LAMPIRAN

Source Code

1. Program Sensor MQ-2

```
#include <LiquidCrystal_I2C.h>
#include <MQUnifiedsensor.h>
/************************Hardware Related
Macros************************************/
#define         Board                   ("Arduino NANO")
#define         Pin                     (A1)  //Analog input 3 of your arduino
/************************Software Related
Macros************************************/
#define         Type                    ("MQ-2") //MQ2
#define         Voltage_Resolution      (5)
#define         ADC_Bit_Resolution      (10) // For arduino
UNO/MEGA/NANO
#define         RatioMQ2CleanAir        (9.83) //RS / R0 = 9.83 ppm

/*****************************Globals***********************
*********************/
MQUnifiedsensor MQ2(Board, Voltage_Resolution,
ADC_Bit_Resolution, Pin, Type);
/*****************************Globals***********************
*********************/
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);
  }
}
```

2. 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 Bimbingan	Tanda Tangan Pembimbing
1	5 - Juni - 2023	Bimbingan menyampaikan lanjutan BAB III	
2	14 Juni 2023	Perbaikan Arsitektur Sistem	
3.	25 - Juli 2023	BAB IV (revisi)	
4.	28 - Juli - 2023	Demonstrasi Alat	
5.	4 - Agus - 2023	Acc Alat & Rekomendasi	

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No	Tanggal	Uraian Bimbingan	Tanda Tangan Pembimbing
1	10 April 2022	Langulan Perbaiwan Gambar dan Jurnal Penambahan	
2	13 April 2023	Bimbingan Mengenai BAB III Laporan Akhir	
3	26 July 2023	Demonstrasi Alat melalui video dan Perbaiwan Laporan	
4	27 Juli 2023	Demostrasi Alat	
		GRAFIK LAPORAN Pengujian	
		Acc Alat dan Laporan	

Acc Ujian

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No	Uraian	Paraf
1.	Tata tulis harus konsisten istilah asing di cetak miring	[signature]
2	Abstrak di perbaiki	[signature]
3	Latar belakang	[signature]
4.	Tambahkan teori tentang Asap pd Bab II	[signature]
5	pd Bab II ada beberapa kutipan yg tdk ada sumber	[signature]
6.	Blok Diagram di perbaiki	[signature]
7.	Flowchart di perbaiki	[signature]
8	Bab III di perbaiki	[signature]
9	Bab IV di perbaiki	[signature]
10	Kesimpulan di perbaiki	[signature]

Palembang, Agustus 2023
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No	Uraian	Paraf
1	Perbaiki. cover, abstrak.	✓ Ef 25/9 2023
2	Perbaiki. hal 21. (lebih-lebih metodologi penelitian?)	✓ Ef 25/9 2023
3	Perbaiki hal 25. (flowchart sistem)	✓ Ef 13/9 2023
4	Bab V : kompulan saran (koma)	✓ Ef 25/9 2023

Palembang, 18 Agustus 2023
Dosen Penguji

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No	Uraian	Paraf
1.	Perbaiki Bab III. (Sample).	
2	Perbaiki flowchart.	
3.	Perbaiki DP.	
4	Perbaiki Bab II (Sumber).	

Palembang, 10 Agustus 2023
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No	Uraian	Paraf
1.	Kurangi spasi kosong	
2.	Gambar 3.4 diperbesar.	
3.	Sub 2.3 kesimpulan hal. 38 diperbesar Sub 4.5 kesimpulan hal. 44	

Palembang, Agustus 2023
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Telah melaksanakan revisi terhadap Laporan Akhir yang diujikan pada hari **Kamis** tanggal **10** bulan **Agustus** tahun **2023** Pelaksanaan revisi terhadap Laporan Akhir tersebut telah disetujui oleh Dosen Penguji yang memberikan revisi:

No	Komentar	Nama Dosen Penguji	Tanggal/ bulan	Tanda Tangan
1.		Ahyar Supani,S.T.,M.T		
2.	Acc	Herlambang Saputra, P.hD	4/9-23	
3.	Ok Acc	Mustaziri,S.T.,M.Kom	25/9 23	
4.	Acc	M.Miftakhul Amin, S.Kom.,M.Eng	23/08 223	
5.	Acc	Ervi Cofriyanti, S.Si.,M.T.I	30/9 2023	

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