Program

```
#define btn_Ok 22       //Push Button Ok
pada robot
#define btn_Up 23       //Push Button Up
pada robot
#define btn_Down 24  //Push Button
Down pada robot

#define tgs_kanan A0
#define tgs_depan A2
#define tgs_kiri A3
#define tgs_skiri A5
#define tgs_skanan A7

#define xbee Serial2
#define pinRSSI 36

#include <EEPROM.h>
#include <Wire.h>
#include <LCD.h>
#include <LiquidCrystal_I2C.h>
//Library LCD I2C
#include "MPU6050.h"
#include "I2Cdev.h"

#include <HMC5883L.h>
//Library Compass

#define I2C_ADDR    0x3F        //LCD
(jika tidak bisa 3F ganti 27F)
#define BACKLIGHT_PIN   3
#define En_pin  2
#define Rw_pin  1
#define Rs_pin  0
#define D4_pin  4
#define D5_pin  5
#define D6_pin  6
#define D7_pin  7

LiquidCrystal_I2C lcd(I2C_ADDR,
En_pin, Rw_pin, Rs_pin, D4_pin,
D5_pin, D6_pin, D7_pin);

#define trig_kiri 28
#define echo_kiri 26
#define trig_skiri 35
#define echo_skiri 33
#define trig_depan 41         //Sensor
Ultrasonik
#define echo_depan 39
#define trig_skanan 47
#define echo_skanan 45
#define trig_kanan 53
#define echo_kanan 51

#define in1_kk 46
#define in2_kk 44
#define in3_kk 50
#define in4_kk 52
#define ena_kk 12
#define enb_kk 13

#define in1_db 32
#define in2_db 34
#define in3_db 38
#define in4_db 40
#define ena_db 9
#define enb_db 10

int jarak_depan;            //variabel
bilangan bulat
int jarak_kanan;
int jarak_kiri;
int jarak_skanan;
int jarak_skiri;
int arah  = 0;
int gas_depan, gas_kiri, gas_kanan,
gas_skiri, gas_skanan;
//0 depan
//1 kiri
//2 kanan

HMC5883L compass;

float Kp, Ki, Kd, Speed, Sp;  //variabel
berkoma
float error, jumlah_error, selisih_error,
error_sebelumnya;
float P, I, D, PID;
byte menu = 1;
float heading;
float headingDegrees;
long waktu_mulai;

#define waktu_batas 5000

#define jarak_aman 30

//fuzzy variabel
int pwm_spelan = 0;
int pwm_pelan  = 100;
int pwm_medium = 150;
int pwm_cepat  = 200;
int pwm_scepat = 250;
```

```
int kondisi[2] ;
double kecepatanKanan = 0;
double kecepatanKiri = 0;
double ka_dksmall ;
double ka_dkmedium ;
double ka_dkbig ;
double ska_dksmall ;
double ska_dkmedium ;
double ska_dkbig ;
double ki_dksmall ;
double ki_dkmedium ;
double ki_dkbig ;
double ski_dksmall ;
double ski_dkmedium ;
double ski_dkbig ;
double d_dksmall ;
double d_dkmedium ;
double d_dkbig ;
double jarak1;
double jarak2;
double jarak3;
double wz_kiri, wz_kanan , w;

int gsmall = 60 ;
int gmedium = 120 ;
int gbig = 250 ;

long rssi = 0;

void setup() {
// put your setup code here, to run once:
  Serial.begin(9600);
  xbee.begin(9600);

  lcd.begin (16, 2);


lcd.setBacklightPin(BACKLIGHT_PIN,
POSITIVE);   //LCD
  lcd.setBacklight(HIGH);
  lcd.home ();

  pinMode(btn_Ok, INPUT_PULLUP);
//Push Button
  pinMode(btn_Up, INPUT_PULLUP);
  pinMode(btn_Down,
INPUT_PULLUP);

  pinMode(pinRSSI, INPUT);


  pinMode(tgs_kanan, INPUT);
  pinMode(tgs_depan, INPUT);
  pinMode(tgs_kiri, INPUT);


  pinMode(in1_db, OUTPUT);
  pinMode(in2_db, OUTPUT);
  pinMode(in3_db, OUTPUT);
  pinMode(in4_db, OUTPUT);
  pinMode(ena_db, OUTPUT);
  pinMode(enb_db, OUTPUT);


  pinMode(in1_kk, OUTPUT);
  pinMode(in2_kk, OUTPUT);
  pinMode(in3_kk, OUTPUT);
  pinMode(in4_kk, OUTPUT);
  pinMode(ena_kk, OUTPUT);
  pinMode(enb_kk, OUTPUT);

  pinMode( trig_kiri, OUTPUT);
  pinMode(echo_kiri, INPUT);
  pinMode( trig_skiri, OUTPUT);
  pinMode(echo_skiri, INPUT);
  pinMode( trig_depan, OUTPUT);
  pinMode(echo_depan, INPUT);
  pinMode( trig_skanan, OUTPUT);
  pinMode(echo_skanan, INPUT);
  pinMode( trig_kanan, OUTPUT);
  pinMode(echo_kanan, INPUT);

  //buka komen ini jika ingin set semua
variabel menjadi 0
  //  Kp = 0;
  //  Kd = 0;
  //  Ki = 0;
  //  Sp = 0;
  //  Speed = 0;
  //  simpan_semua();


  set_variabel();
  // Initialize Initialize HMC5883L
  Serial.println("Initialize HMC5883L");
//Kompas
  while (!compass.begin())
  {
    Serial.println("Could not find a valid
HMC5883L sensor, check wiring!");
    delay(500);
  }

  // Set measurement range
```

```
compass.setRange(HMC5883L_RANGE_1_3GA);

  // Set measurement mode

compass.setMeasurementMode(HMC5883L_CONTINOUS);

  // Set data rate

compass.setDataRate(HMC5883L_DATARATE_30HZ);

  // Set number of samples averaged

compass.setSamples(HMC5883L_SAMPLES_8);

  // Set calibration offset. See HMC5883L_calibration.ino
  compass.setOffset(35, -248);

}

void loop() {
  tampil_menu();
  // put your main code here, to run repeatedly:
  while (1) {                         //Baca depan sensor ultrasonik
    if (digitalRead(btn_Ok) == 0) {
      delay(1000);
      if (menu == 2)random_move();
      else if (menu == 3)setKp();
      else if (menu == 4)setKd();
      else if (menu == 5)setKi();
      else if (menu == 6)setSp();
      else if (menu == 7)setSpd();
      else if (menu == 8) tampil_sensor();
      else if (menu == 9) tampil_kompas();
      else if (menu == 10) baca_gas();
      else if (menu == 11) random_move2();

    }

    if (digitalRead(btn_Up) == 0) {
      delay(200);
      menu = menu + 1;
      if (menu > 11)menu = 1;
      tampil_menu();
    }
    if (digitalRead(btn_Down) == 0) {
      delay(200);
      menu = menu - 1;
      if (menu < 1)menu = 11;
      tampil_menu();
    }
  }
  //
  //  baca_depan();
  //  delay(500);
  //  baca_kanan();
  //  delay(500);
  //  baca_kiri();
  //  delay(500);
}

long microsecondsToCentimeters (long microseconds)
{
  return microseconds / 29 / 2;
}

void baca_gas() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Baca Gas       ");

  while (digitalRead(btn_Ok) == 1) {
    gas_depan = analogRead(tgs_depan);
    gas_kiri = analogRead(tgs_kiri);
    gas_kanan = analogRead(tgs_kanan);
    gas_skiri = analogRead(tgs_skiri);
    gas_skanan = analogRead(tgs_skanan);

    lcd.setCursor(0, 0);
    lcd.print(gas_skanan); lcd.print("    ");
    lcd.setCursor(0, 1);
    lcd.print(gas_kanan); lcd.print("    ");
    lcd.setCursor(5, 1);
    lcd.print(gas_depan); lcd.print("    ");
    lcd.setCursor(10, 1);
    lcd.print(gas_kiri); lcd.print("    ");
    lcd.setCursor(10, 0);
    lcd.print(gas_skiri); lcd.print("    ");

  }


  delay(1000);

  tampil_menu();
```

```
}

void tampil_sensor() {
//tampil sensor ultrasonik
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Baca Sensor       ");


  while (digitalRead(btn_Ok) == 1) {


    baca_skanan ();
    baca_kanan ();
    baca_depan ();
    baca_kiri ();
    baca_skiri ();

    lcd.setCursor(0, 1);
    lcd.print(jarak_kiri); lcd.print("    ");
    lcd.setCursor(0, 0);
    lcd.print(jarak_skiri); lcd.print("    ");
    lcd.setCursor(5, 0);
    lcd.print(jarak_depan); lcd.print("
");
    lcd.setCursor(10, 1);
    lcd.print(jarak_kanan); lcd.print("
");
    lcd.setCursor(10, 0);
    lcd.print(jarak_skanan); lcd.print("
");

  }

  delay(1000);

  tampil_menu();
}


void baca_kompas()
//baca sensor kompas
{
  Vector norm =
compass.readNormalize();

  // Calculate heading
  heading = atan2(norm.YAxis,
norm.XAxis);

  // Set declination angle on your
location and fix heading
  // You can find your declination on:
http://magnetic-declination.com/
  // (+) Positive or (-) for negative
  // For Bytom / Poland declination angle
is 4'26E (positive)
  // Formula: (deg + (min / 60.0)) / (180 /
M_PI);
  float declinationAngle = (4.0 + (26.0 /
60.0)) / (180 / M_PI);
  heading += declinationAngle;

  // Correct for heading < 0deg and
heading > 360deg
  if (heading < 0)
  {
    heading += 2 * PI;
  }

  if (heading > 2 * PI)
  {
    heading -= 2 * PI;
  }

  // Convert to degrees
  headingDegrees = heading * 180 /
M_PI;

  // Output
  Serial.print(" Heading = ");
  Serial.print(heading);
  Serial.print(" Degress = ");
  Serial.print(headingDegrees);
  Serial.println();

  delay(100);
}

void tampil_kompas() {
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Baca Kompas       ");


  while (digitalRead(btn_Ok) == 1) {
    baca_kompas ();
    lcd.setCursor(0, 1);
    lcd.print(heading); lcd.print("    ");
    lcd.setCursor(5, 1);
    lcd.print(headingDegrees); lcd.print("
");
  }

  delay(1000);
```

```
  tampil_menu();
}


void tampil_menu () {

 lcd.clear();
 if (menu == 1) {
   //Serial.println ("C-Fire");
   lcd.setCursor(0, 0);
   lcd.print("C-Balancer     ");
   delay(200);
   //lcd.print("== Bismillah ==");
   //lcd.setCursor(0,1);
   delay(20);

 }

 if (menu == 2) {
   //Serial.println ("Start Kiri");
   lcd.setCursor(0, 0);
   lcd.print("Fuzzy 3       ");
   delay(200);

 }


 if (menu == 3) {

   //Serial..println ("KP");
   lcd.setCursor (0, 0);
   lcd.print("Setting KP     ");
   delay(200);
 }


 if (menu == 4) {

   //Serial..println ("KD");
   lcd.setCursor (0, 0);
   lcd.print("Setting KD     ");
   delay(200);
 }


 if (menu == 5) {

   //Serial..println ("KI");
   lcd.setCursor (0, 0);
   lcd.print("Setting KI     ");
   delay(200);
}


if (menu == 6) {

  //Serial.println ("Set Point");
  lcd.setCursor (0, 0);
  lcd.print("Set Point      ");
  delay(200);
}


if (menu == 7) {

  //Serial..println ("Speed");
  lcd.setCursor (0, 0);
  lcd.print("Speed          ");
  delay(200);
}


if (menu == 8) {

  //Serial..println ("Baca Sensor");
  lcd.setCursor (0, 0);
  lcd.print("Baca Sensor    ");
  delay(200);
}

if (menu == 9) {

  //Serial..println ("Baca Kompas");
