

LAMPIRAN B
PROGRAM PADA PENGONTROL MIKRO
ATMEGA32 DAN ATTINY2313

PROGRAM UTAMA

PENGONTROL MIKRO ATMEGA32

/******

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Project :
Version :
Date : 8/21/2010
Author : WWW
Company : KRCI
Comments:

Chip type : ATmega32
Program type : Application
Clock frequency : 11.059200 MHz
Memory model : Small
External SRAM size : 0
Data Stack size : 512

*****/

```
#include <mega32.h>
#include <stdio.h>
#include <delay.h>
#include <core.c>
#include <procedure.c>

unsigned char buffer[32];
unsigned char cmucam[32];
unsigned int luiMemory = 0;
unsigned int uiMemory = 0;
unsigned int i;
unsigned char bMemory = 0;
unsigned int timer = 0;

// Timer 1 output compare A interrupt
service routine
interrupt [TIM1_COMPA] void
timer1_compa_isr(void) {
    timer++;
}

// Alphanumeric LCD Module functions
#asm
.equ __lcd_port = 0x15;PORTC
#endasm
#include <lcd.h>

#define RXB8 1

#define TXB8 0
#define UPE 2
#define OVR 3
#define FE 4
#define UDRE 5
#define RXC 7

#define FRAMING_ERROR (1<<FE)
#define PARITY_ERROR (1<<UPE)
#define DATA_OVERRUN (1<<OVR)
#define DATA_REGISTER_EMPTY
(1<<UDRE)
#define RX_COMPLETE (1<<RXC)

// USART Receiver buffer
#define RX_BUFFER_SIZE 8
char rx_buffer[RX_BUFFER_SIZE];

#if RX_BUFFER_SIZE<256
unsigned char rx_wr_index, rx_rd_index,
rx_counter;
#else
unsigned int rx_wr_index, rx_rd_index,
rx_counter;
#endif
#endif
```

```

// This flag is set on USART Receiver buffer
overflow
bit rx_buffer_overflow;
unsigned char receiverIndex = 0;
// USART Receiver interrupt service routine

interrupt [USART_RXC] void
usart_rx_isr(void) {
    char status, data;
    status = UCSRA;
    data = UDR;
    if ((status & (FRAMING_ERROR |
PARITY_ERROR | DATA_OVERRUN))
== 0) {
        rx_buffer[rx_wr_index] = data;
        if (++rx_wr_index ==
RX_BUFFER_SIZE) rx_wr_index = 0;
        if (++rx_counter ==
RX_BUFFER_SIZE) {
            rx_counter = 0;
            rx_buffer_overflow = 1;
        };
    };
    if (data == 'T' || receiverIndex >= 30) {
        receiverIndex = 0;
    } else {
        cmucam[receiverIndex] = data;
        receiverIndex++;
    }
}

#ifndef _DEBUG_TERMINAL_IO_
// Get a character from the USART Receiver
buffer
#define _ALTERNATE_GETCHAR_
#pragma used+

char getchar(void) {
    char data;
    while (rx_counter == 0);
    data = rx_buffer[rx_rd_index];
    if (++rx_rd_index ==
RX_BUFFER_SIZE) rx_rd_index = 0;
    #asm("cli")
        --rx_counter;
    #asm("sei")
        return data;
    }
    #pragma used-
    #endif

// USART Transmitter buffer
#define TX_BUFFER_SIZE 8
char tx_buffer[TX_BUFFER_SIZE];

#if TX_BUFFER_SIZE<256
unsigned char tx_wr_index, tx_rd_index,
tx_counter;
#else
unsigned int tx_wr_index, tx_rd_index,
tx_counter;
#endif

// USART Transmitter interrupt service
routine

interrupt [USART_TXC] void
usart_tx_isr(void) {
    if (tx_counter) {
        --tx_counter;
        UDR = tx_buffer[tx_rd_index];
        if (++tx_rd_index ==
TX_BUFFER_SIZE) tx_rd_index = 0;
    };
}

#ifndef _DEBUG_TERMINAL_IO_
// Write a character to the USART
Transmitter buffer
#define _ALTERNATE_PUTCHAR_
#pragma used+

void putchar(char c) {
    while (tx_counter ==
TX_BUFFER_SIZE);
    #asm("cli")
        if (tx_counter || ((UCSRA &
DATA_REGISTER_EMPTY) == 0)) {
            tx_buffer[tx_wr_index] = c;
            if (++tx_wr_index ==
TX_BUFFER_SIZE) tx_wr_index = 0;
            ++tx_counter;
        } else
            UDR = c;
    #asm("sei")
}
    #pragma used-
    #endif

// Standard Input/Output functions
#include <stdio.h>

