

LAMPIRAN - A

Instruksi Mikrokontroler

```

#include <mega16.h>
#include <stdio.h>
#include <delay.h>
bit kirim;
char temp,temp1=6,temp2=15,temp3=6,temp4=0,temp5=0;

#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

// This flag is set on USART Receiver buffer overflow
bit rx_buffer_overflow;

// 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;
};
};kirim=1;
}

#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>

// Declare your global variables here

```

```

void servo (char delay1, char delay2, char delay3)
{
    char i;
    PORTA.0=1;
    for(i=0;i<delay1;i++)
    {delay_us(100);}
    PORTA.0=0;
    PORTA.1=1;
    for(i=0;i<delay2;i++)
    {delay_us(100);}
    PORTA.1=0;
    PORTA.2=1;
    for(i=0;i<delay3;i++)
    {delay_us(100);}
    PORTA.2=0;
    return;
}

```

```

void dccw (char delay4)
{
    char icw,iicw;
    PORTC.0=1;
    for(icw=0;icw<delay4;icw++)
    {for(iicw=0;iicw<8;iicw++)
    {servo(temp1,temp2,temp3);
    delay_ms(15);}
    }
    PORTC.0=0;
    return;}

```

```

void dcccw (char delay5)
{
    char iccw,iiccw;
    PORTC.1=1;
    for(iccw=0;iccw<delay5;iccw++)
    {for(iiccw=0;iiccw<8;iiccw++)
    {servo(temp1,temp2,temp3);
    delay_ms(15);}
    }
    PORTC.1=0;
    return;}

```

```

void main(void)
{
    // Declare your local variables here

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

    // Port B 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