  lcd.setCursor (0, 0);
  lcd.print("Baca Kompas    ");
  delay(200);

}


if (menu == 10) {

  //Serial..println ("Baca Kompas");
  lcd.setCursor (0, 0);
  lcd.print("Baca Gas    ");
  delay(200);

}

  if (menu == 11) {

  //Serial..println ("Baca Kompas");
  lcd.setCursor (0, 0);
  lcd.print("Fuzzy 5       ");
```

```
    delay(200);

  }

}

void random_move() {
  lcd.setCursor(0, 0);
  lcd.print("FUZZY 3    ");
  delay(2000);
  int jumlah = 0;
  while (digitalRead(btn_Ok) == 1) {
    rssi = pulseIn(pinRSSI,LOW,500);
    baca_depan();
    baca_kiri();
    baca_kanan();
    baca_skiri();
    baca_skanan();
    gas_depan = analogRead(tgs_depan);
    gas_kiri = analogRead(tgs_kiri);
    gas_kanan = analogRead(tgs_kanan);
    lcd.setCursor(0, 1);
    lcd.print(gas_kiri); lcd.print(" ");
    lcd.setCursor(5, 1);
    lcd.print(gas_depan); lcd.print(" ");
    lcd.setCursor(10, 1);
    lcd.print(gas_kanan); lcd.print(" ");
    jumlah = 0;
    if (gas_depan > 200)jumlah++ ;
    if (gas_kiri > 200)jumlah++ ;
    if (gas_kanan > 200)jumlah++ ;

    if (jumlah >= 2) {
      motor_kiridp (0);
      motor_kanandp (0);
      motor_kiribk (0);
      motor_kananbk (0);
      lcd.clear();
      lcd.home();
      lcd.print("GAS SOURCE ");
      delay(10000);
      break;
    }


    fungsi_keanggotaan(gas_kanan,
gas_skanan, gas_depan, gas_skiri,
gas_kiri  );

    rule_base1();
    baca_kompas();

    xbee.print(rssi);xbee.print(",");
    xbee.print(jarak_kiri);xbee.print(",");
    xbee.print(jarak_skiri);xbee.print(",");

xbee.print(jarak_depan);xbee.print(",");

xbee.print(jarak_skanan);xbee.print(",");

xbee.print(jarak_kanan);xbee.print(",");
    xbee.print(gas_kiri);xbee.print(",");
    xbee.print(gas_skiri);xbee.print(",");
    xbee.print(gas_depan);xbee.print(",");

xbee.print(gas_skanan);xbee.print(",");
    xbee.print(gas_kanan);xbee.print(",");

xbee.print(headingDegrees);xbee.print("
,");

xbee.print(kecepatanKiri);xbee.print(",")
;
    xbee.println(kecepatanKanan);
    if (jarak_kanan < jarak_aman ||
jarak_skanan < jarak_aman ||
jarak_depan < jarak_aman  ) {
      motor_kiridp (-200);
      motor_kanandp (200);
      motor_kiribk (-200);
      motor_kananbk (200);


      while (jarak_kanan < jarak_aman ||
jarak_skanan < jarak_aman ||
jarak_depan < jarak_aman ) {
        baca_kanan();
        baca_depan();
        baca_skanan();
      }
    } else if (jarak_kiri < jarak_aman ||
jarak_skiri < jarak_aman) {
      motor_kiridp (200);
      motor_kanandp (-200);
      motor_kiribk (200);
      motor_kananbk (-200);

      while (jarak_kiri < jarak_aman ||
jarak_skiri < jarak_aman ) {
        baca_kiri();
        baca_skiri();
      }
    } else {
      motor_kiridp (kecepatanKiri);
      motor_kanandp (kecepatanKanan);
      motor_kiribk (kecepatanKiri);
```

```
      motor_kananbk (kecepatanKanan);

    }


  }


  henti();
  delay(1000);
  tampil_menu();
}



void random_move2() {
  lcd.setCursor(0, 0);
  lcd.print("FUZZY 5    ");
  delay(2000);
  int jumlah = 0;
  while (digitalRead(btn_Ok) == 1) {

    rssi = pulseIn(pinRSSI,LOW,500);
    baca_depan();
    baca_kiri();
    baca_kanan();
    baca_skiri();
    baca_skanan();
    gas_depan = analogRead(tgs_depan);
    gas_kiri = analogRead(tgs_kiri);
    gas_skiri = analogRead(tgs_skiri);
    gas_kanan = analogRead(tgs_kanan);
    gas_skanan =
analogRead(tgs_skanan);

    lcd.setCursor(0, 0);
    lcd.print(gas_skiri); lcd.print(" ");
    lcd.setCursor(0, 1);
    lcd.print(gas_kiri); lcd.print(" ");
    lcd.setCursor(5, 1);
    lcd.print(gas_depan); lcd.print(" ");
    lcd.setCursor(10, 0);
    lcd.print(gas_skanan); lcd.print(" ");
    lcd.setCursor(10, 1);
    lcd.print(gas_kanan); lcd.print(" ");



    jumlah = 0;
    if (gas_depan > 220)jumlah++ ;
    if (gas_kiri > 220)jumlah++ ;
    if (gas_kanan > 220)jumlah++ ;
    if (gas_skiri > 220)jumlah++ ;
    if (gas_skanan > 220)jumlah++ ;

    if (jumlah >= 2) {
      motor_kiridp (0);
      motor_kanandp (0);
      motor_kiribk (0);
      motor_kananbk (0);
      lcd.clear();
      lcd.home();
      lcd.print("GAS SOURCE ");

      delay(10000);
      break;
    }


    fungsi_keanggotaan(gas_kanan,
gas_skanan, gas_depan, gas_skiri,
gas_kiri  );
    rule_base2();
    baca_kompas();

    xbee.print(rssi);xbee.print(",");
    xbee.print(jarak_kiri);xbee.print(",");
    xbee.print(jarak_skiri);xbee.print(",");

xbee.print(jarak_depan);xbee.print(",");

xbee.print(jarak_skanan);xbee.print(",");

xbee.print(jarak_kanan);xbee.print(",");
    xbee.print(gas_kiri);xbee.print(",");
    xbee.print(gas_skiri);xbee.print(",");
    xbee.print(gas_depan);xbee.print(",");

xbee.print(gas_skanan);xbee.print(",");
    xbee.print(gas_kanan);xbee.print(",");

xbee.print(headingDegrees);xbee.print("
,");

xbee.print(kecepatanKiri);xbee.print(",")
;

xbee.println(kecepatanKanan);xbee.print
(",");
    if (jarak_kanan < jarak_aman ||
jarak_skanan < jarak_aman ||
jarak_depan < jarak_aman  ) {
      motor_kiridp (-200);
      motor_kanandp (200);
      motor_kiribk (-200);
      motor_kananbk (200);
```

```
      while (jarak_kanan < jarak_aman ||
jarak_skanan < jarak_aman ||
jarak_depan < jarak_aman ) {
        baca_kanan();
        baca_depan();
        baca_skanan();
       }
    } else if (jarak_kiri < jarak_aman ||
jarak_skiri < jarak_aman) {
      motor_kiridp (200);
      motor_kanandp (-200);
      motor_kiribk (200);
      motor_kananbk (-200);

      while (jarak_kiri < jarak_aman ||
jarak_skiri < jarak_aman ) {
        baca_kiri();
        baca_skiri();
       }
    } else {
      motor_kiridp (kecepatanKiri);
      motor_kanandp (kecepatanKanan);
      motor_kiribk (kecepatanKiri);
      motor_kananbk (kecepatanKanan);


    }


  }


  henti();
  delay(1000);
  tampil_menu();
}

void start_robot() {
  error = 0;
  jumlah_error = 0;
  selisih_error = 0;
  error_sebelumnya = 0;
  set_variabel();
  lcd.setCursor(0, 0);
  lcd.print("ROBOT GO     ");
  delay(2000);
  while (digitalRead(btn_Ok) == 1) {
    baca_depan();
    baca_kiri();
    baca_kanan();
    baca_skiri();
    baca_skanan();
    gas_depan = analogRead(tgs_depan);
    gas_kiri = analogRead(tgs_kiri);
    gas_kanan = analogRead(tgs_kanan);


    if (jarak_depan < jarak_aman) {
     if (jarak_kiri < jarak_kanan) {
       arah  = 2;
     } else {
       arah  = 1;
     }

    } else if (jarak_kiri < jarak_aman) {
     if (jarak_depan > jarak_aman) {
       arah  = 0;
     } else {
       arah = 2;
     }
    } else if (jarak_kanan < jarak_aman)
{
     if (jarak_depan > jarak_aman) {
       arah  = 0;
     } else {
       arah = 1;
     }
    }

//xbee.print(analogRead(tgs2600));xbee.
print(",");xbee.print(analogRead(tgs260
2));xbee.print(",");xbee.println(analogRe
ad(tgs2620));
    baca_kompas();
    error = headingDegrees - Sp;
    jumlah_error += (0.001 * error);
    selisih_error = error -
error_sebelumnya;
    error_sebelumnya = error;

    P = Kp * error;
    D = Kd * selisih_error;
    I = Ki * jumlah_error;

    PID = P + I + D;

    if (arah == 0 ) {
      //      motor_kiri(Speed + PID);
      //      motor_kanan(Speed - PID);
      //      motor_depan(0);
      //      motor_belakang(0);

    } else if (arah == 1) {
      //      motor_kiri(0);
      //      motor_kanan(0);
```

```
    //      motor_depan(Speed + PID);
    //      motor_belakang(Speed - PID);

   } else {
    //      motor_kiri(0);
    //      motor_kanan(0);
    //      motor_depan(Speed - PID);
    //      motor_belakang(Speed + PID);
   }

   lcd.setCursor(0, 1);
   lcd.print("PID="); lcd.print(PID);
lcd.print("    ");

  }


 henti();
 tampil_menu();
}

void henti() {

 motor_kiridp(0);
 motor_kanandp(0);
 motor_kiribk(0);
 motor_kananbk(0);
}

void save_eeprom(int direccion, float
num)
{
 long valor = num * 10000;

 byte cuatro = (valor & 0xFF);
 byte tres = ((valor >> 8) & 0xFF);
 byte dos = ((valor >> 16) & 0xFF);
 byte uno = ((valor >> 24) & 0xFF);

 EEPROM.write(direccion, cuatro);
 EEPROM.write(direccion + 1, tres);
 EEPROM.write(direccion + 2, dos);
 EEPROM.write(direccion + 3, uno);
}

float load_eeprom(long direccion)
{

 long cuatro =
EEPROM.read(direccion);
 long tres = EEPROM.read(direccion +
1);
 long dos = EEPROM.read(direccion +
2);
 long uno = EEPROM.read(direccion +
3);

 float num = ((cuatro << 0) & 0xFF) +
((tres << 8) & 0xFFFF) + ((dos << 16)
& 0xFFFFFF) + ((uno << 24) &
0xFFFFFFFF);
 return (num / 10000);
}

void simpan_semua ()
{


 save_eeprom (0, Kp);
 save_eeprom (4, Kd);
 save_eeprom (8, Ki);
 save_eeprom (12, Sp);
 save_eeprom (16, Speed);



 //Serial.println("SimpanOK");
}

void set_variabel()
{

 Kp = load_eeprom(0);
 Kd = load_eeprom(4);
 Ki = load_eeprom(8);
 Sp = load_eeprom(12);
 Speed = load_eeprom(16);


 //Serial.println("Variables
inicializadas");
}

void setKp() {
 lcd.setCursor(0, 0);
 lcd.print("               ");
 lcd.setCursor(0, 0);
 lcd.print(Kp);

 while (digitalRead(btn_Ok) == 1) {
  if (digitalRead(btn_Up) == 0) {
    delay(20);
    Kp = Kp + 0.01;
    lcd.setCursor(0, 0);
    lcd.print(Kp);
```

```
      lcd.print("  ");
    }
    if (digitalRead(btn_Down) == 0) {
      delay(20);
      Kp = Kp - 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Kp);