```

```
//=====core=====//
// -----gripper-----//

#define POSISI_TANGKAP 0
#define POSISI_DEKAT 1
#define POSISI_JAUH 2
#define POSISI_TARUH 3
#define POSISI_SEDANG 4
#define CAPIT_BUKA 0
#define CAPIT_TUTUP 1
#define CAPIT_IDLE 2

unsigned char bMemPosisi = 4;

void kirimPerintah(unsigned char posisi,
unsigned char capit) {
    DDRD.3 = 1;
    DDRD.4 = 1;
    if (bMemPosisi != posisi) {
        bMemPosisi = posisi;
        PORTD.3 = 1;
        PORTD.4 = 1;
        delay_ms(30);
        switch (posisi) {
            case POSISI_TANGKAP:
            {
                PORTD.3 = 1;
                PORTD.4 = 0;
                delay_ms(5);
                PORTD.3 = 0;
                PORTD.4 = 0;
                delay_ms(20);
                switch (capit) {
                    case CAPIT_BUKA:
                    {
                        PORTD.3 = 0;
                        PORTD.4 = 0;
                    }
                    break;
                    case CAPIT_TUTUP:
                    {
                        PORTD.3 = 0;
                        PORTD.4 = 1;
                    }
                    break;
                    case CAPIT_IDLE:
                    {
                        PORTD.3 = 1;
                        PORTD.4 = 0;
                    }

                    break;
                }
            }
            delay_ms(10);
        }
    }
}
```

```
        break;
    case POSISI_DEKAT:
    {
        PORTD.3 = 1;
        PORTD.4 = 0;
        delay_ms(5);
        PORTD.3 = 0;
        PORTD.4 = 1;
        delay_ms(20);
        switch (capit) {
            case CAPIT_BUKA:
            {
                PORTD.3 = 0;
                PORTD.4 = 0;
            }
            break;
            case CAPIT_TUTUP:
            {
                PORTD.3 = 0;
                PORTD.4 = 1;
            }
            break;
            case CAPIT_IDLE:
            {
                PORTD.3 = 1;
                PORTD.4 = 0;
            }
            break;
        }
        delay_ms(10);
    }
    break;
    case POSISI_JAUH:
    {
        PORTD.3 = 1;
        PORTD.4 = 0;
        delay_ms(5);
        PORTD.3 = 1;
        PORTD.4 = 0;
        delay_ms(20);
        switch (capit) {
            case CAPIT_BUKA:
            {
                PORTD.3 = 0;
                PORTD.4 = 0;
            }
            break;

            case CAPIT_TUTUP:
            {
                PORTD.3 = 0;
                PORTD.4 = 1;
            }
            break;
        }
    }
}
```



```
//-----sensor ultrasonik-----//
```

```
unsigned int getPing(unsigned char i) {
    unsigned int jarak = 0;
    switch (i) {
        case 0:
        {
            PORTA.0 = 0;
            DDRA.0 = 1;
            PORTA.0 = 1;
            delay_us(15);
            PORTA.0 = 0;
            DDRA.0 = 0;
            while (PINA.0 == 0) {
            };
            while (PINA.0 == 1) {
                jarak++;
                if (jarak > 9000) {
                    break;
                }
            }
            delay_ms(5);
        }
        break;
        case 1:
        {
            PORTA.1 = 0;
            DDRA.1 = 1;
            PORTA.1 = 1;
            delay_us(15);
            PORTA.1 = 0;
            DDRA.1 = 0;
            while (PINA.1 == 0) {
            };
            while (PINA.1 == 1) {
                jarak++;
                if (jarak > 9000) {
                    break;
                }
            }
            delay_ms(5);
        }
        break;
        case 2:
        {
            PORTA.2 = 0;
            DDRA.2 = 1;
            PORTA.2 = 1;
            delay_us(15);
            PORTA.2 = 0;
            DDRA.2 = 0;
            while (PINA.2 == 0) {
            };
            while (PINA.2 == 1) {
                jarak++;
            }
        }
    }
}
```

```
        if (jarak > 9000) {
            break;
        }
    }
    delay_ms(5);
}
break;
case 3:
{
    PORTA.3 = 0;
    DDRA.3 = 1;
    PORTA.3 = 1;
    delay_us(15);
    PORTA.3 = 0;
    DDRA.3 = 0;
    while (PINA.3 == 0) {
    };
    while (PINA.3 == 1) {
        jarak++;
        if (jarak > 9000) {
            break;
        }
    }
    delay_ms(5);
}
break;
case 4:
{
    PORTA.4 = 0;
    DDRA.4 = 1;
    PORTA.4 = 1;
    delay_us(15);
    PORTA.4 = 0;
    DDRA.4 = 0;
    while (PINA.4 == 0) {
    };
    while (PINA.4 == 1) {
        jarak++;
        if (jarak > 9000) {
            break;
        }
    }
    delay_ms(5);
}
break;
case 5:
{
    PORTA.5 = 0;
    DDRA.5 = 1;
    PORTA.5 = 1;
    delay_us(15);
}
```

```

    PORTA.5 = 0;
    DDRA.5 = 0;
    while (PINA.5 == 0) {
    };
    while (PINA.5 == 1) {
        jarak++;
        if (jarak > 9000) {
            break;
        }
    }
    delay_ms(5);
}
break;
}
return jarak / 10;
}

//-----motor servo kontinu roda-----//
#define MAJU 0
#define BELOK_KIRI 1
#define PIVOT_KIRI 2
#define BELOK_KANAN 3
#define PIVOT_KANAN 4
#define MUNDUR 5
#define SLOW 0
#define FAST 1

void motorPulse(unsigned char speed,
unsigned char direction) {
    switch (speed) {
        case SLOW:
        {
            switch (direction) {
                case MAJU:
                {
                    PORTB.0 = 1;
                    PORTB.1 = 1;
                    delay_us(1350);
                    PORTB.0 = 0;
                    delay_us(300);
                    PORTB.1 = 0;
                    delay_us(1350);
                }
                break;
                case BELOK_KIRI:
                {
                    PORTB.1 = 1;
                    delay_us(1650);
                    PORTB.1 = 0;
                    delay_us(1350);
                }
                break;
                case PIVOT_KANAN:
                {
                    PORTB.1 = 1;
                    PORTB.0 = 1;
                    delay_us(1350);
                    PORTB.1 = 0;
                    PORTB.0 = 0;
                    delay_us(1650);
                }
                break;
                case PIVOT_KIRI:
                {
                    PORTB.1 = 1;
                    PORTB.0 = 1;
                    delay_us(1650);
                    PORTB.1 = 0;
                    PORTB.0 = 0;
                    delay_us(1350);
                }
                break;
                case MUNDUR:
                {
                    PORTB.0 = 1;
                    PORTB.1 = 1;
                    delay_us(1350);
                    PORTB.1 = 0;
                    delay_us(300);
                    PORTB.0 = 0;
                    delay_us(1350);
                }
                break;
            }
        }
        break;
    }
}

case FAST:
{
    switch (direction) {
        case MAJU:
        {
            PORTB.0 = 1;
            PORTB.1 = 1;
            delay_us(1000);
            PORTB.0 = 0;
            delay_us(1000);
            PORTB.1 = 0;
        }
    }
}

