1);
 }
 /*****************************
MQ CAlibration ********************************************/

 MQ2.serialDebug(true);
}

void loop() {
 MQ2.update(); // Update data, the arduino will read the voltage from the analog
      pin
 MQ2.readSensor(); // Sensor will read PPM concentration using the model, a and
      b values set previously or from the setup
 MQ2.serialDebug(); // Will print the table on the serial port
 delay(500); //Sampling frequency
```

```
 lcd.setCursor(0, 0); lcd.print("Smoke:"); lcd.print(MQ2._PPM); lcd.print(" PPM
        ");
 if (MQ2._PPM >= 20) {
  digitalWrite(relay, LOW);
  digitalWrite(com, LOW);
  digitalWrite(buzz, HIGH);
  delay(10000);
  digitalWrite(relay, HIGH);
  Serial.println("bahaya");
 }
 else {
  //digitalWrite(relay, HIGH);
  digitalWrite(com, HIGH);
  digitalWrite(buzz, LOW);
 }
}
```

B. Kode Program ESP32 Cam

```
// AI Thinker ESP32-CAM
#include <Arduino.h>
#include <WiFi.h>
#include <WiFiClientSecure.h>
#include "soc/soc.h"
#include "soc/rtc_cntl_reg.h"
#include "esp_camera.h"
#include <UniversalTelegramBot.h>
#include <ArduinoJson.h>

const char* ssid = "Semesta";
const char* password = "12345678";
```

```
// Initialize Telegram BOT
String BOTtoken = "6015153939:AAFgmoFwbqDAn-zqtrJddQATycDkHaeCaFk";  // your Bot Token (Get from Botfather)

// Use @myidbot to find out the chat ID of an individual or a group
// Also note that you need to click "start" on a bot before it can
// message you
String CHAT_ID = "1109492936";

bool sendPhoto = false;

WiFiClientSecure clientTCP;
UniversalTelegramBot bot(BOTtoken, clientTCP);

#define FLASH_LED_PIN 4
bool flashState = LOW;

//Checks for new messages every 1 second.
int botRequestDelay = 1000;
unsigned long lastTimeBotRan;

//CAMERA_MODEL_AI_THINKER
#define PWDN_GPIO_NUM     32
#define RESET_GPIO_NUM    -1
#define XCLK_GPIO_NUM      0
#define SIOD_GPIO_NUM     26
#define SIOC_GPIO_NUM     27

#define Y9_GPIO_NUM       35
#define Y8_GPIO_NUM       34
```

```
#define Y7_GPIO_NUM       39
#define Y6_GPIO_NUM       36
#define Y5_GPIO_NUM       21
#define Y4_GPIO_NUM       19
#define Y3_GPIO_NUM       18
#define Y2_GPIO_NUM        5
#define VSYNC_GPIO_NUM    25
#define HREF_GPIO_NUM     23
#define PCLK_GPIO_NUM     22
#define Foto 13
int foto = 0;

void configInitCamera() {
  camera_config_t config;
  config.ledc_channel = LEDC_CHANNEL_0;
  config.ledc_timer = LEDC_TIMER_0;
  config.pin_d0 = Y2_GPIO_NUM;
  config.pin_d1 = Y3_GPIO_NUM;
  config.pin_d2 = Y4_GPIO_NUM;
  config.pin_d3 = Y5_GPIO_NUM;
  config.pin_d4 = Y6_GPIO_NUM;
  config.pin_d5 = Y7_GPIO_NUM;
  config.pin_d6 = Y8_GPIO_NUM;
  config.pin_d7 = Y9_GPIO_NUM;
  config.pin_xclk = XCLK_GPIO_NUM;
  config.pin_pclk = PCLK_GPIO_NUM;
  config.pin_vsync = VSYNC_GPIO_NUM;
  config.pin_href = HREF_GPIO_NUM;
  config.pin_sscb_sda = SIOD_GPIO_NUM;
```

```
  config.pin_sscb_scl = SIOC_GPIO_NUM;
  config.pin_pwdn = PWDN_GPIO_NUM;
  config.pin_reset = RESET_GPIO_NUM;
  config.xclk_freq_hz = 20000000;
  config.pixel_format = PIXFORMAT_JPEG;