      lcd.print("  ");
    }
  }
  delay (1000);
  lcd.setCursor(0, 0);
  lcd.print("Set KP Selesai");
  simpan_semua();
  delay(1000);


  tampil_menu();

}

void setKd() {
  lcd.setCursor(0, 0);
  lcd.print("                ");
  lcd.setCursor(0, 0);
  lcd.print(Kd);

  while (digitalRead(btn_Ok) == 1) {
    if (digitalRead(btn_Up) == 0) {
      delay(20);
      Kd = Kd + 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Kd);
      lcd.print("  ");
    }
    if (digitalRead(btn_Down) == 0) {
      delay(20);
      Kd = Kd - 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Kd);
      lcd.print("  ");
    }
  }
  delay (1000);
  lcd.setCursor(0, 0);
  lcd.print("Set KD Selesai");
  simpan_semua();
  delay (1000);


  tampil_menu();
}

void setKi() {
  lcd.setCursor(0, 0);
  lcd.print("                ");
  lcd.setCursor(0, 0);
  lcd.print(Ki);

  while (digitalRead(btn_Ok) == 1) {
    if (digitalRead(btn_Up) == 0) {
      delay(20);
      Ki = Ki + 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Ki);
      lcd.print("  ");
    }
    if (digitalRead(btn_Down) == 0) {
      delay(20);
      Ki = Ki - 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Ki);
      lcd.print("  ");
    }
  }
  delay (1000);
  lcd.setCursor(0, 0);
  lcd.print("Set KI Selesai");
  simpan_semua();
  delay (1000);


  tampil_menu();
}

void setSp() {
  lcd.setCursor(0, 0);
  lcd.print("                ");
  lcd.setCursor(0, 0);
  lcd.print(Sp);

  while (digitalRead(btn_Ok) == 1) {
    if (digitalRead(btn_Up) == 0) {
      delay(20);
      Sp = Sp + 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Sp);
      lcd.print("  ");
    }
    if (digitalRead(btn_Down) == 0) {
      delay(20);
      Sp = Sp - 0.01;
      lcd.setCursor(0, 0);
      lcd.print(Sp);
      lcd.print("  ");
    }
```

```
  }
  delay (1000);
  lcd.setCursor(0, 0);
  lcd.print("Set Sp Selesai");
  simpan_semua();
  delay (1000);


  tampil_menu();
}

void setSpd() {
  lcd.setCursor(0, 0);
  lcd.print("                ");
  lcd.setCursor(0, 0);
  lcd.print(Speed);

  while (digitalRead(btn_Ok) == 1) {
    if (digitalRead(btn_Up) == 0) {
      delay(20);
      Speed = Speed + 1;
      lcd.setCursor(0, 0);
      lcd.print(Speed);
      lcd.print("  ");
    }
    if (digitalRead(btn_Down) == 0) {
      delay(20);
      Speed = Speed - 1;
      lcd.setCursor(0, 0);
      lcd.print(Speed);
      lcd.print("  ");
    }
  }
  delay (1000);
  lcd.setCursor(0, 0);
  lcd.print("Set Spd Selesai");
  simpan_semua();
  delay(1000);


  tampil_menu();
}


void motor_kiridp(int v) {

  if (v == 0) {
    digitalWrite(in1_kk, 1);
    digitalWrite(in2_kk, 1);

  } else if (v > 0) {
    if (v > 255)v = 255;
    digitalWrite(in1_kk, 1);
    digitalWrite(in2_kk, 0);
    analogWrite(ena_kk, v);
  } else {
    v = abs(v);
    if (v > 255)v = 255;
    digitalWrite(in1_kk, 0);
    digitalWrite(in2_kk, 1);
    analogWrite(ena_kk, v);
  }

  // put your main code here, to run
repeatedly:

}

void motor_kananbk(int v) {

  if (v == 0) {
    digitalWrite(in3_kk, 1);
    digitalWrite(in4_kk, 1);

  } else if (v > 0) {
    if (v > 255)v = 255;
    digitalWrite(in3_kk, 1);
    digitalWrite(in4_kk, 0);
    analogWrite(enb_kk, v);
  } else {
    v = abs(v);
    if (v > 255)v = 255;
    digitalWrite(in3_kk, 0);
    digitalWrite(in4_kk, 1);
    analogWrite(enb_kk, v);
  }

  // put your main code here, to run
repeatedly:

}

void motor_kiribk(int v) {

  if (v == 0) {
    digitalWrite(in1_db, 1);
    digitalWrite(in2_db, 1);

  } else if (v > 0) {
    if (v > 255)v = 255;
    digitalWrite(in1_db, 1);
    digitalWrite(in2_db, 0);
    analogWrite(ena_db, v);
  } else {
    v = abs(v);
    if (v > 255)v = 255;
```

```
    digitalWrite(in1_db, 0);
    digitalWrite(in2_db, 1);
    analogWrite(ena_db, v);
  }

  // put your main code here, to run repeatedly:

}

void motor_kanandp(int v) {

  if (v == 0) {
    digitalWrite(in3_db, 1);
    digitalWrite(in4_db, 1);

  } else if (v > 0) {
    if (v > 255)v = 255;
    digitalWrite(in3_db, 1);
    digitalWrite(in4_db, 0);
    analogWrite(enb_db, v);
  } else {
    v = abs(v);
    if (v > 255)v = 255;
    digitalWrite(in3_db, 0);
    digitalWrite(in4_db, 1);
    analogWrite(enb_db, v);
  }

  // put your main code here, to run repeatedly:

}


void baca_depan() {                 //Baca depan sensor ultrasonik
  digitalWrite(trig_depan, LOW);
  delay(2);
  digitalWrite(trig_depan, HIGH);
  delay(5);
  digitalWrite(trig_depan, LOW);
  jarak_depan = pulseIn(echo_depan, HIGH);
  jarak_depan = microsecondsToCentimeters(jarak_depan);
  if (jarak_depan < 0 ) jarak_depan = 100;
  Serial.print("DEPAN=");
  Serial.println(jarak_depan);
}

void baca_kanan() {                 //Baca kanan sensor ultrasonik
  digitalWrite(trig_kanan, LOW);
  delay(2);
  digitalWrite(trig_kanan, HIGH);
  delay(5);
  digitalWrite(trig_kanan, LOW);
  jarak_kanan = pulseIn(echo_kanan, HIGH);
  jarak_kanan = microsecondsToCentimeters(jarak_kanan);
  if (jarak_kanan < 0 ) jarak_kanan = 100;
  Serial.print("KANAN=");
  Serial.println(jarak_kanan);
}
void baca_skanan() {                //Baca kanan sensor ultrasonik
  digitalWrite(trig_skanan, LOW);
  delay(2);
  digitalWrite(trig_skanan, HIGH);
  delay(5);
  digitalWrite(trig_skanan, LOW);
  jarak_skanan = pulseIn(echo_skanan, HIGH);
  jarak_skanan = microsecondsToCentimeters(jarak_skanan);
  if (jarak_skanan < 0 ) jarak_skanan = 100;
  Serial.print("Serong KANAN=");
  Serial.println(jarak_skanan);
}


void baca_kiri() {                  //Baca kiri sensor ultrasonik
  digitalWrite(trig_kiri, LOW);
  delay(2);
  digitalWrite(trig_kiri, HIGH);
  delay(5);
  digitalWrite(trig_kiri, LOW);
  jarak_kiri = pulseIn(echo_kiri, HIGH);
  jarak_kiri = microsecondsToCentimeters(jarak_kiri);
  if (jarak_kiri < 0 ) jarak_kiri = 100;
  Serial.print("KIRI=");
  Serial.println(jarak_kiri);
}
```

```
void baca_skiri() {                    //Baca kiri sensor ultrasonik
  digitalWrite(trig_skiri, LOW);
  delay(2);
  digitalWrite(trig_skiri, HIGH);
  delay(5);
  digitalWrite(trig_skiri, LOW);
  jarak_skiri = pulseIn(echo_skiri, HIGH);
  jarak_skiri = microsecondsToCentimeters(jarak_skiri);
  if (jarak_skiri < 0 ) jarak_skiri = 100;
  Serial.print("Serong KIRI=");
  Serial.println(jarak_skiri);
}

//fuzzy function
void fungsi_keanggotaan(int gas1, int gas2, int gas3, int gas4, int gas5) {
  ka_dksmall = derajat_keanggotaan_small(gas1);
  ka_dkmedium = derajat_keanggotaan_medium(gas1);
  ka_dkbig = derajat_keanggotaan_big(gas1);

  ska_dksmall = derajat_keanggotaan_small(gas2);
  ska_dkmedium = derajat_keanggotaan_medium(gas2);
  ska_dkbig = derajat_keanggotaan_big(gas2);

  d_dksmall = derajat_keanggotaan_small(gas3);
  d_dkmedium = derajat_keanggotaan_medium(gas3);
  d_dkbig = derajat_keanggotaan_big(gas3);

  ski_dksmall = derajat_keanggotaan_small(gas4);
  ski_dkmedium = derajat_keanggotaan_medium(gas4);
  ski_dkbig = derajat_keanggotaan_big(gas4);

  ki_dksmall = derajat_keanggotaan_small(gas5);
  ki_dkmedium = derajat_keanggotaan_medium(gas5);
  ki_dkbig = derajat_keanggotaan_big(gas5);

}

void rule_base2() {
  wz_kanan = 0;
  wz_kiri = 0;
  w = 0;
  kondisi [0] = 0; //kanan
  kondisi [1] = 0; //kiri
  //0 pelan
  //1 medium
  //2 cepat
  //kiri kanan

  if (ki_dksmall > 0 && ski_dksmall > 0 && d_dksmall > 0 && ska_dksmall > 0 && ka_dksmall > 0 ) {  //1
    defuzzyfikasi2(ki_dksmall, ski_dksmall, d_dksmall, ska_dksmall, ka_dksmall, 1, 1);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0 && d_dksmall > 0 && ska_dksmall > 0 && ka_dkmedium > 0 ) { //2
    defuzzyfikasi2(ki_dksmall, ski_dksmall, d_dksmall, ska_dksmall, ka_dkmedium , 2, 1);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0 && d_dksmall > 0 && ska_dksmall > 0 && ka_dkbig > 0 ) {  //3
    defuzzyfikasi2(ki_dksmall, ski_dksmall, d_dksmall, ska_dksmall, ka_dkbig, 3, 1);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0 && d_dksmall > 0 && ska_dkmedium > 0 && ka_dksmall > 0 ) { //4
    defuzzyfikasi2(ki_dksmall, ski_dksmall, d_dksmall, ska_dkmedium, ka_dksmall, 2, 0);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0 && d_dksmall > 0 && ska_dkmedium > 0 && ka_dkmedium > 0 ) { //5
```

```
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dksmall, ska_dkmedium,
ka_dkmedium, 2, 1);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //6
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dksmall, ska_dkmedium,
ka_dkbig, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //7
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dksmall, ska_dkbig,
ka_dksmall, 3, 1);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //8
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dksmall, ska_dkbig,
ka_dkmedium, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //9
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dksmall, ska_dkbig,
ka_dkbig, 4, 0);
  }



  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) { //10
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium ,
ska_dksmall, ka_dksmall, 2, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkmedium > 0 ) { //11
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium, ska_dksmall,