```

```

        delay_us(1000);
    }
    break;
case BELOK_KIRI:
{
    PORTB.1 = 1;
    delay_us(2000);
    PORTB.1 = 0;
    delay_us(1000);
}
    break;
case PIVOT_KANAN:
{
    PORTB.1 = 1;
    PORTB.0 = 1;
    delay_us(1000);
    PORTB.1 = 0;
    PORTB.0 = 0;
    delay_us(2000);
}
    break;
case BELOK_KANAN:
{
    PORTB.0 = 1;
    delay_us(1000);
    PORTB.0 = 0;
    delay_us(2000);
}
    break;
case PIVOT_KIRI:
{
    PORTB.1 = 1;
    PORTB.0 = 1;
    delay_us(2000);
    PORTB.1 = 0;
    PORTB.0 = 0;
    delay_us(1000);
}
    break;
case MUNDUR:
{
    PORTB.0 = 1;
    PORTB.1 = 1;
    delay_us(1000);
    PORTB.1 = 0;
    delay_us(1000);
    PORTB.0 = 0;
    delay_us(1000);
}
    break;
}
break;
}
}

//=====end of core=====//

// -----dip switch-----
unsigned char terimaInput() {
    DDRB &= 0x1F;
    DDRD &= 0x1F;
    DDRA &= 0x9F;
    PORTB |= ~0x1F;
    PORTD |= ~0x1F;
    PORTA |= ~0x9F;
    return ~(((PINA & 0x60) << 1) | ((PIND
& 0xE0) >> 2) | ((PINB & 0xE0) >> 5));
}

// -----servo tong-----//
SERVO_TONG PORTA.7
#define TUTUP 1
#define BUKA 0

void tong(unsigned int servo) {
    int i;
    DDRA.7 = 1;

    if (servo == TUTUP) {
        for (i = 0; i < 77; i++) {
            SERVO_TONG = 1;
            delay_us(2500);
            SERVO_TONG = 0;
            delay_us(17500);
        }
    }
    else if (servo == BUKA) {
        for (i = 0; i < 77; i++) {
            SERVO_TONG = 1;
            delay_us(700);
            SERVO_TONG = 0;
            delay_us(19300);
        }
    }
}

//=====program untuk pengambilan
bola tenis=====//

void RATA_BELAKANG() {
    while (getPing(2) != getPing(3)) {
        if (getPing(2) > getPing(3)) {
            motorPulse(SLOW,
PIVOT_KANAN);
        }
        else motorPulse(SLOW,
PIVOT_KIRI);
    }
}

```



```

}

void MAJU_RATA_KIRI_1() {
while(getPing(1) < 150 || getPing(0) < 210){

    if(getPing(4) < 35){
        motorPulse (FAST,
BELOK_KANAN);
    }
    else if(getPing(4) > 50){
        motorPulse (FAST,
BELOK_KIRI);
    }
    else motorPulse (FAST, MAJU);
}

}

void MAJU_RATA_KANAN_1() {
while(getPing(0) > 50){
    if(getPing(1) < 32){
        motorPulse (FAST,
BELOK_KIRI);
    }
    else if(getPing(1) > 38){
        motorPulse (FAST,
BELOK_KANAN);
    }
    else motorPulse (FAST, MAJU);
}

}

void MAJU_RATA_KANAN_2() {
while (getPing(1) < 180 || getPing(3) > 380){
    if (getPing(4) < 30) {
        motorPulse(FAST,
PIVOT_KANAN);
    } else if (getPing(4) > 50) {
        motorPulse(FAST, PIVOT_KIRI);
    }
    else motorPulse(FAST, MAJU);
}

}

void MAJU_1() {
for(i=0; i<250; i++){
    motorPulse(FAST, MAJU);
}

}

void MAJU_2() {
while(getPing(0) > 55){
    motorPulse(FAST, MAJU);
}

}

void MAJU_3() {
while(getPing(0) > 60){
    motorPulse(FAST, MAJU);
}

}

void PIVOT_KANAN_1() {
while(getPing(2) > 100){
    motorPulse(FAST,
PIVOT_KANAN);
}

}

void PIVOT_KIRI_1() {
while (getPing(3) > 100) {
    motorPulse(FAST, PIVOT_KIRI);
}

}

void CARI_TENIS_1() {
    kirimPerintah(POSISI_JAUH,
CAPIT_IDLE);
    printf("RS\r");
    delay_ms(100);
    printf("CR 18 32\r");
    delay_ms(100);
    printf("RM 3\r");
    delay_ms(100);
    printf("TC 0 30 100 240 0 30\r");
    delay_ms(100);

    while (cmucam[0] == 0){
        motorPulse(SLOW, PIVOT_KIRI);
    }

    while (cmucam[1] < 138) {
        if (cmucam[0] == 0 || cmucam[1] == 0)
        {
            motorPulse(FAST, BELOK_KIRI);
        }
        else if (cmucam[0] < 50 ){
            motorPulse(FAST, BELOK_KIRI);
        }
        else if (cmucam[0] > 65) {
            motorPulse(FAST,
BELOK_KANAN);
        }
        else
            motorPulse(FAST, MAJU);
        delay_ms(100);
    }
}

```

```

    kirimPerintah(POSISI_SEDANG,
CAPIT_IDLE);
    printf("RS\r");
    delay_ms(100);
    printf("CR 18 32\r");
    delay_ms(100);
    printf("RM 3\r");
    delay_ms(100);
    printf("TC 0 30 100 240 0 30\r");
    delay_ms(100);

    while (cmucam[1] < 80) {
    if (cmucam[0] == 0 || cmucam[1] == 0)
{
    motorPulse(FAST, BELOK_KIRI);
}
    else if (cmucam[0] < 55){
    motorPulse(SLOW, BELOK_KIRI);
}
    else if (cmucam[0] > 60) {
    motorPulse(SLOW,
BELOK_KANAN);
}
    else
    motorPulse(FAST, MAJU);
    delay_ms(100);
}

```

```

    kirimPerintah(POSISI_DEKAT,
CAPIT_BUKA);
    delay_ms(500);
    printf("RS\r");
    delay_ms(100);
    printf("CR 18 32\r");
    delay_ms(100);
    printf("RM 3\r");
    delay_ms(100);
    printf("TC 0 30 100 240 0 30\r");
    delay_ms(100);

    while (cmucam[1] < 20) {
    if (cmucam[0] == 0 || cmucam[1] == 0)
{
    motorPulse(FAST, BELOK_KIRI);
}
    else if (cmucam[0] < 55 ){
    motorPulse(SLOW, BELOK_KIRI);
}
    else if (cmucam[0] > 60) {
    motorPulse(SLOW,
BELOK_KANAN);
}
    else
    motorPulse(NORMAL, MAJU);
}

```

```

    delay_ms(100);
}

    for (i = 0; i < 100; i++){
    motorPulse(SLOW, MUNDUR);
}
    kirimPerintah(POSISI_TANGKAP,
CAPIT_BUKA);
    delay_ms(500);
    kirimPerintah(POSISI_TANGKAP,
CAPIT_TUTUP);

    for (i = 0; i < 250; i++){
    motorPulse(FAST, MAJU);
    delay_ms(300);
    kirimPerintah(POSISI_TARUH,
CAPIT_TUTUP);

    for (i = 0; i < 200; i++){
    motorPulse(FAST, MUNDUR);
}
    kirimPerintah(POSISI_TARUH,
CAPIT_BUKA);
    delay_ms(500);
    kirimPerintah(POSISI_TARUH,
CAPIT_TUTUP);
}