```

```

PORTB=0x00;
DDRB=0x00;

// Port C 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
PORTC=0x00;
DDRC=0xFF;

// Port D initialization
// Func7=Out Func6=Out Func5=Out Func4=Out Func3=Out Func2=Out Func1=Out Func0=Out
// State7=0 State6=0 State5=0 State4=0 State3=0 State2=0 State1=0 State0=0
PORTD=0x00;
DDRD=0xFF;

// 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: 1500.000 kHz
// Mode: Ph. & fr. cor. PWM top=ICR1
// OC1A output: Non-Inv.
// OC1B output: Non-Inv.
// 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=0xA0;
TCCR1B=0x12;
TCNT1H=0x00;
TCNT1L=0x00;
ICR1H=0x3A;
ICR1L=0x98;
OCR1AH=0x01;
OCR1AL=0xC2;
OCR1BH=0x01;
OCR1BL=0xC2;

// Timer/Counter 2 initialization
// Clock source: System Clock
// Clock value: Timer 2 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;

// USART initialization
// Communication Parameters: 8 Data, 1 Stop, No Parity
// USART Receiver: On
// USART Transmitter: On
// USART Mode: Asynchronous
// USART Baud rate: 9600
UCSRA=0x00;
UCSRB=0xD8;
UCSRC=0x86;
UBRRH=0x00;
UBRRL=0x4D;

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

// Global enable interrupts
#asm("sei")

while (1)
{OCR1A=1198;OCR1B=1198;
awal:
if(kirim==1)
{ kirim=0;
temp=getchar();
switch(temp)
{
case '0':PORTA=0;OCR1A=1198;OCR1B=1198;temp1=6;temp2=6;temp3=6;break;
case '1':PORTA=0;PORTA.7=1;goto servo1;break;
case '2':PORTA=0;PORTA.6=1;goto servo2;break;
case '3':PORTA=0;PORTA.5=1;goto servo3;break;
case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
case '5':PORTA=0xf0;goto dcmtrcw;break;
case '6':PORTA=0xf0;goto dcmtrccw;break;
}}

servo(temp1,temp2,temp3);
delay_ms(15);
goto awal;

dcmtrcw:
if(kirim==1)
{ kirim=0;
temp=getchar();
switch(temp)
{
case 'a':temp4=2;break;

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```

    case 'b':temp4=4;break;
    case 'c':temp4=6;break;
    case 'd':temp4=8;break;
    case 'e':temp4=10;break;
    case 'f':temp4=12;break;
    case 'g':temp4=14;break;
    case 'h':temp4=16;break;
    case 'i':temp4=18;break;
    case 'j':temp4=20;break;
    case 'k':temp4=22;break;
    case 'l':temp4=24;break;
    case 'm':temp4=26;break;
    case 'n':temp4=28;break;
    case 'o':temp4=30;break;
    case 'p':temp4=32;break;
    case 'q':temp4=34;break;
    case 'r':temp4=36;break;
    case '0':PORTA=1;OCR1A=600;OCR1B=600;temp1=6;temp2=6;temp3=6;break;
    case '1':PORTA=0;PORTA.7=1;goto servo1;break;
    case '2':PORTA=0;PORTA.6=1;goto servo2;break;
    case '3':PORTA=0;PORTA.5=1;goto servo3;break;
    case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
    case '5':PORTA=0xf0;goto dcmtrcw;break;
    case '6':PORTA=0xf0;goto dcmtrccw;break;
  }}
servo(temp1,temp2,temp3);