ka_dkmedium, 2, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkbig > 0 ) { //12
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium, ska_dksmall,
ka_dkbig, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //13
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium,
ska_dkmedium, ka_dksmall, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //14
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium,
ska_dkmedium, ka_dkmedium, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//15
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium,
ska_dkmedium, ka_dkbig, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //16
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium, ska_dkbig,
ka_dksmall, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //17
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium , ska_dkbig,
ka_dkmedium, 4, 2);
  }
```

```
  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //18
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkmedium, ska_dkbig,
ka_dkbig, 4, 3);
  }


  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //19
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dksmall,
ka_dksmall, 4, 4);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //20
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dksmall,
ka_dkmedium, 4, 4);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //21
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dksmall,
ka_dkbig, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dksmall > 0 ) { //22
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dkmedium,
ka_dksmall, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkmedium > 0 ) { //23
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dkmedium,
ka_dkmedium, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkbig > 0 ) { //24
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dkmedium,
ka_dkbig, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //25
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dkbig,
ka_dksmall, 4, 2);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //26
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dkbig,
ka_dkmedium, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //27
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dkbig, ska_dkbig,
ka_dkbig, 4, 0);
  }


  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) { //28
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall, ska_dksmall,
ka_dksmall, 0, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dkmedium > 0 ) { //29
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkmedium, 2, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dkbig > 0 ) { //30
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkbig, 3, 2);
```

```
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //31
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dksmall, 2, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //32
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dkmedium, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//33
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dkbig, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 && ska_dkbig >
0 && ka_dksmall > 0 ) { //34
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dksmall, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 && ska_dkbig >
0 && ka_dkmedium > 0 ) { //35
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium , d_dksmall, ska_dkbig,
ka_dkmedium , 4, 1);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dksmall > 0 && ska_dkbig >
0 && ka_dkbig > 0 ) { //36
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dkbig, 4, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 &&
ska_dksmall > 0 && ka_dksmall > 0 ) {
//37
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dksmall, 1, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 &&
ska_dksmall > 0 && ka_dkmedium > 0
) { //38
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dkmedium, 2, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 &&
ska_dksmall > 0 && ka_dkbig > 0 ) {
//39
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dkbig, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //40
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dksmall, 2, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //41
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dkmedium, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//42
```

```
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dkbig, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 && ska_dkbig
> 0 && ka_dksmall > 0 ) { //43
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dkbig, ka_dksmall, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 && ska_dkbig
> 0 && ka_dkmedium > 0 ) { //44
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dkbig, ka_dkmedium, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkmedium > 0 && ska_dkbig
> 0 && ka_dkbig > 0 ) { //45
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkmedium,
ska_dkbig, ka_dkbig, 4, 2);
  }



  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dksmall > 0 ) { //46
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dksmall, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dkmedium > 0 ) { //47
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkmedium, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dkbig > 0 ) { //48
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkbig, 3, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dkmedium
> 0 && ka_dksmall > 0 ) { //49
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dksmall, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dkmedium
> 0 && ka_dkmedium > 0 ) { //50
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dkmedium, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //51
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dkbig, 4, 2);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //52
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dksmall, 4, 1);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //53
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dkmedium, 4, 1);
  }

  if (ki_dksmall > 0 && ski_dkmedium
> 0 && d_dkbig > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //54
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dkbig, 4, 0);
  }
```

```
  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //55
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dksmall, ka_dksmall, 0,
4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //56
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dksmall, ka_dkmedium,
0, 3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //57
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dksmall, ka_dkbig, 3,
3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dksmall > 0 ) { //58
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dkmedium, ka_dksmall,
2, 3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkmedium > 0 ) { //59
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dkmedium,
ka_dkmedium, 2, 2);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //60
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dkmedium, ka_dkbig, 3,
3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //61
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dkbig, ka_dksmall, 4,
4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //62
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dkbig, ka_dkmedium, 4,
4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //63
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dksmall, ska_dkbig, ka_dkbig, 4, 0);
  }



  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) { //64
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dksmall, ka_dksmall,
3, 4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkmedium > 0 ) { //65
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dksmall,
ka_dkmedium, 3, 3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkbig > 0 ) { //66
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dksmall, ka_dkbig, 3,
2);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //67
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dkmedium,
ka_dksmall, 3, 3);
```

```
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //68
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dkmedium,
ka_dkmedium, 4, 4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//69
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dkmedium, ka_dkbig,
4, 4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //70
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dkbig, ka_dksmall, 3,
3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //71
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dkbig, ka_dkmedium,
4, 4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //72
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkmedium, ska_dkbig, ka_dkbig, 4,
3);
  }



  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //73
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dksmall, ka_dksmall, 2,
4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //74
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dksmall, ka_dkmedium, 1,
4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //75