```

```

void CARI_TENIS_2() {
    kirimPerintah(POSISI_SEDANG,
CAPIT_IDLE);
    printf("RS\r");
    delay_ms(100);
    printf("CR 18 32\r");
    delay_ms(100);
    printf("RM 3\r");
    delay_ms(100);
    printf("TC 0 30 100 240 0 30\r");
    delay_ms(100);

    while (cmucam[1] < 80) {
    if (cmucam[0] == 0 || cmucam[1] == 0)
{
    motorPulse(FAST, BELOK_KIRI);
}
    else if (cmucam[0] < 55){
    motorPulse(SLOW, BELOK_KIRI);
}
    else if (cmucam[0] > 60) {
    motorPulse(SLOW,
BELOK_KANAN);
}
}
}

```

```

else
    motorPulse(FAST, MAJU);
    delay_ms(100);
}

    kirimPerintah(POSISI_DEKAT,
CAPIT_BUKA);
    delay_ms(500);
    printf("RS\r");
    delay_ms(100);
    printf("CR 18 32\r");
    delay_ms(100);
    printf("RM 3\r");
    delay_ms(100);
    printf("TC 0 30 100 240 0 30\r");
    delay_ms(100);

    while (cmucam[1] < 20) {
    if (cmucam[0] == 0 || cmucam[1] == 0)
    {
        motorPulse(FAST, BELOK_KIRI);
    }
    else if (cmucam[0] < 55 ){
        motorPulse(SLOW, BELOK_KIRI);
    }
    else if (cmucam[0] > 60) {
        motorPulse(SLOW,
BELOK_KANAN);
    }
    else
        motorPulse(NORMAL, MAJU);
        delay_ms(100);
    }

    for (i = 0; i < 100; i++){
        motorPulse(SLOW, MUNDUR);
    }
    kirimPerintah(POSISI_TANGKAP,
CAPIT_BUKA);
    delay_ms(500);
    kirimPerintah(POSISI_TANGKAP,
CAPIT_TUTUP);

    for (i = 0; i < 250; i++)
        motorPulse(FAST, MAJU);
        delay_ms(300);
        kirimPerintah(POSISI_TARUH,
CAPIT_TUTUP);

    for (i = 0; i < 200; i++){
        motorPulse(FAST, MUNDUR);
    }
    kirimPerintah(POSISI_TARUH,
CAPIT_BUKA);

        delay_ms(500);
        kirimPerintah(POSISI_TARUH,
CAPIT_TUTUP);
    }

    if (terimaInput() == 0x01) {
    //////////////ambil tenis 1////////////////////////
    kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
    RATA_BELAKANG();
    MAJU_RATA_KIRI_1();
    PIVOT_KANAN_1();
    RATA_BELAKANG();
    MAJU_1();
    CARI_TENIS_1();
    while(getPing(0) > 45){
        motorPulse(FAST, MAJU);
    }
    while(getPing(4) > 30){
        motorPulse(FAST, PIVOT_KANAN);
    }
    kirimPerintah(POSISI_SEDANG,
CAPIT_IDLE);
    while(cmucam[0] == 0){
        if(getPing(4) < 28){
            motorPulse (FAST, BELOK_KANAN);
        }
        else if(getPing(4) > 35){
            motorPulse (FAST, BELOK_KIRI);
        }
        else motorPulse (FAST, MAJU);}
        while(cmucam[0] != 0){
            CARI_BOLA_TENIS_2();
        }
        while(getPing(0) < 45){
            motorPulse(FAST, PIVOT_KIRI);
        }
        while(getPing(1) > 35){
            motorPulse(FAST, PIVOT_KIRI);
        }
        for(i=0; i<150; i++){
            if(getPing(1) < 30){
                motorPulse (FAST, BELOK_KIRI);
            }
            else if(getPing(1) > 40){
                motorPulse (FAST, BELOK_KANAN);
            }
            else motorPulse (FAST, MAJU);
        }
        while (getPing(2) > 20) {
            motorPulse(FAST, PIVOT_KIRI);
        }
        RATA_BELAKANG();
        while (getPing(2) > 15 || getPing(3) > 15){
            if (getPing(2) > getPing(3)){

```

```

    motorPulse(SLOW, PIVOT_KANAN);
  }
  else if (getPing(2) < getPing(3)){
    motorPulse(SLOW, PIVOT_KIRI);
  }
  else motorPulse(SLOW, MUNDUR);
  }
  }

  tong(BUKA);
  tong(TUTUP);

}

if (terimaInput() == 0x02) {
  ////////////ambil tenis 2//////////
  kirimPerintah(POSISI_TARUH,
  CAPIT_IDLE);
  RATA_BELAKANG();
  MAJU_RATA_KANAN_1();
  PIVOT_KIRI_1();
  RATA_BELAKANG();
  MAJU_2();
  MAJU_RATA_KANAN_2();
  PIVOT_KANAN_1();
  RATA_BELAKANG();
  MAJU_3();
  CARL_TENIS_1();
  kirimPerintah(POSISI_SEDANG,
  CAPIT_IDLE);
  while(cmucam[0] == 0){
    if(getPing(4) < 28){
      motorPulse (FAST, BELOK_KANAN);
    }
    else if(getPing(4) > 35){
      motorPulse (FAST, BELOK_KIRI);
    }
    else motorPulse (FAST, MAJU);
  }
  while(cmucam[0] != 0){
    CARL_BOLA_TENIS_2();
  }
  for(i=0; i<200; i++){
    if(getPing(4) < 30){
      motorPulse (FAST, BELOK_KANAN);
    }
    else if(getPing(4) > 40){
      motorPulse (FAST, BELOK_KIRI);
    }
    else motorPulse (FAST, MAJU);
  }
  while (getPing(3) > 20) {
    motorPulse(FAST, PIVOT_KANAN);
  }
}

```

```

RATA_BELAKANG();
while (getPing(2) > 15 || getPing(3) > 15) {
  if (getPing(2) > getPing(3)){
    motorPulse(SLOW, PIVOT_KANAN);
  }
  else if (getPing(2) < getPing(3)) {
    motorPulse(SLOW, PIVOT_KIRI);
  }
  else motorPulse(SLOW, MUNDUR);
}

tong(BUKA);
tong(TUTUP);
}

if (terimaInput() == 0x03) {
  ////////////navigasi tenis 1//////////
  kirimPerintah(POSISI_TARUH,
  CAPIT_IDLE);
  RATA_BELAKANG();
  MAJU_RATA_KIRI_1();
  PIVOT_KANAN_1();
  RATA_BELAKANG();
  MAJU_1();
  while(getPing(0) < 45){
    motorPulse(FAST, PIVOT_KIRI);
  }
  while(getPing(1) > 35){
    motorPulse(FAST, PIVOT_KIRI);
  }
  for(i=0; i<150; i++){
    if(getPing(1) < 30){
      motorPulse (FAST, BELOK_KIRI);
    }
    else if(getPing(1) > 40){
      motorPulse (FAST, BELOK_KANAN);
    }
    else motorPulse (FAST, MAJU);
  }
  while (getPing(2) > 20) {
    motorPulse(FAST, PIVOT_KIRI);
  }
  RATA_BELAKANG();
}

if (terimaInput() == 0x04) {
  ////////////navigasi tenis 2//////////

