

Lampiran 4: Program Robot Penjejak Jalur Dengan Sistem Aktivasi 4 Kode PIN Berbasis Mikrokontroler AVR ATmega16

/*****

This program was produced by the
CodeWizardAVR V2.04.6 Evaluation
Automatic Program Generator
© Copyright 1998-2010 Pavel Haiduc, HP InfoTech s.r.l.
<http://www.hpinfotech.com>

Project : Robot Penjejak Jalur Dengan Sistem Aktivasi 4 Kode PIN Berbasis
Mikrokontroler AVR ATmega16
Version : 1
Date : 09/02/2011
Author : Freeware, for evaluation and non-commercial use only
Company : Teknik Elektronika, Fakultas Teknik, Universitas Negeri Jakarta
Comments : -

Chip type : ATmega16L
Program type : Application
AVR Core Clock frequency : 11,059200 MHz
Memory model : Small
External RAM size : 0
Data Stack size : 256
*****/

```
#include <mega16.h>
#include <delay.h>
// Alphanumeric LCD Module functions
#asm
.equ __lcd_port=0x1B ;PORTA
#endasm
#include <lcd.h>
```

```
// Declare your global variables here
#define kypd_baris_1 PORTD.0 //PD.0=Keypad baris 1
#define kypd_baris_2 PORTD.1 //PD.1=Keypad baris 2
#define kypd_baris_3 PORTD.2 //PD.2=Keypad baris 3
#define kypd_baris_4 PORTD.3 //PD.3=Keypad baris 4
#define kypd_kolom_1 PIND.4 //PD.4=Keypad kolom 1
#define tunda delay_ms //delay(mS)=Tunda
#define detik 1000 //1000 mS= 1 detik
#define ON 1 //Logika 1 = ON
#define OFF 0 //Logika 0 = OFF
```

```
*****/
//****Dasar Sub-rutin Program*****/
void robot_deaktivasi(void);
void cek_bintang(void);
void masukkan_pin(void);
```

```

void cek_keypad(void);
void batalkan_pin(void);
void cek_no_pin(void);
void pin_ok(void);
void robot_diaktifkan(void);
void peringatan(void);

/****Global Variable*****/
unsigned int dt,tombol,input_pin,penekanan,i;
unsigned long int no_pin,pin1,pin2,pin3,pin4;

/****Program utama*****/
void main(void)
{
// Declare your local variables here

// Input/Output Ports initialization
// Port A initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In Func0=In
// State7=T State6=T State5=T State4=T State3=T State2=T State1=T State0=T
PORTA=0x00;
DDRA=0x00;

// Port B initialization
// Func7=In Func6=In Func5=In Func4=In Func3=In Func2=In Func1=In Func0=In
// State7=P State6=P State5=P State4=P State3=P State2=P State1=P State0=P
PORTB=0xFF;
DDRB=0x00;

// Port C initialization
// Func7=Out Func6=Out Func5=Out Func4=Out Func3=Out Func2=Out Func1=Out
Func0=Out
// State7=1 State6=1 State5=1 State4=1 State3=1 State2=1 State1=1 State0=1
PORTC=0xFF;
DDRC=0xFF;

// Port D initialization
// Func7=Out Func6=In Func5=In Func4=In Func3=Out Func2=Out Func1=Out
Func0=Out
// State7=1 State6=P State5=P State4=P State3=1 State2=1 State1=1 State0=1
PORTD=0xFF;
DDRD=0x8F;

// Timer/Counter 0 initialization
// Clock source: System Clock
// Clock value: Timer 0 Stopped
// Mode: Normal top=FFh
// OC0 output: Disconnected
TCCR0=0x00;
TCNT0=0x00;