delay_ms(15);
dccw(temp4);
temp4=0;
goto dcmtrcw;

dcmtrccw:
  if(kirim==1)
  { kirim=0;
    temp=getchar();
    switch(temp)
    {
      case 'a':temp5=2;break;
      case 'b':temp5=4;break;
      case 'c':temp5=6;break;
      case 'd':temp5=8;break;
      case 'e':temp5=10;break;
      case 'f':temp5=12;break;
      case 'g':temp5=14;break;
      case 'h':temp5=16;break;
      case 'i':temp5=18;break;
      case 'j':temp5=20;break;
      case 'k':temp5=22;break;
      case 'l':temp5=24;break;
      case 'm':temp5=26;break;
      case 'n':temp5=28;break;
      case 'o':temp5=30;break;
      case 'p':temp5=32;break;
      case 'q':temp5=34;break;
      case 'r':temp5=36;break;
      case '0':PORTA=1;OCR1A=600;OCR1B=600;temp1=6;temp2=6;temp3=6;break;
      case '1':PORTA=0;PORTA.7=1;goto servo1;break;

```

```

        case '2':PORTA=0;PORTA.6=1;goto servo2;break;
        case '3':PORTA=0;PORTA.5=1;goto servo3;break;
        case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
        case '5':PORTA=0xf0;goto dcmtrcw;break;
        case '6':PORTA=0xf0;goto dcmtrccw;break;
    }}
    servo(temp1,temp2,temp3);
    delay_ms(15);
    dcccw(temp5);
    temp5=0;
    goto dcmtrccw;

srvocr:
    if(kirim==1)
    { kirim=0;
      temp=getchar();
      switch(temp)
      {
        case 'a':OCR1A=550;OCR1B=550;break;
        case 'b':OCR1A=622;OCR1B=622;break;
        case 'c':OCR1A=694;OCR1B=694;break;
        case 'd':OCR1A=766;OCR1B=766;break;
        case 'e':OCR1A=838;OCR1B=838;break;
        case 'f':OCR1A=910;OCR1B=910;break;
        case 'g':OCR1A=982;OCR1B=982;break;
        case 'h':OCR1A=1054;OCR1B=1054;break;
        case 'i':OCR1A=1126;OCR1B=1126;break;
        case 'j':OCR1A=1198;OCR1B=1198;break;
        case '0':PORTA=0;OCR1A=550;OCR1B=550;temp1=6;temp2=6;temp3=6;break;
        case '1':PORTA=0;PORTA.7=1;goto servo1;break;
        case '2':PORTA=0;PORTA.6=1;goto servo2;break;
        case '3':PORTA=0;PORTA.5=1;goto servo3;break;
        case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
        case '5':PORTA=0xf0;goto dcmtrcw;break;
        case '6':PORTA=0xf0;goto dcmtrccw;break;
      }
    }
    servo(temp1,temp2,temp3);
    delay_ms(15);
    goto srvocr;

servo1:
    if(kirim==1)
    { kirim=0;
      temp=getchar();
      switch(temp)
      {
        case 'a':temp1=6;break;
        case 'b':temp1=7;break;
        case 'c':temp1=8;break;
        case 'd':temp1=9;break;
        case 'e':temp1=10;break;
        case 'f':temp1=11;break;
        case 'g':temp1=12;break;
        case 'h':temp1=13;break;
        case 'i':temp1=14;break;
        case 'j':temp1=15;break;
        case 'k':temp1=16;break;