```

```

    kirimPerintah(POSISI_TARUH,
    CAPIT_IDLE);
    RATA_BELAKANG();
    MAJU_RATA_KANAN_1();
    PIVOT_KIRI_1();
    RATA_BELAKANG();
    MAJU_2();
    MAJU_RATA_KANAN_2();
    MAJU_3();
    kirimPerintah(POSISI_SEDANG,
    CAPIT_IDLE);
    while(cmucam[0] == 0){
        if(getPing(4) < 28){
            motorPulse (FAST, BELOK_KANAN);
        }
        else if(getPing(4) > 35){
            motorPulse (FAST, BELOK_KIRI);
        }
        else motorPulse (FAST, MAJU);
    }
    for(i=0; i<200; i++){
        if(getPing(4) < 30){
            motorPulse (FAST, BELOK_KANAN);
        }
        else if(getPing(4) > 40){
            motorPulse (FAST, BELOK_KIRI);
        }
        else motorPulse (FAST, MAJU);
    }
    while (getPing(3) > 20) {
        motorPulse(FAST, PIVOT_KANAN);
    }
    RATA_BELAKANG();
}
//=====program untuk pengambilan bola
tenis=====//

//=====program untuk pengambilan bola
pingpong=====//
void RATA_BELAKANG() {
    while (getPing(2) != getPing(3)) {
        if (getPing(2) > getPing(3)) {
            motorPulse(SLOW,
            PIVOT_KANAN);
        }
        else motorPulse(SLOW,
        PIVOT_KIRI);
    }
}

void MAJU_1() {
    for (i = 0; i < 250; i++) {

```

```

        motorPulse(FAST, MAJU);
    }
}

void MAJU_2() {
    while (getPing(0) > 55) {
        motorPulse(FAST, MAJU);
    }
}

void MAJU_3() {
    while (getPing(3) > 180) {
        motorPulse(FAST, MAJU);
    }
}

void KELUAR_1() {
    while (getPing(0) > 48 || getPing(1) < 150) {
        if (getPing(4) < 30) {
            motorPulse(FAST, PIVOT_KANAN);
        }
        else if (getPing(4) > 55) {
            motorPulse(FAST, PIVOT_KIRI);
        }
        else motorPulse(FAST, MAJU);
    }
}

void KELUAR_2() {
    while (getPing(0) > 180 || getPing(1) < 150)
    {
        if (getPing(4) < 30) {
            motorPulse(FAST, PIVOT_KANAN);
        }
        else if (getPing(4) > 55) {
            motorPulse(FAST, PIVOT_KIRI);
        }
        else motorPulse(FAST, MAJU);
    }
}

void KELUAR_3() {
    while (getPing(1) < 150 || getPing(4) < 150)
    {
        if (getPing(4) < 30) {
            motorPulse(FAST, PIVOT_KANAN);
        }
        else if (getPing(4) > 55) {
            motorPulse(FAST, PIVOT_KIRI);
        }
        else motorPulse(FAST, MAJU);
    }
}

```

```

void MAJU_RATA_KANAN_1() {
while (getPing(0) > 50) {
if (getPing(1) < 35) {
motorPulse(FAST, BELOK_KIRI);
}
else if (getPing(1) > 50) {
motorPulse(FAST, BELOK_KANAN);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KANAN_2() {
while (getPing(0) > 200) {
if (getPing(1) < 35) {
motorPulse(FAST, BELOK_KIRI);
}
else if (getPing(1) > 50) {
motorPulse(FAST, BELOK_KANAN);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KANAN_3() {
while (getPing(4) < 180 || getPing(3) < 380)
{
if (getPing(1) < 30) {
motorPulse(FAST, PIVOT_KIRI);
}
else if (getPing(1) > 50) {
motorPulse(FAST, PIVOT_KANAN);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KANAN_4() {
while (getPing(0) > 180 || getPing(1) < 150)
{
if (getPing(1) < 35) {
motorPulse(FAST, PIVOT_KIRI);
}
else if (getPing(1) > 50) {
motorPulse(FAST, PIVOT_KANAN);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KANAN_5() {
for (i = 0; i < 200; i++) {
if (getPing(1) < 35) {
motorPulse(FAST, PIVOT_KIRI);
}
else if (getPing(1) > 50) {
motorPulse(FAST, PIVOT_KANAN);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KIRI_1() {
while(getPing(0) > 185){
if (getPing(4) < 35) {
motorPulse(SLOW, PIVOT_KANAN);
}
else if (getPing(4) > 40) {
motorPulse(SLOW, PIVOT_KIRI);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KIRI_2() {
while(getPing(0) > 50){
if (getPing(4) < 30) {
motorPulse(FAST, PIVOT_KANAN);
}
else if (getPing(4) > 55) {
motorPulse(FAST, PIVOT_KIRI);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KIRI_3() {
while(getPing(3) < 230){
if (getPing(4) < 35) {
motorPulse(FAST, PIVOT_KANAN);
}
else if (getPing(4) > 50) {
motorPulse(FSAT, PIVOT_KIRI);
}
else motorPulse(FAST, MAJU);
}
}

void MAJU_RATA_KIRI_4() {
while(getPing(0) < 198){
if (getPing(4) < 35) {
motorPulse(SLOW, PIVOT_KANAN);
}
else if (getPing(4) > 40) {
motorPulse(SLOW, PIVOT_KIRI);
}
}
}

```

```

else motorPulse(FAST, MAJU);
}
}

```

```

void MAJU_RATA_KIRI_5() {
for (i = 0; i < 500; i++) {
if (getPing(4) < 35) {
motorPulse(FAST, PIVOT_KANAN);
}
else if (getPing(4) > 50) {
motorPulse(FAST, PIVOT_KIRI);
}
else motorPulse(FAST, MAJU);
}
}

```

```

void MAJU_RATA_KIRI_6() {
for (i = 0; i < 150; i++) {
if (getPing(4) < 35) {
motorPulse(FAST, PIVOT_KANAN);
}
else if (getPing(4) > 50) {
motorPulse(FAST, PIVOT_KIRI);
}
else motorPulse(FAST, MAJU);
}
}