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dksmall, ka_dkbig, 4, 4);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dksmall > 0 ) { //76
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dkmedium, ka_dksmall, 4,
3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkmedium > 0 ) { //77
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dkmedium, ka_dkmedium,
4, 2);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkbig > 0 ) { //78
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dkmedium, ka_dkbig, 4,
0);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //79
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dkbig, ka_dksmall, 4, 3);
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //80
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dkbig, ka_dkmedium, 4,
0);
```

```
  }

  if (ki_dksmall > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //81
    defuzzyfikasi2(ki_dksmall, ski_dkbig,
d_dkbig, ska_dkbig, ka_dkbig, 4, 3);
  }



  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) {  //82
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dksmall,
ka_dksmall, 0, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 && ska_dksmall
> 0 && ka_dkmedium > 0 ) { //83
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dksmall,
ka_dkmedium, 1, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 && ska_dksmall
> 0 && ka_dkbig > 0 ) {  //84
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dksmall,
ka_dkbig, 2, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //85
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dkmedium,
ka_dksmall, 1, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //86
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dkmedium,
ka_dkmedium, 3, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//87
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dkmedium,
ka_dkbig, 3, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 && ska_dkbig >
0 && ka_dksmall > 0 ) { //88
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dkbig,
ka_dksmall, 3, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 && ska_dkbig >
0 && ka_dkmedium > 0 ) { //89
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dkbig,
ka_dkmedium, 3, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dksmall > 0 && ska_dkbig >
0 && ka_dkbig > 0 ) { //90
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dksmall, ska_dkbig,
ka_dkbig, 3, 0);
  }



  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 &&
ska_dksmall > 0 && ka_dksmall > 0 ) {
//91
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium, ska_dksmall,
ka_dksmall, 1, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 &&
ska_dksmall > 0 && ka_dkmedium > 0
) { //92
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium, ska_dksmall,
ka_dkmedium, 2, 2);
  }
```

```
  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 &&
ska_dksmall > 0 && ka_dkbig > 0 ) {
//93
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium, ska_dksmall,
ka_dkbig, 3, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //94
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium,
ska_dkmedium, ka_dksmall, 3, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //95
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium,
ska_dkmedium, ka_dkmedium, 3, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//96
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium,
ska_dkmedium, ka_dkbig, 3, 0);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 && ska_dkbig
> 0 && ka_dksmall > 0 ) { //97
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium, ska_dkbig,
ka_dksmall, 3, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 && ska_dkbig
> 0 && ka_dkmedium > 0 ) { //98
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium, ska_dkbig,
ka_dkmedium, 3, 1);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkmedium > 0 && ska_dkbig
> 0 && ka_dkbig > 0 ) { //99
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkmedium, ska_dkbig,
ka_dkbig, 3, 0);
  }


  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dksmall > 0 ) { //100
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dksmall,
ka_dksmall, 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dkmedium > 0 ) { //101
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dksmall,
ka_dkmedium, 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dksmall >
0 && ka_dkbig > 0 ) { //102
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dksmall,
ka_dkbig, 4, 3);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dkmedium
> 0 && ka_dksmall > 0 ) { //103
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dkmedium,
ka_dksmall, 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dkmedium
> 0 && ka_dkmedium > 0 ) { //104
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dkmedium,
ka_dkmedium, 4, 3);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //105
```

```
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dkmedium,
ka_dkbig, 4, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //106
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dkbig,
ka_dksmall, 4, 3);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //107
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dkbig,
ka_dkmedium, 4, 2);
  }

  if (ki_dkmedium > 0 && ski_dksmall
> 0 && d_dkbig > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //108
    defuzzyfikasi2(ki_dkmedium,
ski_dksmall, d_dkbig, ska_dkbig,
ka_dkbig, 4, 1);
  }



  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dksmall > 0 && ka_dksmall >
0 ) { //109
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall, ska_dksmall,
ka_dksmall, 1, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dksmall > 0 && ka_dkmedium
> 0 ) { //110
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall, ska_dksmall,
ka_dkmedium, 2, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dksmall > 0 && ka_dkbig > 0 )
{ //111
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall, ska_dksmall,
ka_dkbig, 3, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dkmedium > 0 && ka_dksmall
> 0 ) { //112
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dksmall, 2, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dkmedium > 0 &&
ka_dkmedium > 0 ) { //113
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dkmedium, 3, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dkmedium > 0 && ka_dkbig >
0 ) { //114
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dkbig, 3, 1);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dkbig > 0 && ka_dksmall > 0 )
{ //115
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dksmall, 3, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
&& ska_dkbig > 0 && ka_dkmedium >
0 ) { //116
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dkmedium, 4, 2);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dksmall > 0
```

```
&& ska_dkbig > 0 && ka_dkbig > 0 ) {
//117
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dkbig, 4, 3);
  }



  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dksmall > 0 && ka_dksmall
> 0 ) { //118
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dksmall, 2, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dksmall > 0 &&
ka_dkmedium > 0 ) { //119
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dkmedium, 3, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dksmall > 0 && ka_dkbig >
0 ) { //120
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dkbig, 4, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dkmedium > 0 &&
ka_dksmall > 0 ) { //121
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dksmall, 4, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dkmedium > 0 &&
ka_dkmedium > 0 ) { //122
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dkmedium, 4, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dkmedium > 0 && ka_dkbig
> 0 ) { //123
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dkbig, 4, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dkbig > 0 && ka_dksmall >
0 ) { //124
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dkbig, ka_dksmall, 4, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dkbig > 0 && ka_dkmedium
> 0 ) { //125
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dkbig, ka_dkmedium, 4, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkmedium >
0 && ska_dkbig > 0 && ka_dkbig > 0 )
{ //126
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkmedium,
ska_dkbig, ka_dkbig, 4, 4);
  }



  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dksmall > 0 && ka_dksmall > 0 ) {
//127
   defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dksmall, 3, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dksmall > 0 && ka_dkmedium > 0
) { //128
```

```
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkmedium, 3, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dksmall > 0 && ka_dkbig > 0 ) {
//129
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkbig, 3, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //130
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dksmall, 3, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //131
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dkmedium, 3, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//132