```

```
OCR0=0x00;

// Timer/Counter 1 initialization
// Clock source: System Clock
// Clock value: Timer1 Stopped
// Mode: Normal top=FFFFh
// OC1A output: Discon.
// OC1B output: Discon.
// Noise Canceler: Off
// Input Capture on Falling Edge
// Timer1 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;

// Timer/Counter 2 initialization
// Clock source: System Clock
// Clock value: Timer2 Stopped
// Mode: Normal top=FFh
// OC2 output: Disconnected
ASSR=0x00;
TCCR2=0x00;
TCNT2=0x00;
OCR2=0x00;

// External Interrupt(s) initialization
// INT0: Off
// INT1: Off
// INT2: Off
MCUCR=0x00;
MCUCSR=0x00;

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

// Analog Comparator initialization
// Analog Comparator: Off
// Analog Comparator Input Capture by Timer/Counter 1: Off
ACSR=0x80;
SFIOR=0x00;
```

```

// LCD module initialization
lcd_init(16);

while(PINB!=0xFF)      //syarat looping
{
    robot_deaktivasi(); //memanggil sub rutin robot_deaktivasi()
}
while(PINB==0xFF)     //syarat looping
{
    robot_deaktivasi(); //jika PINB==0xFF maka memanggil sub rutin
                        robot_deaktivasi()
    cek_bintang();     //memanggil sub rutin cek_bintang()
}
/****Global Enable Interrupts*****/
#asm("sei")
while (1)              //program utama
    // Place your code here
    {
        robot_diaktifkan(); //memanggil sub rutin robot_diaktifkan()
    }
/****Sub-rutin peringatan*****/
void peringatan(void)
{
for(i=1;i<=15;i++)    //syarat looping
    {
        //lcd menampilkan tulisan "PERINGATAN ADA
        PENJAHAT"

        lcd_clear();
        lcd_gotoxy(0,0);
        lcd_putsf("PERINGATAN");
        lcd_gotoxy(0,1);
        lcd_putsf("ADA PENJAHAT!!!");
        delay_ms(1000);
    };
}
/****Sub-rutin Robot_Deaktivasi*****/
void robot_deaktivasi(void)
{
    lcd_clear();      // LCD menampilkan tulisan "ROBOT DEAKTIVASI"
    lcd_gotoxy(7,0);
    lcd_putsf("\x5b\x78\x5d");
    lcd_gotoxy(0,1);
    lcd_putsf("ROBOT DEAKTIVASI");
    PORTC.0=0;       //motor dc diam
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
}

```

```

        delay_ms(1000); //tunda 1 detik
    }
    /****Sub-rutin cek tombol bintang *****/
    void cek_bintang(void)
    {
        kypd_baris_4=0;
        if(kypd_kolom_1==0)
        {
            lcd_clear();
            lcd_gotoxy(0,0);
            lcd_putsf("MASUKKAN PIN");// LCD menampilkan tulisan "MASUKKAN PIN"
            lcd_gotoxy(0,1);
            lcd_putsf("x3e");
            delay_ms(100);
            PORTC.0=0;    //motor DC diam
            PORTC.1=0;
            PORTC.2=0;
            PORTC.3=0;
            PORTC.4=0;
            PORTC.5=0;
            kypd_kolom_1=1;
            delay_ms(100);
            kypd_baris_4=1;
            input_pin=0;
            penekanan=0;
            no_pin=0;
            cek_keypad(); //memanggil sub rutin cek_keypad()
        }
    };
}
/****Sub-rutin Cek Nomor PIN*****/
void cek_no_pin(void)
{
    no_pin=pin1+pin2+pin3+pin4;
    switch(no_pin)
    {
        case 2163:    //kasus pin 2163
            lcd_clear();
            lcd_gotoxy(1,1);
            lcd_putsf("Hanif Azhari");
            delay_ms(100);
            pin_ok(); //memanggil sub rutin pin_ok()
            break;

        case 5431:    //kasus pin 5431
            lcd_clear();
            lcd_gotoxy(1,1);
            lcd_putsf("Wisnu D");
            delay_ms(100);
            pin_ok();
            break;    // memanggil sub rutin pin_ok()
    }
}