```

```

    case 'l':temp1=17;break;
    case 'm':temp1=18;break;
    case 'n':temp1=19;break;
    case 'o':temp1=20;break;
    case 'p':temp1=21;break;
    case 'q':temp1=22;break;
    case 'r':temp1=23;break;
    case 's':temp1=24;break;
    case '0':PORTA=0;OCR1A=600;OCR1B=600;temp1=6;temp2=6;temp3=6;break;
    case '1':PORTA=0;PORTA.7=1;goto servo1;break;
    case '2':PORTA=0;PORTA.6=1;goto servo2;break;
    case '3':PORTA=0;PORTA.5=1;goto servo3;break;
    case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
    case '5':PORTA=0xf0;goto dcmtrcw;break;
    case '6':PORTA=0xf0;goto dcmtrccw;break;
  }}
servo(temp1,temp2,temp3);
delay_ms(15);
goto servo1;

```

```

servo2:
  if(kirim==1)
  { kirim=0;
    temp=getchar();
    switch(temp)
    {
      case 'a':temp2=6;break;
      case 'b':temp2=7;break;
      case 'c':temp2=8;break;
      case 'd':temp2=9;break;
      case 'e':temp2=10;break;
      case 'f':temp2=11;break;
      case 'g':temp2=12;break;
      case 'h':temp2=13;break;
      case 'i':temp2=14;break;
      case 'j':temp2=15;break;
      case 'k':temp2=16;break;
      case 'l':temp2=17;break;
      case 'm':temp2=18;break;
      case 'n':temp2=19;break;
      case 'o':temp2=20;break;
      case 'p':temp2=21;break;
      case 'q':temp2=22;break;
      case 'r':temp2=23;break;
      case 's':temp2=24;break;
      case '0':PORTA=0;OCR1A=600;OCR1B=600;temp1=6;temp2=6;temp3=6;break;
      case '1':PORTA=0;PORTA.7=1;goto servo1;break;
      case '2':PORTA=0;PORTA.6=1;goto servo2;break;
      case '3':PORTA=0;PORTA.5=1;goto servo3;break;
      case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
      case '5':PORTA=0xf0;goto dcmtrcw;break;
      case '6':PORTA=0xf0;goto dcmtrccw;break;
    }}
servo(temp1,temp2,temp3);
delay_ms(15);
goto servo2;