  //init with high specs to pre-allocate larger buffers
  if (psramFound()) {
    config.frame_size = FRAMESIZE_UXGA;
    config.jpeg_quality = 10;  //0-63 lower number means higher quality
    config.fb_count = 2;
  } else {
    config.frame_size = FRAMESIZE_SVGA;
    config.jpeg_quality = 12;  //0-63 lower number means higher quality
    config.fb_count = 1;
  }
  // camera init
  esp_err_t err = esp_camera_init(&config);
  if (err != ESP_OK) {
    Serial.printf("Camera init failed with error 0x%x", err);
    delay(1000);
    ESP.restart();
  }
  // Drop down frame size for higher initial frame rate
  sensor_t * s = esp_camera_sensor_get();
  s->set_framesize(s,                FRAMESIZE_CIF);                              //
UXGA|SXGA|XGA|SVGA|VGA|CIF|QVGA|HQVGA|QQVGA
}

void handleNewMessages(int numNewMessages) {
```

```
  Serial.print("Handle New Messages: ");
  Serial.println(numNewMessages);

  for (int i = 0; i < numNewMessages; i++) {
    String chat_id = String(bot.messages[i].chat_id);
    if (chat_id != CHAT_ID) {
      bot.sendMessage(chat_id, "Unauthorized user", "");
      continue;
    }
    // Print the received message
    String text = bot.messages[i].text;
    Serial.println(text);

    String from_name = bot.messages[i].from_name;
    if (text == "/start") {
      String welcome = "Welcome , " + from_name + "\n";
      welcome += "Use the following commands to interact with the ESP32-CAM \n";
      welcome += "/photo : takes a new photo\n";
      welcome += "/flash : toggles flash LED \n";
      bot.sendMessage(CHAT_ID, welcome, "");
    }
    if (text == "/flash") {
      flashState = !flashState;
      digitalWrite(FLASH_LED_PIN, flashState);
      Serial.println("Change flash LED state");
    }
    if (text == "/photo") {
      sendPhoto = true;
      Serial.println("New photo request");
```

```
    }
  }
}
String sendPhotoTelegram() {
  const char* myDomain = "api.telegram.org";
  String getAll = "";
  String getBody = "";

  camera_fb_t * fb = NULL;
  fb = esp_camera_fb_get();
  if (!fb) {
    Serial.println("Camera capture failed");
    delay(1000);
    ESP.restart();
    return "Camera capture failed";
  }
  Serial.println("Connect to " + String(myDomain));

  if (clientTCP.connect(myDomain, 443)) {
    Serial.println("Connection successful");
    String head = "--RandomNerdTutorials\r\nContent-Disposition: form-data; name=\"chat_id\"; \r\n\r\n" + CHAT_ID + "\r\n--RandomNerdTutorials\r\nContent-Disposition: form-data; name=\"photo\"; filename=\"esp32-cam.jpg\"\r\nContent-Type: image/jpeg\r\n\r\n";
    String tail = "\r\n--RandomNerdTutorials--\r\n";
    uint16_t imageLen = fb->len;
    uint16_t extraLen = head.length() + tail.length();
    uint16_t totalLen = imageLen + extraLen;

    clientTCP.println("POST /bot" + BOTtoken + "/sendPhoto HTTP/1.1");
```

```
  clientTCP.println("Host: " + String(myDomain));
  clientTCP.println("Content-Length: " + String(totalLen));
  clientTCP.println("Content-Type: multipart/form-data; boundary=RandomNerdTutorials");
  clientTCP.println();
  clientTCP.print(head);

  uint8_t *fbBuf = fb->buf;
  size_t fbLen = fb->len;
  for (size_t n = 0; n < fbLen; n = n + 1024) {
   if (n + 1024 < fbLen) {
    clientTCP.write(fbBuf, 1024);
    fbBuf += 1024;
   }
   else if (fbLen % 1024 > 0) {
    size_t remainder = fbLen % 1024;
    clientTCP.write(fbBuf, remainder);
   }
  }

  clientTCP.print(tail);
  esp_camera_fb_return(fb);
  int waitTime = 10000;   // timeout 10 seconds
  long startTimer = millis();
  boolean state = false;

  while ((startTimer + waitTime) > millis()) {
   Serial.print(".");
   delay(100);
   while (clientTCP.available()) {
```