```

```

case 1747:      //kasus pin 1747
    lcd_clear();
    lcd_gotoxy(1,1);
    lcd_putsf("Yusuf B");
    delay_ms(100);
    pin_ok();   // memanggil sub rutin pin_ok()
    break;

default:
    penekanan=penekanan+1;      //tiap penekanan tambah 1
    if(penekanan==3)           //jika penekanan sudah 3 kali
    {
        peringatan();         //memanggil sub rutin peringatan()
    }
    else                        //yang lain
    {
        lcd_clear();
        lcd_gotoxy(0,0);
        lcd_putsf("PIN SALAH");//LCD menampilkan "PIN SALAH"
        lcd_gotoxy(0,1);
        lcd_putsf("XXXXXXXXXXXXXXXXXXXX");
        delay_ms(2000);
        input_pin=0;
        no_pin=0;
        lcd_clear();
        lcd_gotoxy(0,0);
        lcd_putsf("MASUKKAN PIN");//LCD menampilkan "MASUKKAN PIN"
        lcd_gotoxy(0,1);
        lcd_putsf("\x3e");
        cek_keypad();          //memanggil sub rutin cek_keypad()
    };
};
}

/****Sub-rutin Masukkan Kode PIN*****/
void masukkan_pin(void)
{
    input_pin=input_pin+1;
    switch(input_pin)
    {
        case 1:
            pin1=1000UL*tombol;
            lcd_gotoxy(1,1);
            lcd_putsf("X");
            delay_ms(300);
            cek_keypad();      //memanggil sub rutin cek_keypad()
            break;
    }
}

```

```

    case 2:
    pin2=100UL*tombol;
    lcd_gotoxy(2,1);
    lcd_putsf("X");
    delay_ms(300);
    cek_keypad(); //memanggil sub rutin cek_keypad()
    break;

    case 3:
    pin3=10UL*tombol;
    lcd_gotoxy(3,1);
    lcd_putsf("X");
    delay_ms(300);
    cek_keypad(); //memanggil sub rutin cek_keypad()
    break;

    case 4:
    pin4=1UL*tombol;
    lcd_gotoxy(4,1);
    lcd_putsf("X");
    delay_ms(300);
    cek_no_pin(); //memanggil sub rutin cek_no_pin()
    break;
};
}
/****Sub-rutin Batalkan Masukkan Kode PIN*****/
void batalkan_pin(void)
{
    lcd_clear();
    lcd_gotoxy(0,0);
    lcd_putsf("KODE PIN BATAL");//LCD menampilkan "KODE PIN BATAL"
    lcd_gotoxy(0,1);
    lcd_putsf("\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5\xa5");
    delay_ms(2000);
    robot_deaktivasi(); //memanggil sub rutin robot_deaktivasi()
    cek_keypad(); //memanggil sub rutin cek_keypad()
}

/****Sub-rutin PIN OK*****/
void pin_ok(void)
{
    lcd_clear();
    lcd_gotoxy(7,0);
    lcd_putsf("\x5b\xdb\x5d");
    lcd_gotoxy(0,1);
    lcd_putsf("ROBOT DIAKTIFKAN");
    delay_ms(2000);
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=1;
}

```

```

PORTC.3=0;
PORTC.4=0;
PORTC.5=0;
delay_ms(200);
robot_diaktifkan();
}

/****Sub-rutin Cek Keypad*****/
void cek_keypad(void)
{
while(input_pin<4)
{
kypd_baris_1=0;
dt=(~PIND&0xF0); //scan baris 1
switch(dt)
{
case 0x10: //kolom 1==no.1
tombol=1;
masukkan_pin(); //memanggil sub rutin masukkan_pin()
break;

case 0x20: //kolom 2==no.2
tombol=2;
masukkan_pin();
break;

case 0x40: //kolom 3==no.3
tombol=3;
masukkan_pin();
break;
};

kypd_baris_1=1;
kypd_baris_2=0;
dt=(~PIND&0xF0); //scan baris 2
switch(dt)
{
case 0x10: //kolom 1==no.4
tombol=4;
masukkan_pin();
break;

case 0x20: //kolom 2==no.5
tombol=5;
masukkan_pin();
break;

case 0x40: //kolom 3==no.6
tombol=6;
masukkan_pin();