```

```

servo3:
    if(kirim==1)
    {
        kirim=0;
        temp=getchar();
        switch(temp)
        {
            case 'a':temp3=6;break;
            case 'b':temp3=7;break;
            case 'c':temp3=8;break;
            case 'd':temp3=9;break;
            case 'e':temp3=10;break;
            case 'f':temp3=11;break;
            case 'g':temp3=12;break;
            case 'h':temp3=13;break;
            case 'i':temp3=14;break;
            case 'j':temp3=15;break;
            case 'k':temp3=16;break;
            case 'l':temp3=17;break;
            case 'm':temp3=18;break;
            case 'n':temp3=19;break;
            case 'o':temp3=20;break;
            case 'p':temp3=21;break;
            case 'q':temp3=22;break;
            case 'r':temp3=23;break;
            case 's':temp3=24;break;
            case '0':PORTA=0;OCR1A=600;OCR1B=600;temp1=6;temp2=6;temp3=6;break;
            case '1':PORTA=0;PORTA.7=1;goto servo1;break;
            case '2':PORTA=0;PORTA.6=1;goto servo2;break;
            case '3':PORTA=0;PORTA.5=1;goto servo3;break;
            case '4':PORTA=0;PORTA.4=1;goto srvocr;break;
            case '5':PORTA=0xf0;goto dcmtrcw;break;
            case '6':PORTA=0xf0;goto dcmtrccw;break;
        }
    }
    servo(temp1,temp2,temp3);
    delay_ms(15);
    goto servo3;
};
}

```

LAMPIRAN - B

Instruksi Program AoS

```
Dim srv1, srv2, srv3, srv4, dc, ctr As Integer
```

```
Private Sub Command1_Click()  
Label1.Caption = "TRAINING MODE"  
Label1.Visible = True  
HScroll1.Visible = True  
HScroll2.Visible = True  
HScroll3(0).Visible = True  
HScroll3(1).Visible = True  
Command1.Visible = False  
Command2.Visible = False  
Command3.Visible = True  
Command4.Visible = True  
Command5.Visible = True  
Command7.Visible = True  
Command8.Visible = True  
Command9.Visible = True  
Text1.Visible = True  
Text2.Visible = True  
Text3.Visible = True  
Text4.Visible = True  
Line1.Visible = True  
Line2.Visible = True  
Line3.Visible = True  
Line4.Visible = True  
Line5.Visible = True  
Line6.Visible = True  
Line7.Visible = True  
Timer1.Enabled = True  
End Sub
```

```
Private Sub Command2_Click()  
Label1.Caption = "PICK and PLACE simulation"  
Label1.Visible = True  
Label2.Visible = True  
Text5.Visible = True  
Command1.Visible = False  
Command2.Visible = False  
Command5.Visible = True
```

```
cdc1 = InputBox("clockwise/counter-clockwise (0/1) :", "PICK input", 0)  
dc1 = InputBox("dc motor (0-180) :", "'PICK' input", 0)  
s11 = InputBox("servo1&2 (30-90) :", "'PICK' input", 30)  
s21 = InputBox("servo3 (50-120) :", "'PICK' input", 50)  
s31 = InputBox("servo4 (0-180) :", "'PICK' input", 0)
```

```
cdc2 = InputBox("clockwise/counter-clockwise (0/1) :", "'PLACE' input", 0)  
dc2 = InputBox("dc motor (0-180) :", "'PLACE' input", 0)  
s12 = InputBox("servo1&2 (30-90) :", "'PLACE' input", 30)  
s22 = InputBox("servo3 (50-120) :", "'PLACE' input", 50)  
s32 = InputBox("servo4 (0-180) :", "'PLACE' input", 0)
```

```
ctr = InputBox("pengulangan :", "input counter", 1)  
ctr2 = 0
```

```
MSComm1.Output = "3"  
Call Pause(1)
```

```
MSComm1.Output = "j"  
Call Pause(1)
```

```
For i = 0 To ctr  
Text5.Text = ctr2
```

```
If cdc1 = 0 Then  
MSComm1.Output = "5"  
Elseif cdc1 = 1 Then  
MSComm1.Output = "6"  
End If  
Call Pause(1)  
Select Case (dc1)  
Case "10": MSComm1.Output = "a"  
Case "20": MSComm1.Output = "b"  
Case "30": MSComm1.Output = "c"  
Case "40": MSComm1.Output = "d"  
Case "50": MSComm1.Output = "e"  
Case "60": MSComm1.Output = "f"  
Case "70": MSComm1.Output = "g"  
Case "80": MSComm1.Output = "h"  
Case "90": MSComm1.Output = "i"  
Case "100": MSComm1.Output = "j"  
Case "110": MSComm1.Output = "k"  
Case "120": MSComm1.Output = "l"  
Case "130": MSComm1.Output = "m"  
Case "140": MSComm1.Output = "n"  
Case "150": MSComm1.Output = "o"  
Case "160": MSComm1.Output = "p"  
Case "170": MSComm1.Output = "q"  
Case "180": MSComm1.Output = "r"  
End Select  
Call Pause(1)
```

```
MSComm1.Output = "4"  
Call Pause(1)  
Select Case (s11)  
Case "30": MSComm1.Output = "b"  
Case "40": MSComm1.Output = "c"  
Case "50": MSComm1.Output = "d"  
Case "60": MSComm1.Output = "e"  
Case "70": MSComm1.Output = "f"  
Case "80": MSComm1.Output = "g"  
Case "90": MSComm1.Output = "h"  
End Select  
Call Pause(1)
```

```
MSComm1.Output = "1"  
Call Pause(1)  
Select Case (s21)  
Case "50": MSComm1.Output = "f"  
Case "60": MSComm1.Output = "g"  
Case "70": MSComm1.Output = "h"  
Case "80": MSComm1.Output = "i"  
Case "90": MSComm1.Output = "j"  
Case "100": MSComm1.Output = "k"  
Case "110": MSComm1.Output = "l"  
Case "120": MSComm1.Output = "m"
```