```

```

void MAJU_RATA_KIRI_7() {
while (getPing(1) < 150 || getPing(0) < 200)
{
if (getPing(4) < 35) {
motorPulse(FAST, BELOK_KANAN);
}
else if (getPing(4) > 50) {
motorPulse(FAST, BELOK_KIRI);
}
else motorPulse(FAST, MAJU);
}
}

```

```

void PIVOT_KIRI_1() {
while (getPing(3) > 100) {
motorPulse(FAST, PIVOT_KIRI);
}
}

```

```

void PIVOT_KIRI_2() {
for (i = 0; i < 200; i++) {
motorPulse(FAST, PIVOT_KIRI);
}
}

```

```

void PIVOT_KANAN_1() {
while (getPing(2) > 100) {

```

```

motorPulse(FAST, PIVOT_KANAN);
}
}

```

```

void MUTAR_BALIK() {
while(getPing(0) <165){
if (getPing(1) > getPing(4))
bMemory = 1;
else if (getPing(1) < getPing(4))
bMemory = 2;
while (getPing(0) < 250 || getPing(2) > 150)
{
if (bMemory == 1) {
motorPulse(NORMAL, PIVOT_KANAN);
}
else {
motorPulse(NORMAL, PIVOT_KIRI);
}
}
}
}

```

```

void MAJU_GOAL() {
while (getPing(0) > 30) {
motorPulse(FAST, MAJU);
}
}

```

```

void PIVOT_GOAL() {
while (getPing(2) > 20) {
motorPulse(FAST, PIVOT_KIRI);
}
}

```

```

void GOAL() {
while (getPing(2) > 15 || getPing(3) > 15) {
if (getPing(3) > getPing(2)) {
motorPulse(SLOW, PIVOT_KIRI);
}
else if (getPing(3) < getPing(2)) {
motorPulse(SLOW, PIVOT_KANAN);
}
else motorPulse(SLOW, MUNDUR);
}
tong(BUKA);
tong(TUTUP);
}

```

```

void CARI_PINGPONG_1() {
timer = 0;
 kirimPerintah(POSISI_JAUH,
CAPIT_IDLE);

```

```

printf("RS\r");
delay_ms(100);
printf("CR 18 32\r");
delay_ms(100);
printf("RM 3\r");
delay_ms(100);
printf("TC 100 240 70 240 0 30\r"); //100
240 0 77 0 50
delay_ms(100);

while (cmucam[0] == 0)
    motorPulse(FAST, PIVOT_KIRI);
for (i = 0; i < 100; i++)
    motorPulse(FAST, MAJU);

while (getPing(0) > 150 || getPing(2) <
160) {
    if (getPing(1) > getPing(4)) {
        motorPulse(SLOW,
BELOK_KANAN);
    }
    else if (getPing(1) < getPing(4)) {
        motorPulse(SLOW, BELOK_KIRI);
    }
    else motorPulse(FAST, MAJU);
    if (timer == 12)
        return;
}
    kirimPerintah(POSISI_SEDANG,
CAPIT_IDLE);
    delay_ms(500);

while (cmucam[1] < 125) {
    if (cmucam[0] == 0 || cmucam[1] == 0)
{
        motorPulse(SLOW, BELOK_KIRI);
    }
    else if (cmucam[0] < 45) {
        motorPulse(SLOW, BELOK_KIRI);
    }
    else if (cmucam[0] > 60) {
        motorPulse(SLOW,
BELOK_KANAN);
    }
    else
        motorPulse(FAST, MAJU);
    delay_ms(100);
    if (timer == 12)
        return;
}

```

```

while (cmucam[0] < 45 || cmucam[0] >
60) {
    if (cmucam[0] < 45) {
        motorPulse(SLOW, BELOK_KIRI);
    }
    else if (cmucam[0] > 60) {
        motorPulse(SLOW,
BELOK_KANAN);
    }
    else motorPulse(FAST, MAJU);
    if (timer == 12)
        return;
}

    kirimPerintah(POSISI_DEKAT,
CAPIT_BUKA);
    delay_ms(500);

while (1) {
    if (cmucam[1] > 120)
        motorPulse(SLOW, MUNDUR);
    else if (cmucam[0] < 50) {
        motorPulse(SLOW, BELOK_KIRI);
    }
    else if (cmucam[0] > 60)
        motorPulse(SLOW,
BELOK_KANAN);
    if (timer == 12)
        return;
}

    for (i = 0; i < 120; i++){
        motorPulse(SLOW, MUNDUR);
        kirimPerintah(POSISI_TANGKAP,
CAPIT_IDLE);
        delay_ms(500);
        kirimPerintah(POSISI_TANGKAP,
CAPIT_TUTUP);
    }
    for (i = 0; i < 200; i++){
        motorPulse(FAST, MAJU);
        delay_ms(200);
        kirimPerintah(POSISI_TARUH,
CAPIT_TUTUP);
    }
    for (i = 0; i < 260; i++){
        motorPulse(FAST, MUNDUR);
        kirimPerintah(POSISI_TARUH,
CAPIT_BUKA);
        delay_ms(500);
    }
}