```
        char c = clientTCP.read();
        if (state == true) getBody += String(c);
        if (c == '\n') {
          if (getAll.length() == 0) state = true;
          getAll = "";
        }
        else if (c != '\r')
          getAll += String(c);
        startTimer = millis();
      }
      if (getBody.length() > 0) break;
    }
    clientTCP.stop();
    Serial.println(getBody);
  }
  else {
    getBody = "Connected to api.telegram.org failed.";
    Serial.println("Connected to api.telegram.org failed.");
  }
  return getBody;
}
void setup() {
  WRITE_PERI_REG(RTC_CNTL_BROWN_OUT_REG, 0);
  // Init Serial Monitor
  Serial.begin(115200);
  pinMode(Foto, INPUT_PULLUP);
  // Set LED Flash as output
  pinMode(FLASH_LED_PIN, OUTPUT);
  digitalWrite(FLASH_LED_PIN, flashState);
```

```
  // Config and init the camera
  configInitCamera();

  // Connect to Wi-Fi
  WiFi.mode(WIFI_STA);
  Serial.println();
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, password);
  clientTCP.setCACert(TELEGRAM_CERTIFICATE_ROOT);  // Add root
certificate for api.telegram.org
  while (WiFi.status() != WL_CONNECTED) {
    Serial.print(".");
    delay(500);
  }
  Serial.println();
  Serial.print("ESP32-CAM IP Address: ");
  Serial.println(WiFi.localIP());
}

void loop() {
  foto = digitalRead(Foto);
  Serial.println(foto);
  if (sendPhoto) {
    Serial.println("Preparing photo");
    sendPhotoTelegram();
    sendPhoto = false;
  }
  if (millis() > lastTimeBotRan + botRequestDelay)  {
```

```
    if (foto == 0) {
      sendPhoto = true;
      Serial.println("New photo request");
    }
    int numNewMessages = bot.getUpdates(bot.last_message_received + 1);
    while (numNewMessages) {
      Serial.println("got response");
      handleNewMessages(numNewMessages);
      numNewMessages = bot.getUpdates(bot.last_message_received + 1);
    }
    lastTimeBotRan = millis();
  }
}
```

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NO	TANGGAL	URAIAN	PARAF PEMBIMBING
1	02/24 /7	Revisi Bab I : perumusan masalah disesuaikan (lebih ringkas)	
2		Revisi Bab II ACC	
3		Revisi Bab III tambahkan layout Perancangan pada bab Pengujian	
		revisi Bab III flowchart kerja sesuai	
	11/24 /7	revisi bab pengujian hasil	
X.		ACC BAB I, II, III	
5	15/2024 /7	ACC BAB IV	
		ACC BAB V	

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NO	TANGGAL	URAIAN	PARAF PEMBIMBING
1.	25/03/2024	Acc Judul Laporan Akhir	
2.	27/05/2024	Pengajuan Bab I	
3.	29/05/2024	Revisi Bab I	
4.	30/05/2024	Acc Bab I dan Bab II	
5.	03/06/2024	Pengajuan Bab III	
6.	06/06/2024	Acc Bab III	
7.	10/06/2024	Pengajuan Bab IV	
8.	14/06/2024	Revisi Bab IV	
9.	02/07/2024	Revisi Bab IV	
10.	03/07/2024	Acc Bab IV	
11.	08/07/2024	Pengajuan Bab V	
12.	09/07/2024	Revisi Bab V	
13.	10/07/2024	Acc Bab V	
14.	11/07/2024	Acc Bab I, II, III, IV, V	

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Mahasiswa tersebut telah memenuhi persyaratan dan dapat mengikuti Ujian Laporan Tugas Akhir, pada Tahun Akademik 2024.

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No	Uraian Revisi	Paraf
	tata tulis Pembahasan data diuji dengan coding kesimpulan	

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No	Uraian Revisi	Paraf
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Telah melaksanakan revisi terhadap Laporan Akhir (LA) yang diseminarkan pada hari **Selasa** tanggal **16** bulan **Juli** tahun **2024.** Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen penilai yang memberikan revisi:

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1.	ACC	Yulian Mirza, S.T., M.Kom	24/07/2024	
2.	ACC	Hartati Deviana, S.T.,M.Kom	8/8/2024	
3.	ACC	Ir. Alan Novi Tompunu, S.T., M.T., IPM., ASEAN Eng	5/7/2024	
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