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dkbig, 4, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dkbig > 0 && ka_dksmall > 0 ) {
//133
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dksmall, 4, 4);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dkbig > 0 && ka_dkmedium > 0 ) {
//134
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dkmedium, 4, 3);
  }

  if (ki_dkmedium > 0 &&
ski_dkmedium > 0 && d_dkbig > 0 &&
ska_dkbig > 0 && ka_dkbig > 0 ) {
//135
    defuzzyfikasi2(ki_dkmedium,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dkbig, 4, 2);
  }



  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //136
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dksmall,
ka_dksmall, 2, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //137
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dksmall,
ka_dkmedium , 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //138
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dksmall,
ka_dkbig, 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dksmall > 0 ) { //139
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dkmedium,
ka_dksmall, 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkmedium > 0 ) { //140
```

```
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dkmedium,
ka_dkmedium , 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //141
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dkmedium,
ka_dkbig, 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //142
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dkbig,
ka_dksmall, 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //143
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dkbig,
ka_dkmedium, 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ska_dkbig > 0 ) { //144
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dksmall, ska_dkbig,
ka_dkbig, 4, 3);
  }



  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) { //145
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium, ska_dksmall,
ka_dksmall, 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkmedium > 0 ) { //146
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium, ska_dksmall,
ka_dkmedium, 3, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkbig > 0 ) { //147
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium, ska_dksmall,
ka_dkbig, 2, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //148
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium,
ska_dkmedium, ka_dksmall, 3, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //149
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium,
ska_dkmedium, ka_dkmedium, 2, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//150
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium,
ska_dkmedium, ka_dkbig, 2, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //151
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium, ska_dkbig,
ka_dksmall, 2, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //152
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium, ska_dkbig,
ka_dkmedium, 3, 3);
  }
```

```
  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //153
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkmedium, ska_dkbig,
ka_dkbig, 4, 3);
  }



  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //154
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dksmall,
ka_dksmall, 3, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //155
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dksmall,
ka_dkmedium, 2, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //156
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dksmall,
ka_dkbig, 1, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkmedium  >
0 && ka_dksmall > 0 ) { //157
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dkmedium ,
ka_dksmall, 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkmedium > 0 ) { //158
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dkmedium ,
ka_dkmedium, 2, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkbig > 0 ) { //159
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dkmedium ,
ka_dkbig, 3, 3);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //160
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dksmall,
ka_dksmall, 3, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //161
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dksmall,
ka_dkmedium, 4, 4);
  }

  if (ki_dkmedium > 0 && ski_dkbig > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //162
    defuzzyfikasi2(ki_dkmedium,
ski_dkbig, d_dkbig, ska_dksmall,
ka_dkbig, 4, 4);
  }



  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) {  //163
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dksmall, 0,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //164
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dksmall, 2,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) {  //165
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dkbig, 3,
3);
```

```
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dksmall > 0 ) { //166
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dksmall, 2,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkmedium > 0 ) { //167
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dkmedium,
3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //168
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dkbig, 3,
1);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //169
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dksmall, 2,
2);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //170
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dkmedium,
3, 2);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //171
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dkbig, 3,
1);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) { //172
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dksmall, ka_dksmall,
2, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkmedium > 0 ) { //173
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dksmall,
ka_dkmedium, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkbig > 0 ) { //174
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dksmall, ka_dkbig, 3,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //175
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dkmedium,
ka_dksmall, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //176
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dkmedium,
ka_dkmedium, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//177
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dkmedium, ka_dkbig,
3, 3);
  }
```

```
  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //178
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dkbig, ka_dksmall, 3,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //179
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dkbig, ka_dkmedium,
3, 2);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //180
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkmedium, ska_dkbig, ka_dkbig, 4,
3);
  }



  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //181
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dksmall, ka_dksmall, 2,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //182
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dksmall, ka_dkmedium, 2,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //183
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dksmall, ka_dkbig, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dksmall > 0 ) { //184
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dksmall, ka_dksmall, 2,
3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkmedium > 0 ) { //185
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dkmedium, ka_dkmedium,
3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkbig > 0 ) { //186
    defuzzyfikasi2(ki_dksmall,
ski_dksmall, d_dksmall, ska_dksmall,
ka_dkbig, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //187
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dkbig, ka_dksmall, 4, 4);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //188
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dkbig, ka_dkmedium, 3,
4);
  }

  if (ki_dkbig > 0 && ski_dksmall > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //189
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dkbig, ska_dkbig, ka_dkbig, 4, 3);
  }



  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //190
    defuzzyfikasi2(ki_dkbig, ski_dksmall,
d_dksmall, ska_dksmall, ka_dksmall, 1,
3);
  }
```

```
  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //191
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall, ska_dksmall,
ka_dkmedium, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //192
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall, ska_dksmall,
ka_dkbig, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dksmall > 0 ) { //193
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dksmall, 0, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkmedium > 0 ) { //194
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dkmedium, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dkmedium