```



```

void CARI_PINGPONG_2() {
    timer = 0;
    kirimPerintah(POSISI_SEDANG,
CAPIT_IDLE);
    delay_ms(500);

    if (getPing(1) > getPing(4))
        bMemory = 1;
    else if (getPing(1) < getPing(4))
        bMemory = 2;
    delay_ms(500);

    while (cmucam[0] == 0 && cmucam[1]
== 0) {
        if (bMemory == 1) {
            motorPulse(SLOW,
PIVOT_KANAN);
        }
        else if (bMemory == 2) {
            motorPulse(SLOW, PIVOT_KIRI);
        }
        if (timer == 12)
            return;
    }

    while (cmucam[1] < 130) {
        if (cmucam[0] == 0 || cmucam[1] == 0)
        {
            motorPulse(SLOW, BELOK_KIRI);
        }
        else if (cmucam[0] < 35) {
            motorPulse(SLOW, BELOK_KIRI);
        }
        else if (cmucam[0] > 50) {
            motorPulse(SLOW,
BELOK_KANAN);
        }
        else
            motorPulse(SLOW, MAJU);
        delay_ms(100);
        if (timer == 12)
            return;
    }
    while (cmucam[0] < 35 || cmucam[0] >
50) {
        if (cmucam[0] < 35) {
            motorPulse(SLOW, BELOK_KIRI);
        }
        else if (cmucam[0] > 50) {
            motorPulse(SLOW,
BELOK_KANAN);
        }
        else break;
        if (timer == 12)
            return; }

        kirimPerintah(POSISI_DEKAT,
CAPIT_BUKA);
        delay_ms(500);

        while (1) {
            if (cmucam[1] > 120)
                motorPulse(SLOW, MUNDUR);
            else if (cmucam[0] < 50) {
                motorPulse(SLOW, BELOK_KIRI);
            }
            else if (cmucam[0] > 60)
                motorPulse(SLOW,
BELOK_KANAN);
            if (timer == 12)
                return;
        }

        for (i = 0; i < 120; i++){
            motorPulse(SLOW, MUNDUR);
            kirimPerintah(POSISI_TANGKAP,
CAPIT_IDLE);
            delay_ms(500);
            kirimPerintah(POSISI_TANGKAP,
CAPIT_TUTUP);
        }
        for (i = 0; i < 200; i++){
            motorPulse(FAST, MAJU);
            delay_ms(200);
            kirimPerintah(POSISI_TARUH,
CAPIT_TUTUP);
        }
        for (i = 0; i < 260; i++){
            motorPulse(FAST, MUNDUR);
            kirimPerintah(POSISI_TARUH,
CAPIT_BUKA);
            delay_ms(500);
        }
        }

        if (terimaInput() == 0x01) {
            //////////////////////////////////ambil pingpong
            1////////////////////////////////
            kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
            MAJU_RATA_KANAN_1();
            PIVOT_KIRI_1();
            RATA_BELAKANG();
            MAJU_RATA_KANAN_1();
            PIVOT_KIRI_1();
            RATA_BELAKANG();
            MAJU_RATA_KANAN_2();
            MAJU_2();
            PIVOT_KIRI_1();
            MAJU_RATA_KANAN_1();

```

```

PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MAJU_RATA_KANAN_3();
MAJU_GOAL();
PIVOT_GOAL();
RATA_BELAKANG();
GOAL();
}

```

```

if (terimaInput() == 0x02) {
//////////ambil pingpong 2//////////
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_RATA_KANAN_2();
MAJU_2();
PIVOT_KIRI_1();
MAJU_RATA_KANAN_1();

```

```

PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MAJU_RATA_KANAN_3();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_2();
PIVOT_KIRI_2();
MAJU_RATA_KANAN_4();
MAJU_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_3();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_4();
PIVOT_KANAN_1();
RATA_BELAKANG();

```

```

MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_6();
MAJU_RATA_KIRI_7();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_3();
MAJU_RATA_KANAN_5();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_3();
PIVOT_KANAN_1();
MAJU_GOAL();
PIVOT_GOAL();
RATA_BELAKANG();
GOAL();
}

```

```

if (terimaInput() == 0x03) {
//////////ambil pingpong
3//////////
 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_RATA_KANAN_2();
MAJU_2();
PIVOT_KIRI_1();
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();

```

```

 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MAJU_RATA_KANAN_3();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_2();
PIVOT_KIRI_2();
MAJU_RATA_KANAN_4();
MAJU_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_3();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_4();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
CARI_PINGPONG_1();
CARI_PINGPONG_2();
 kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);

```

```

MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_5();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_GOAL();
PIVOT_GOAL();
RATA_BELAKANG();
GOAL();
}

```

```

if (terimaInput() == 0x04) {
////////navigasi pingpong //////////
kirimPerintah(POSISI_TARUH,
CAPIT_IDLE);
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_RATA_KANAN_2();
MAJU_2();
PIVOT_KIRI_1();
MAJU_RATA_KANAN_1();
PIVOT_KIRI_1();
RATA_BELAKANG();
MAJU_1();
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_1();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MAJU_RATA_KANAN_3();
PIVOT_KIRI_1();

```

```

RATA_BELAKANG();
MAJU_2();
PIVOT_KIRI_2();
MAJU_RATA_KANAN_4();
MAJU_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_3();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_4();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_1();
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_2();
MAJU_2();
PIVOT_KANAN_1();
MAJU_RATA_KIRI_2();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_RATA_KIRI_6();
MAJU_RATA_KIRI_7();
PIVOT_KANAN_1();
RATA_BELAKANG();
MAJU_3();
MAJU_RATA_KANAN_5();
MUTAR_BALIK();
RATA_BELAKANG();
KELUAR_3();
PIVOT_KANAN_2();
MAJU_GOAL();
PIVOT_GOAL();
RATA_BELAKANG();
}

```

```

//===program untuk pengambilan bola
pingpong=====//

```

PENGONTROL MIKRO ATTINY2313

/*

This program was produced by the
CodeWizardAVR V1.25.3 Professional
Automatic Program Generator
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InfoTech s.r.l.
<http://www.hpinfotech.com>

Project :
Version :
Date : 8/21/2010
Author : WWW
Company : KRCI
Comments :

Chip type : ATtiny2313
Clock frequency : 11.059200
MHz
Memory model : Tiny
External SRAM size : 0
Data Stack size : 32

*****/

#include <tiny2313.h>
#include "gripper.c"

// Declare your global variables here
void main(void) {
// Declare your local variables here
// Crystal Oscillator division factor: 1
#pragma optimize-
CLKPR = 0x80;
CLKPR = 0x00;
#ifdef _OPTIMIZE_SIZE_
#pragma optimize+
#endif

// Input/Output Ports initialization
// Port A initialization
// Func2=In Func1=In Func0=In
// State2=T State1=T State0=T
PORTA = 0x00;
DDRA = 0x00;

// Port B initialization
// Func7=In Func6=In Func5=In
Func4=In Func3=In Func2=Out Func1=Out
Func0=Out

// State7=T State6=T State5=T State4=T
State3=T State2=0 State1=0 State0=0

PORTB = 0x00;
DDRB = 0x07;

// Port D initialization

// Func6=In Func5=In Func4=In
Func3=Out Func2=Out Func1=Out
Func0=Out
// State6=T State5=T State4=T State3=0
State2=0 State1=0 State0=0

PORTD = 0x00;
DDRD = 0x0F;
// Timer/Counter 0 initialization
// Clock source: System Clock
// Clock value: Timer 0 Stopped
// Mode: Normal top=FFh
// OC0A output: Disconnected
// OC0B output: Disconnected
TCCR0A = 0x00;
TCCR0B = 0x00;
TCNT0 = 0x00;
OCR0A = 0x00;
OCR0B = 0x00;

