PROGRAM SISTEM MQ2 PADA ROBOT WALL FOLLOWER PENDETEKSI KEBOCORAN GAS LPG

```
//==========Wall Follower with Gas Detector + SIM800L==========
//Sensor MQ2 harus dikalibrasi bila tidak dinyalakan selama beberapa jam,
//robot akan otomatis melakukan kalibrasi bila nilai "adc_gas" melebihi 190
//saat awal robot dinyalakan...
//nilai 190 dapat disesuaikan/diubah pada bagian sub program "warming_mq2();"
#include <SoftwareSerial.h>
SoftwareSerial SIM800L(10, 11);      //RX, TX
#include <LiquidCrystal.h>
LiquidCrystal lcd(16, 15, 20, 19, 18, 17);

#define pwm_kanan 6
#define pwm_kiri 4
#define dir_kanan 7
#define dir_kiri 5

#define trigger_kanan 22
#define echo_kanan 23
#define trigger_depan 24
#define echo_depan 25
#define trigger_kiri 26
#define echo_kiri 27

#define buzzer 12

#define tombol_RIGHT    0
#define tombol_UP       1
#define tombol_DOWN     2
#define tombol_LEFT     3
#define tombol_SELECT 4
#define tidak_ditekan 5

#define BAR 1
#define ANALOG 2
#define TEGANGAN 3

#define KANAN 1
#define KIRI 2

#define tombol baca_tombol()                //baca tombol
```

```
bool state = 0;
byte susur = 1, data_gas = 1;
unsigned int adc_gas;
unsigned int jarak_kanan, jarak_depan, jarak_kiri;
char buff_adc_gas[4], buff_jarak_kanan[3], buff_jarak_depan[3],
buff_jarak_kiri[3];

void setup() {
   pinMode(dir_kiri, OUTPUT);
   pinMode(dir_kanan, OUTPUT);
   setMotor(0, 0);
   pinMode(trigger_kanan, OUTPUT);
   pinMode(trigger_depan, OUTPUT);
   pinMode(trigger_kiri, OUTPUT);
   pinMode(echo_kanan, INPUT);
   pinMode(echo_depan, INPUT);
   pinMode(echo_kiri, INPUT);
   pinMode(buzzer, OUTPUT);
   digitalWrite(buzzer, LOW);

   lcd.begin(16, 2);
   lcd.clear();
   lcd.setCursor(0, 0); lcd.print("Inisiasi SIM800L");
   SIM800L.begin(9600);
   delay(2000);

   lcd.setCursor(0, 0); lcd.print("Si Pinky Unyu      ");
   lcd.setCursor(0, 1); lcd.print("READY...!          ");
   delay(2000);
   lcd.clear();
   adc_gas = baca_mq2();
   if (adc_gas > 170) {
      warming_mq2();
   }
}
//=========================================================
==
void loop() {
   sprintf(buff_jarak_kanan, "%3d", jarak_kanan);
   sprintf(buff_jarak_depan, "%3d", jarak_depan);
   sprintf(buff_jarak_kiri, "%3d", jarak_kiri);

   lcd.setCursor(0, 0); lcd.print(buff_jarak_kanan); lcd.setCursor(3, 0); lcd.print("
");
   lcd.setCursor(6, 0); lcd.print(buff_jarak_depan); lcd.setCursor(9, 0); lcd.print("
```

```
");
    lcd.setCursor(13, 0); lcd.print(buff_jarak_kiri);
    lcd.setCursor(0, 1);
    switch (susur) {
      case KANAN:
        lcd.print("[RGT]| Gas: ");
        break;
      case KIRI:
        lcd.print("[LFT]| Gas: ");
        break;
    }

    adc_gas = baca_mq2();
    if (data_gas == BAR) {
      if (adc_gas > 200 && adc_gas <= 406) {
        lcd.setCursor(12, 1); lcd.write(255);
        lcd.setCursor(13, 1); lcd.print("___");
      }
      else if (adc_gas > 406 && adc_gas <= 612) {
        lcd.setCursor(12, 1); lcd.write(255);
        lcd.setCursor(13, 1); lcd.write(255);
        lcd.setCursor(14, 1); lcd.print("__");
      }
      else if (adc_gas > 612 && adc_gas <= 818) {
        lcd.setCursor(12, 1); lcd.write(255);
        lcd.setCursor(13, 1); lcd.write(255);
        lcd.setCursor(14, 1); lcd.write(255);
        lcd.setCursor(15, 1); lcd.print("_");
      }
      else if (adc_gas > 818 && adc_gas <= 1023) {
        lcd.setCursor(12, 1); lcd.write(255);
        lcd.setCursor(13, 1); lcd.write(255);
        lcd.setCursor(14, 1); lcd.write(255);
        lcd.setCursor(15, 1); lcd.write(255);
      }
      else {
        lcd.setCursor(12, 1); lcd.print("____");
      }
    }
    else if (data_gas == ANALOG) {
      sprintf(buff_adc_gas, "%4d", adc_gas);
      lcd.setCursor(12, 1); lcd.print(buff_adc_gas);
    }
    else if (data_gas == TEGANGAN) {
      float f_adc_gas = (float)adc_gas * 5.00 / 1023.00;
      lcd.setCursor(11, 1); lcd.print(f_adc_gas);
```

```
    lcd.setCursor(15, 1); lcd.print("V");
  }

  if (tombol == tombol_LEFT) {
    if (++susur > 2) {
      susur = 1;
    }
    delay(200);
  }

  if (tombol == tombol_RIGHT) {
    if (++data_gas > 3) {
      data_gas = 1;
    }
    delay(200);
  }

  if (tombol == tombol_SELECT) {
    mulai();
  }

  ultrasonic();                          //baca ultrasonic
}