> 0 && ka_dkbig > 0 ) { //195
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall,
ska_dkmedium, ka_dkbig, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //196
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dksmall, 0, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //197
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dkmedium, 1, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dksmall > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //198
    defuzzyfikasi2(ki_dksmall,
ski_dkmedium, d_dksmall, ska_dkbig,
ka_dkbig, 3, 2);
  }


  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dksmall > 0 ) { //199
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dksmall, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkmedium > 0 ) { //200
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dkmedium, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 && ska_dksmall
> 0 && ka_dkbig > 0 ) { //201
    defuzzyfikasi2(ki_dkbig ,
ski_dkmedium, d_dkmedium,
ska_dksmall, ka_dkbig , 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dksmall > 0
) { //202
    defuzzyfikasi2(ki_dkbig ,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dksmall, 1, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkmedium >
0 ) { //203
```

```
    defuzzyfikasi2(ki_dkbig ,
ski_dkmedium, d_dkmedium,
ska_dkmedium, ka_dkmedium, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 &&
ska_dkmedium > 0 && ka_dkbig > 0 ) {
//204
    defuzzyfikasi2(ki_dkbig ,
ski_dksmall, d_dksmall, ska_dksmall,
ka_dkbig , 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dksmall > 0 ) { //205
    defuzzyfikasi2(ki_dkbig ,
ski_dkmedium, d_dkmedium, ska_dkbig
, ka_dksmall, 1, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkmedium > 0 ) { //206
    defuzzyfikasi2(ki_dkbig ,
ski_dkmedium, d_dkmedium, ska_dkbig
, ka_dkmedium, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkmedium > 0 && ska_dkbig > 0
&& ka_dkbig > 0 ) { //207
    defuzzyfikasi2(ki_dkbig ,
ski_dkmedium, d_dkmedium, ska_dkbig
, ka_dkbig , 3, 3);
  }



  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //208
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dksmall, 0, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //209
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkmedium, 1, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //210
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig, ska_dksmall,
ka_dkbig, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dksmall > 0 ) { //211
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dksmall, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkmedium > 0 ) { //212
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dkmedium, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dkmedium > 0
&& ka_dkbig > 0 ) { //213
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig,
ska_dkmedium, ka_dkbig, 3, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //214
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dksmall, 2, 3);
  }

  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //215
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dkmedium, 3, 3);
  }
```

```
  if (ki_dkbig > 0 && ski_dkmedium > 0
&& d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //216
    defuzzyfikasi2(ki_dkbig,
ski_dkmedium, d_dkbig, ska_dkbig,
ka_dkbig, 4, 3);
  }



  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dksmall > 0 &&
ka_dksmall > 0 ) { //217
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dksmall, ka_dksmall, 2,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dksmall > 0 &&
ka_dkmedium > 0 ) { //218
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dksmall, ka_dkmedium,
1, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dksmall > 0 &&
ka_dkbig > 0 ) { //219
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dksmall, ka_dkbig, 2,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dkmedium > 0
&& ka_dksmall > 0 ) { //220
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dkmedium, ka_dksmall,
0, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dkmedium > 0
&& ka_dkmedium > 0 ) { //221
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dkmedium,
ka_dkmedium, 1, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dkmedium > 0
&& ka_dkbig > 0 ) { //222
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dkmedium, ka_dkbig, 2,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //223
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dkbig, ka_dksmall, 0,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //224
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dkbig, ka_dkmedium, 3,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dksmall > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //225
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dksmall, ska_dkbig, ka_dkbig, 4, 4);
  }



  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dksmall > 0
&& ka_dksmall > 0 ) { //226
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dksmall, ka_dksmall,
0, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dksmall > 0
&& ka_dkmedium > 0 ) { //227
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dksmall,
ka_dkmedium, 1, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dksmall > 0
&& ka_dkbig > 0 ) { //228
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium , ska_dksmall, ka_dkbig,
2, 4);
  }
```

```
  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dkmedium >
0 && ka_dksmall > 0 ) { //229
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium , ska_dkmedium ,
ka_dksmall, 0, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dkmedium >
0 && ka_dkmedium > 0 ) { //230
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dkmedium,
ka_dkmedium, 1, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dkmedium >
0 && ka_dkbig > 0 ) { //231
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dkmedium, ka_dkbig,
2, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //232
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dkbig, ka_dksmall, 0,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //233
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dkbig, ka_dkmedium,
3, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkmedium > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //234
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkmedium, ska_dkbig, ka_dkbig, 4,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dksmall > 0 &&
ka_dksmall > 0 ) { //235
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dksmall, ka_dksmall, 0,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dksmall > 0 &&
ka_dkmedium > 0 ) { //236
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dksmall, ka_dkmedium, 2,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dksmall > 0 &&
ka_dkbig > 0 ) { //237
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dksmall, ka_dkbig, 3, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dkmedium > 0 &&
ka_dksmall > 0 ) { //238
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dkmedium, ka_dksmall, 1,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dkmedium > 0 &&
ka_dkmedium > 0 ) { //239
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dkmedium, ka_dkmedium,
2, 4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dkmedium > 0 &&
ka_dkbig > 0 ) { //240
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dkmedium, ka_dkbig, 3,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dkbig > 0 &&
ka_dksmall > 0 ) { //241
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dkbig, ka_dksmall, 0, 4);
  }
```

```
  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkmedium > 0 ) { //242
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dkbig, ka_dkmedium, 1,
4);
  }

  if (ki_dkbig > 0 && ski_dkbig > 0 &&
d_dkbig > 0 && ska_dkbig > 0 &&
ka_dkbig > 0 ) { //243
    defuzzyfikasi2(ki_dkbig, ski_dkbig,
d_dkbig, ska_dkbig, ka_dkbig, 0, 0);
  }

    if (w != 0) {
    kecepatanKanan = wz_kanan / w;
    //kecepatanKanan +=
tambahan_kecepatan_kanan -
tambahan_kecepatan_kiri;
    kecepatanKiri = wz_kiri / w;
    //kecepatanKiri +=
tambahan_kecepatan_kiri -
tambahan_kecepatan_kanan;

    //    lcd.setCursor(8,0);
    //    lcd.print(kecepatanKiri,2);
    //    lcd.print("    ");
    //    lcd.setCursor(8,1);
    //    lcd.print(kecepatanKanan,2);
    //    lcd.print("    ");

    if (kecepatanKanan > 255) {
      kecepatanKanan = 255;
    }
    //kananmaju((int)kecepatanKanan);
    if (kecepatanKiri > 255) {
      kecepatanKiri = 255;
    }
    //kirimaju((int)kecepatanKiri);
    if (kecepatanKanan < 0) {
      kecepatanKanan =
abs(kecepatanKanan);
      if (kecepatanKanan >
255)kecepatanKanan = 255;

//kananmundur((int)kecepatanKanan);

    }
    if (kecepatanKiri < 0 ) {
      kecepatanKiri = abs(kecepatanKiri);
      if (kecepatanKiri >
255)kecepatanKiri = 255;
      //kirimundur((int)kecepatanKiri);

    }

  }


}

void rule_base1() {
  wz_kanan = 0;
  wz_kiri = 0;
  w = 0;
  kondisi [0] = 0; //kanan
  kondisi [1] = 0; //kiri
  //0 pelan
  //1 medium
  //2 cepat
  //kiri kanan
  if (ka_dkbig > 0 && d_dkbig > 0 &&
ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dkbig, d_dkbig,
ki_dkbig, 0, 0);