// Timer/Counter 1 initialization
// Clock source: System Clock
// Clock value: Timer 1 Stopped
// Mode: Normal top=FFFFh
// OC1A output: Discon.
// OC1B output: Discon.
// Noise Canceler: Off
// Input Capture on Falling Edge
// Timer 1 Overflow Interrupt: Off
// Input Capture Interrupt: Off
// Compare A Match Interrupt: Off
// Compare B Match Interrupt: Off

TCCR1A = 0x00;
TCCR1B = 0x00;
TCNT1H = 0x00;
TCNT1L = 0x00;
ICR1H = 0x00;
ICR1L = 0x00;
OCR1AH = 0x00;
OCR1AL = 0x00;
OCR1BH = 0x00;
OCR1BL = 0x00;

// External Interrupt(s) initialization
// INT0: Off
// INT1: Off

```

    // Interrupt on any change on pins
    PCINT0-7: Off
    GIMSK = 0x00;
    MCUCR = 0x00;

    // Timer(s)/Counter(s) Interrupt(s)
    initialization
    TIMSK = 0x00;

    // Universal Serial Interface initialization
    // Mode: Disabled
    // Clock source: Register & Counter=no
    clk.
    // USI Counter Overflow Interrupt: Off
    USICR = 0x00;

    // Analog Comparator initialization
    // Analog Comparator: Off
    // Analog Comparator Input Capture by
    Timer/Counter 1: Off
    ACSR = 0x80;

    DDRB.0 = 1;
    DDRB.1 = 1;
    DDRB.2 = 1;
    DDRD.0 = 0;
    DDRD.1 = 0;
    DDRD.2 = 1;
    DDRD.3 = 1;

    while (1) {
        if (PIND.0 == 1 && PIND.1 == 0) {
            delay_ms(10);
            if (PIND.0 == 0 && PIND.1 == 0) {
                delay_ms(30);
                while (1){
                    lengan(POSISI_TANGKAP);
                    if(PIND.0 == 0 && PIND.1 ==
0)
                        capit(CAPIT_BUKA);
                    else if(PIND.0 == 0 &&
PIND.1 == 1)
                        capit(CAPIT_TUTUP);
                    else if(PIND.0 == 1 &&
PIND.1 == 0)
                        capit(CAPIT_IDLE);
                    else
                        break;
                }
            } else if (PIND.0 == 0 && PIND.1
== 1) {
                delay_ms(30);
                while (1){
                    lengan(POSISI_LIHAT_DEKAT);

```

```

                    if(PIND.0 == 0 && PIND.1 ==
0)
                        capit(CAPIT_BUKA);
                    else if(PIND.0 == 0 &&
PIND.1 == 1)
                        capit(CAPIT_TUTUP);
                    else if(PIND.0 == 1 &&
PIND.1 == 0)
                        capit(CAPIT_IDLE);
                    else
                        break;
                }
            } else if (PIND.0 == 1 && PIND.1
== 0) {
                delay_ms(30);
                while (1){
                    lengan(POSISI_LIHAT_JAUH);
                    if(PIND.0 == 0 && PIND.1 ==
0)
                        capit(CAPIT_BUKA);
                    else if(PIND.0 == 0 &&
PIND.1 == 1)
                        capit(CAPIT_TUTUP);
                    else if(PIND.0 == 1 &&
PIND.1 == 0)
                        capit(CAPIT_IDLE);
                    else
                        break;
                }
            }
        } else if (PIND.0 == 1 && PIND.1 ==
1) {
            delay_ms(30);
            while (1){
                lengan(POSISI_TARUH);
                if(PIND.0 == 0 && PIND.1 ==
0)
                    capit(CAPIT_BUKA);
                else if(PIND.0 == 0 &&
PIND.1 == 1)
                    capit(CAPIT_TUTUP);
                else if(PIND.0 == 1 &&
PIND.1 == 0)
                    capit(CAPIT_IDLE);
                else
                    break;
            }
        } else if (PIND.0 == 0 && PIND.1 ==
1) {

```

```

        delay_ms(10);
        if (PIND.0 == 0 && PIND.1 == 0) {
            delay_ms(30);
            while (1){

lengan(POSISI_LIHAT_SEDANG);
        if(PIND.0 == 0 && PIND.1 ==
0)
            capit(CAPIT_BUKA);
        else if(PIND.0 == 0 &&
PIND.1 == 1)
            capit(CAPIT_TUTUP);
        else if(PIND.0 == 1 &&
PIND.1 == 0)
            capit(CAPIT_IDLE);
        else
            break;
    }
}
}
}
}
}

```

//=====gripper=====//

```

#include <delay.h>
#define CAPIT_TUTUP 0
#define CAPIT_BUKA 1
#define CAPIT_IDLE 2

#define POSISI_TANGKAP 0
#define POSISI_LIHAT_DEKAT 1
#define POSISI_LIHAT_JAUH 2
#define POSISI_TARUH 3
#define POSISI_LIHAT_SEDANG 4

//-----capit-----
unsigned char capit(unsigned char mode){
//en portb.0
//in1 portb.1
//in2 portb.2
    switch(mode){
        case CAPIT_TUTUP:{
            PORTB = 0x03;
        }break;
        case CAPIT_BUKA:{
            PORTB = 0x05;
        }break;
        case CAPIT_IDLE:{
            PORTB = 0x00;
        }break;
    }
    return 0;
}

```

//-----lengan-----

```

void lengan(unsigned int derajat){
    switch(derajat){
        case POSISI_TANGKAP:{
            PORTD.2 = 1;
            PORTD.3 = 1;
            delay_us(750);
            PORTD.2 = 0;
            delay_us(1500);
            PORTD.3 = 0;
            delay_us(17800);
        }break;
        case POSISI_LIHAT_DEKAT:{
            PORTD.2 = 1;
            PORTD.3 = 1;
            delay_us(1300);
            PORTD.2 = 0;
            delay_us(400);
            PORTD.3 = 0;
            delay_us(18300);
        }break;
        case POSISI_LIHAT_JAUH:{
            PORTD.2 = 1;
            PORTD.3 = 1;
            delay_us(1200);
            PORTD.3 = 0;
            delay_us(600);
            PORTD.2 = 0;
            delay_us(18200);
        }break;
        case POSISI_TARUH:{
            PORTD.2 = 1;
            PORTD.3 = 1;
            delay_us(900);
            PORTD.3 = 0;
            delay_us(1600);
            PORTD.2 = 0;
            delay_us(17500);
        }break;
        case
        POSISI_LIHAT_SEDANG:{
            PORTD.2 = 1;
            PORTD.3 = 1;
            delay_us(1500);
            PORTD.2 = 0;
            PORTD.3 = 0;
            delay_us(18500);
        }break;
    }
}

```