```



```

        break;
    };

    kypd_baris_2=1;
    kypd_baris_3=0;
    dt=(~PIND&0xF0);          //scan baris 3
    switch(dt)
    {
        case 0x10:            //kolom 1==no.7
            tombol=7;
            masukkan_pin();
            break;

        case 0x20:            //kolom 2==no.8
            tombol=8;
            masukkan_pin();
            break;

        case 0x40:            //kolom 3==no.9
            tombol=9;
            masukkan_pin();
            break;
    };

    kypd_baris_3=1;
    kypd_baris_4=0;
    dt=(~PIND&0xF0);          //scan baris 4
    switch(dt)
    {
        case 0x10:            //kolom 1==tombol *
            masukkan_pin();
            break;

        case 0x20:            //kolom 2==tombol 0
            tombol=0;
            masukkan_pin();
            break;

        case 0x40:            //kolom 3==karakter #
            batalkan_pin(); //memanggil sub rutin batalkan_pin()
            break;
    };
    kypd_baris_4=1;
};
}

```

```

/****sub-rutin robot diaktifkan*****/
void robot_diaktifkan(void)
{
  lcd_clear();
  lcd_gotoxy(7,0);
  lcd_putsf("\x5b\xdb\x5d");
  lcd_gotoxy(0,1);
  lcd_putsf("ROBOT DIAKTIFKAN");
  if (PINB==0xC4) //sinyal dari IR sensor tengah
  {
    //==Robot Maju==
    //motor kiri (maju), // motor kanan (maju)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
  }
  if (PINB==0xC2) //sinyal IR sensor kiri 2
  {
    //==Robot Belok kiri==
    //motor kiri (stop), //motor kanan (maju)
    PORTC.0=0;
    PORTC.1=0;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
  }
  if (PINB==0xC6)
  {
    //==Robot Belok kiri==
    //motor kiri (stop), //motor kanan (maju)
    PORTC.0=0;
    PORTC.1=0;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
  }
  if (PINB==0xC7)
  {
    //==Robot Belok kiri==
    //motor kiri (stop), //motor kanan (maju)
    PORTC.0=0;
    PORTC.1=0;
  }
}

```

```

    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xC3)
{
    //==Robot Belok kiri==
    //motor kiri (stop), //motor kanan (maju)
    PORTC.0=0;
    PORTC.1=0;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xC1) //sinyal IR sensor kiri 1
{
    //==Robot Belok Kiri Tajam==
    //motor kiri (mundur), //motor kanan (maju cepat)
    PORTC.0=0;
    PORTC.1=1;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xC8) //sinyal IR sensor kanan 2
{
    //==Robot Belok kanan==
    //motor kiri (maju), //motor kanan (stop)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xCC)
{
    //==Robot Belok kanan==
    //motor kiri (maju), //motor kanan (stop)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;

```

```

    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xDC)
{
    //==Robot Belok kanan==
    //motor kiri (maju), //motor kanan (stop)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xDC)
{
    //==Robot Belok kanan==
    //motor kiri (maju), //motor kanan (stop)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xD8)
{
    //==Robot Belok kanan==
    //motor kiri (maju), //motor kanan (stop)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(100);
}
if (PINB==0xD0) //sinyal IR sensor kanan 1
{
    //==Robot Belok Kanan Tajam==
    //motor kiri (maju cepat), //motor kanan (mundur)
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=1;
    PORTC.4=0;
    PORTC.5=0;
}

```

```

    delay_ms(100);
  }
  if (PINB==0xE4) //sinyal sensor sprayer
  {
    //Robot Berhenti,//motor sprayer berputar bolak-balik,//motor sprayer
    berhenti,//motor maju 500 ms
    PORTC.0=0;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=1;
    PORTC.5=0;
    delay_ms(1000);
    PORTC.0=0;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=1;
    delay_ms(500);
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(500);
  }
  if (PINB==0xFF)
  {
    //==Robot berhenti, tiap siklus selama 15 detik==
    //motor kiri (stop), // motor kanan (stop)
    PORTC.0=0;
    PORTC.1=0;
    PORTC.2=0;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(15000);
    PORTC.0=1;
    PORTC.1=0;
    PORTC.2=1;
    PORTC.3=0;
    PORTC.4=0;
    PORTC.5=0;
    delay_ms(500);
  }
};

```