  }
  if (ka_dkbig > 0 && d_dkbig > 0 &&
ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dkbig, d_dkbig,
ki_dkmedium, 4, 0);
  }
  if (ka_dkbig > 0 && d_dkbig > 0 &&
ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dkbig, d_dkbig,
ki_dksmall, 3, 0);
  }

  if (ka_dkbig > 0 && d_dkmedium > 0
&& ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dkbig,
d_dkmedium, ki_dkbig, 4, 4);
  }
  if (ka_dkbig > 0 && d_dkmedium > 0
&& ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dkbig,
d_dkmedium, ki_dkmedium, 5, 0);
  }
  if (ka_dkbig > 0 && d_dkmedium > 0
&& ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dkbig,
d_dkmedium, ki_dksmall, 5, 0);
  }
```

```
  if (ka_dkbig > 0 && d_dksmall > 0
&& ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dkbig, d_dksmall,
ki_dkbig, 4, 4);
  }
  if (ka_dkbig > 0 && d_dksmall > 0
&& ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dkbig, d_dksmall,
ki_dkmedium, 4, 3);
  }
  if (ka_dkbig > 0 && d_dksmall > 0
&& ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dkbig, d_dksmall,
ki_dksmall, 5, 0);
  }


  if (ka_dkmedium > 0 && d_dkbig > 0
&& ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dkbig, ki_dkbig, 4, 5);
  }
  if (ka_dkmedium > 0 && d_dkbig > 0
&& ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dkbig, ki_dkmedium, 4, 4);
  }
  if (ka_dkmedium > 0 && d_dkbig > 0
&& ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dkbig, ki_dksmall, 4, 3);
  }

  if (ka_dkmedium > 0 && d_dkmedium
> 0 && ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dkmedium, ki_dkbig, 4, 5);
  }
  if (ka_dkmedium > 0 && d_dkmedium
> 0 && ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dkmedium, ki_dkmedium, 4, 4);
  }
  if (ka_dkmedium > 0 && d_dkmedium
> 0 && ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dkmedium, ki_dksmall, 4, 3);
  }

  if (ka_dkmedium > 0 && d_dksmall >
0 && ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dksmall, ki_dkbig, 3, 4 );
  }
  if (ka_dkmedium > 0 && d_dksmall >
0 && ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dksmall, ki_dkmedium, 3, 3);
  }
  if (ka_dkmedium > 0 && d_dksmall >
0 && ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dkmedium,
d_dksmall, ki_dksmall, 4, 2);
  }


  if (ka_dksmall > 0 && d_dkbig > 0
&& ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dksmall, d_dkbig,
ki_dkbig, 4, 5);
  }
  if (ka_dksmall > 0 && d_dkbig > 0
&& ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dksmall, d_dkbig,
ki_dkmedium, 3, 3);
  }
  if (ka_dksmall > 0 && d_dkbig > 0
&& ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dksmall, d_dkbig,
ki_dksmall, 5, 5);
  }

  if (ka_dksmall > 0 && d_dkmedium >
0 && ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dksmall,
d_dkmedium, ki_dkbig, 3, 4);
  }
  if (ka_dksmall > 0 && d_dkmedium >
0 && ki_dkmedium > 0 ) {
    defuzzyfikasi(ka_dksmall,
d_dkmedium, ki_dkmedium, 3, 4);
  }
  if (ka_dksmall > 0 && d_dkmedium >
0 && ki_dksmall > 0 ) {
    defuzzyfikasi(ka_dksmall,
d_dkmedium, ki_dksmall, 4, 4);
  }

  if (ka_dksmall > 0 && d_dksmall > 0
&& ki_dkbig > 0 ) {
    defuzzyfikasi(ka_dksmall, d_dksmall,
ki_dkbig, 0, 4);
  }
  if (ka_dksmall > 0 && d_dksmall > 0
&& ki_dkmedium > 0 ) {
```

```
   defuzzyfikasi(ka_dksmall, d_dksmall,
ki_dkmedium, 2, 4);
  }
  if (ka_dksmall > 0 && d_dksmall > 0
&& ki_dksmall > 0 ) {
   defuzzyfikasi(ka_dksmall, d_dksmall,
ki_dksmall, 3, 3);
  }



  //  Serial.print("kondisi 1 = ");
  //  Serial.print("\t");
  //  Serial.print(kondisi[0]);
  //  Serial.print("\t");
  //  Serial.print("kondisi 2 = ");
  //  Serial.print("\t");
  //  Serial.println(kondisi[1]);
  //Serial.print("wz_kanan = ");
  //Serial.println(wz_kanan,8);
  //Serial.print("wz_kiri = ");
  //Serial.println(wz_kiri,8);
  //Serial.print("w = ");
  //Serial.println(w,8);
  if (w != 0) {
   kecepatanKanan = wz_kanan / w;
   //kecepatanKanan +=
tambahan_kecepatan_kanan -
tambahan_kecepatan_kiri;
   kecepatanKiri = wz_kiri / w;
   //kecepatanKiri +=
tambahan_kecepatan_kiri -
tambahan_kecepatan_kanan;

   //    lcd.setCursor(8,0);
   //    lcd.print(kecepatanKiri,2);
   //    lcd.print("    ");
   //    lcd.setCursor(8,1);
   //    lcd.print(kecepatanKanan,2);
   //    lcd.print("    ");

   if (kecepatanKanan > 255) {
    kecepatanKanan = 255;
   }
   //kananmaju((int)kecepatanKanan);
   if (kecepatanKiri > 255) {
    kecepatanKiri = 255;
   }
   //kirimaju((int)kecepatanKiri);
   if (kecepatanKanan < 0) {
    kecepatanKanan =
abs(kecepatanKanan);
    if (kecepatanKanan >
255)kecepatanKanan = 255;

//kananmundur((int)kecepatanKanan);

   }
   if (kecepatanKiri < 0 ) {
    kecepatanKiri = abs(kecepatanKiri);
    if (kecepatanKiri >
255)kecepatanKiri = 255;
    //kirimundur((int)kecepatanKiri);

   }

  }


}

void defuzzyfikasi(double dk1, double
dk2, double dk3, int vkiri, int vkanan) {
  double dk_terendah = 1;
  if (dk1 < dk_terendah) dk_terendah =
dk1;
  if (dk2 < dk_terendah) dk_terendah =
dk2;
  if (dk3 < dk_terendah) dk_terendah =
dk3;
  /*
   *
    int pwm_pelan = 10;
    int pwm_medium =  20;
    int pwm_cepat = 30 ;


   */

  //Serial.print("dk tinggi");
  //Serial.println(dk_terendah);

  int pengali_kanan, pengali_kiri;
  if (vkanan == 0) {
   pengali_kanan = pwm_spelan;
  } else if (vkanan == 1) {
   pengali_kanan = pwm_pelan;
  } else if (vkanan == 2) {
   pengali_kanan = pwm_medium;
  } else if (vkanan == 3) {
   pengali_kanan = pwm_cepat;
  } else if (vkanan == 4) {
   pengali_kanan = pwm_scepat;
  }
  //  else if (vkanan == -1) {
```

```
//    pengali_kanan = -pwm_pelan;
//  } else if (vkanan == -2) {
//    pengali_kanan = -pwm_medium;
//  } else if (vkanan == -3) {
//    pengali_kanan = -pwm_cepat;
//  } else if (vkanan == -4) {
//    pengali_kanan = -pwm_scepat;
//  }

 if (vkiri == 0) {
  pengali_kiri = pwm_spelan;
 } else if (vkiri == 1) {
  pengali_kiri = pwm_pelan;
 } else if (vkiri == 2) {
  pengali_kiri = pwm_medium;
 } else if (vkiri == 3) {
  pengali_kiri = pwm_cepat;
 } else if (vkiri == 4) {
  pengali_kiri = pwm_scepat;

 }
 //  else if (vkiri == -1) {
 //    pengali_kiri = -pwm_pelan;
 //  } else if (vkiri == -2) {
 //    pengali_kiri = -pwm_medium;
 //  } else if (vkiri == -3) {
 //    pengali_kiri = -pwm_cepat;
 //  } else if (vkiri == -4) {
 //    pengali_kiri = -pwm_scepat;
 //
 //  }
 wz_kanan += dk_terendah *
pengali_kanan;
 wz_kiri += dk_terendah * pengali_kiri;
 w += dk_terendah;
 //kecepatanKanan = dk_terendah *
pengali_kanan;
 //kecepatanKiri = dk_terendah *
pengali_kiri;
}


void defuzzyfikasi2(double dk1, double
dk2, double dk3, double dk4, double
dk5, int vkiri, int vkanan) {
 double dk_terendah = 1;
 if (dk1 < dk_terendah) dk_terendah =
dk1;
 if (dk2 < dk_terendah) dk_terendah =
dk2;
 if (dk3 < dk_terendah) dk_terendah =
dk3;
 /*
 *
 int pwm_pelan = 10;
 int pwm_medium =  20;
 int pwm_cepat = 30 ;


 */

//Serial.print("dk tinggi");
//Serial.println(dk_terendah);

int pengali_kanan, pengali_kiri;
if (vkanan == 0) {
 pengali_kanan = pwm_spelan;
} else if (vkanan == 1) {
 pengali_kanan = pwm_pelan;
} else if (vkanan == 2) {
 pengali_kanan = pwm_medium;
} else if (vkanan == 3) {
 pengali_kanan = pwm_cepat;
} else if (vkanan == 4) {
 pengali_kanan = pwm_scepat;
}
//  else if (vkanan == -1) {
//    pengali_kanan = -pwm_pelan;
//  } else if (vkanan == -2) {
//    pengali_kanan = -pwm_medium;
//  } else if (vkanan == -3) {
//    pengali_kanan = -pwm_cepat;
//  } else if (vkanan == -4) {
//    pengali_kanan = -pwm_scepat;
//  }

if (vkiri == 0) {
 pengali_kiri = pwm_spelan;
} else if (vkiri == 1) {
 pengali_kiri = pwm_pelan;
} else if (vkiri == 2) {
 pengali_kiri = pwm_medium;
} else if (vkiri == 3) {
 pengali_kiri = pwm_cepat;
} else if (vkiri == 4) {
 pengali_kiri = pwm_scepat;

}
//  else if (vkiri == -1) {
//    pengali_kiri = -pwm_pelan;
//  } else if (vkiri == -2) {
//    pengali_kiri = -pwm_medium;
//  } else if (vkiri == -3) {
//    pengali_kiri = -pwm_cepat;
//  } else if (vkiri == -4) {
//    pengali_kiri = -pwm_scepat;
```

```
  //
  //  }
  wz_kanan += dk_terendah *
pengali_kanan;
  wz_kiri += dk_terendah * pengali_kiri;
  w += dk_terendah;
  //kecepatanKanan = dk_terendah *
pengali_kanan;
  //kecepatanKiri = dk_terendah *
pengali_kiri;
}


double
derajat_keanggotaan_small(double gas)
{
  double dk_small = 0;
  if (gas <= gsmall) {
    dk_small = 1;
  } else if (gas <= gmedium) {
    dk_small = (gmedium - gas) /
(gmedium - gsmall);
  } else {
    dk_small = 0;
  }
  //Serial.print("ka_dksmall=");
  //Serial.println(dk_small);
  return dk_small;
}

double
derajat_keanggotaan_medium(double
gas) {
  double dk_medium = 0;
  if (gas <= gsmall) {
    dk_medium = 0;
  } else if (gas <= gmedium) {
    dk_medium = (gas - gsmall) /
(gmedium - gsmall);
  } else if (gas <= gbig) {
    dk_medium = (gbig - gas) / (gbig -
gmedium);
  } else {
    dk_medium = 0;
  }
  //Serial.print("ka_dksmall=");
  //Serial.println(dk_small);
  return dk_medium;
}

double derajat_keanggotaan_big(double
gas) {
  double dk_big = 0;
  if (gas <= gmedium) {
    dk_big = 0;
  } else if (gas <= gbig) {
    dk_big = (gas - gmedium) / (gbig -
gmedium);
  } else {
    dk_big = 1;
  }
  //Serial.print("dkbig=");
  //Serial.println(dk_big);
  return dk_big;
}
```