//=========================================================
void warming_mq2() {
  byte x = 11;
  lcd.setCursor(0, 0); lcd.print("Si Pinky Unyu      ");
  lcd.setCursor(0, 1); lcd.print("Warming MQ2");
  while (1) {
    if (millis() % 125 == 0) {
      lcd.setCursor(x, 1); lcd.print(".");
      if (++x > 15) {
        x = 11;
        lcd.setCursor(x, 1); lcd.print("          ");
      }
    }
    adc_gas = baca_mq2();
    if (adc_gas < 170) {
      break;
    }
  }
}
//=========================================================
void mulai() {
  int error = 0, last_error = 0;
```

```
lcd.clear();
delay(200);
lcd.setCursor(0, 0); lcd.print("Go! PINKY...!      ");
lcd.setCursor(0, 1); lcd.print("[STOP]                  ");
//==========
while (1) {

   ultrasonic();
   if (susur == KANAN) {
      error = 8 - jarak_kanan;
      if (jarak_kanan <= 7) error = error * 3;
      if (jarak_depan <= 16) {
         setMotor(0, 0);
         delay(10);
         setMotor(-100, 100);
         delay(300);
      }
   }
   if (susur == KIRI) {
      error = jarak_kiri - 8;
      if (jarak_kanan <= 7) error = error * 3;
      if (jarak_depan <= 16) {
         setMotor(0, 0);
         delay(10);
         setMotor(100, -100);
         delay(300);
      }
   }
   int rateError = error - last_error;
   last_error = error;
   int PD = (error * 15) + (rateError * 80);
   int spKa = 110 + PD;
   int spKi = 110 - PD;
   spKa = constrain(spKa, 0, 110);
   spKi = constrain(spKi, 0, 110);
   setMotor(spKi, spKa);

   if (tombol == tombol_SELECT) break;

   adc_gas = baca_mq2();
   if (adc_gas > 200) {
      //lcd.setCursor(7, 1); lcd.print("DETECTED!");
      setMotor(0, 0);
      for (byte counter = 1; counter <= 51; ++counter) {      //buzzer
         state = !state;
```

```
            digitalWrite(buzzer, state);
            delay(50);
          }
          state = 0;
          digitalWrite(buzzer, state);
          SIM800L.write("AT+CMGF=1\r\n");
          delay(500);
          SIM800L.write("AT+CMGS=\"085788309390\"\r\n");    //085788309390
          delay(500);
          SIM800L.write("GAS Terdeteksi");
          delay(500);
          SIM800L.write((char)26);
          delay(1000);
          for (unsigned long counter = 1; counter <= 10000; ++counter) {
            adc_gas = baca_mq2();
            if (adc_gas <= 170) {
              break;
            }
            delay(1);
          }
        }

    }
    //===============
    setMotor(0, 0);
    lcd.clear();
    delay(200);
}
//=========================================================
==
void setMotor(int L, int R) {
    if (L >= 0) {
      digitalWrite(dir_kiri, LOW);
    }
    else {
      digitalWrite(dir_kiri, HIGH);
      L = L + 255;
    }

    if (R >= 0) {
      digitalWrite(dir_kanan, LOW);
    }
    else {
      digitalWrite(dir_kanan, HIGH);
      R = R + 255;
    }
```

```
  analogWrite(pwm_kiri, L);
  analogWrite(pwm_kanan, R);
}
//=========================================================
==
void ultrasonic() {
  digitalWrite(trigger_depan, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigger_depan, LOW);
  jarak_depan = pulseIn(echo_depan, HIGH) / 58;

  if (susur == KANAN) {
    digitalWrite(trigger_kanan, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigger_kanan, LOW);
    jarak_kanan = pulseIn(echo_kanan, HIGH) / 58;
    jarak_kiri = 0;
  }
  else if (susur == KIRI) {
    digitalWrite(trigger_kiri, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigger_kiri, LOW);
    jarak_kiri = pulseIn(echo_kiri, HIGH) / 58;
    jarak_kanan = 0;
  }
  //delay(10);
}
//=========================================================
==
byte baca_tombol() {
  unsigned int adc_tombol = analogRead(A2);
  if (adc_tombol >= 0 && adc_tombol <= 50) {
    return tombol_RIGHT;
  }
  else if (adc_tombol >= 51 && adc_tombol <= 250) {
    return tombol_UP;
  }
  else if (adc_tombol >= 251 && adc_tombol <= 450) {
    return tombol_DOWN;
  }
  else if (adc_tombol >= 451 && adc_tombol <= 650) {
    return tombol_LEFT;
  }
  else if (adc_tombol >= 651 && adc_tombol <= 850) {
    return tombol_SELECT;
```

```
    }
    else {
        return tidak_ditekan;
    }
}
//=============================================================
==
unsigned int baca_mq2() {
    return analogRead(A0);
}
```