End Select
Call Pause(1)

MSComm1.Output = "2"
Call Pause(1)
Select Case (s31)
Case "0": MSComm1.Output = "a"
Case "10": MSComm1.Output = "b"
Case "20": MSComm1.Output = "c"
Case "30": MSComm1.Output = "d"
Case "40": MSComm1.Output = "e"
Case "50": MSComm1.Output = "f"
Case "60": MSComm1.Output = "g"
Case "70": MSComm1.Output = "h"
Case "80": MSComm1.Output = "i"
Case "90": MSComm1.Output = "j"
Case "100": MSComm1.Output = "k"
Case "110": MSComm1.Output = "l"
Case "120": MSComm1.Output = "m"
Case "130": MSComm1.Output = "n"
Case "140": MSComm1.Output = "o"
Case "150": MSComm1.Output = "p"
Case "160": MSComm1.Output = "q"
Case "170": MSComm1.Output = "r"
Case "180": MSComm1.Output = "s"
End Select
Call Pause(1)

MSComm1.Output = "3"
Call Pause(1)
MSComm1.Output = "a"
Call Pause(1)

If cdc1 = 0 Then
MSComm1.Output = "6"
Elseif cdc1 = 1 Then
MSComm1.Output = "5"
End If
Call Pause(1)
Select Case (dc1)
Case "10": MSComm1.Output = "a"
Case "20": MSComm1.Output = "b"
Case "30": MSComm1.Output = "c"
Case "40": MSComm1.Output = "d"
Case "50": MSComm1.Output = "e"
Case "60": MSComm1.Output = "f"
Case "70": MSComm1.Output = "g"
Case "80": MSComm1.Output = "h"
Case "90": MSComm1.Output = "i"
Case "100": MSComm1.Output = "j"
Case "110": MSComm1.Output = "k"
Case "120": MSComm1.Output = "l"
Case "130": MSComm1.Output = "m"
Case "140": MSComm1.Output = "n"
Case "150": MSComm1.Output = "o"
Case "160": MSComm1.Output = "p"
Case "170": MSComm1.Output = "q"
Case "180": MSComm1.Output = "r"

```
End Select
Call Pause(1)
```

```
If cdc2 = 0 Then
MSComm1.Output = "5"
ElseIf cdc2 = 1 Then
MSComm1.Output = "6"
End If
Call Pause(1)
Select Case (dc2)
Case "10": MSComm1.Output = "a"
Case "20": MSComm1.Output = "b"
Case "30": MSComm1.Output = "c"
Case "40": MSComm1.Output = "d"
Case "50": MSComm1.Output = "e"
Case "60": MSComm1.Output = "f"
Case "70": MSComm1.Output = "g"
Case "80": MSComm1.Output = "h"
Case "90": MSComm1.Output = "i"
Case "100": MSComm1.Output = "j"
Case "110": MSComm1.Output = "k"
Case "120": MSComm1.Output = "l"
Case "130": MSComm1.Output = "m"
Case "140": MSComm1.Output = "n"
Case "150": MSComm1.Output = "o"
Case "160": MSComm1.Output = "p"
Case "170": MSComm1.Output = "q"
Case "180": MSComm1.Output = "r"
End Select
Call Pause(1)
```

```
MSComm1.Output = "4"
Call Pause(1)
Select Case (s12)
Case "30": MSComm1.Output = "b"
Case "40": MSComm1.Output = "c"
Case "50": MSComm1.Output = "d"
Case "60": MSComm1.Output = "e"
Case "70": MSComm1.Output = "f"
Case "80": MSComm1.Output = "g"
Case "90": MSComm1.Output = "h"
End Select
Call Pause(1)
```

```
MSComm1.Output = "1"
Call Pause(1)
Select Case (s22)
Case "50": MSComm1.Output = "f"
Case "60": MSComm1.Output = "g"
Case "70": MSComm1.Output = "h"
Case "80": MSComm1.Output = "i"
Case "90": MSComm1.Output = "j"
Case "100": MSComm1.Output = "k"
Case "110": MSComm1.Output = "l"
Case "120": MSComm1.Output = "m"
End Select
Call Pause(1)
```

```
MSComm1.Output = "2"
Call Pause(1)
Select Case (s32)
Case "0": MSComm1.Output = "a"
Case "10": MSComm1.Output = "b"
Case "20": MSComm1.Output = "c"
Case "30": MSComm1.Output = "d"
Case "40": MSComm1.Output = "e"
Case "50": MSComm1.Output = "f"
Case "60": MSComm1.Output = "g"
Case "70": MSComm1.Output = "h"
Case "80": MSComm1.Output = "i"
Case "90": MSComm1.Output = "j"
Case "100": MSComm1.Output = "k"
Case "110": MSComm1.Output = "l"
Case "120": MSComm1.Output = "m"
Case "130": MSComm1.Output = "n"
Case "140": MSComm1.Output = "o"
Case "150": MSComm1.Output = "p"
Case "160": MSComm1.Output = "q"
Case "170": MSComm1.Output = "r"
Case "180": MSComm1.Output = "s"
End Select
Call Pause(1)
```

```
MSComm1.Output = "3"
Call Pause(1)
MSComm1.Output = "j"
Call Pause(1)
```

```
If cdc2 = 0 Then
MSComm1.Output = "6"
ElseIf cdc2 = 1 Then
MSComm1.Output = "5"
End If
Call Pause(1)
Select Case (dc2)
Case "10": MSComm1.Output = "a"
Case "20": MSComm1.Output = "b"
Case "30": MSComm1.Output = "c"
Case "40": MSComm1.Output = "d"
Case "50": MSComm1.Output = "e"
Case "60": MSComm1.Output = "f"
Case "70": MSComm1.Output = "g"
Case "80": MSComm1.Output = "h"
Case "90": MSComm1.Output = "i"
Case "100": MSComm1.Output = "j"
Case "110": MSComm1.Output = "k"
Case "120": MSComm1.Output = "l"
Case "130": MSComm1.Output = "m"
Case "140": MSComm1.Output = "n"
Case "150": MSComm1.Output = "o"
Case "160": MSComm1.Output = "p"
Case "170": MSComm1.Output = "q"
Case "180": MSComm1.Output = "r"
End Select
Call Pause(1)
```

```
ctr2 = ctr2 + 1
Next
End Sub
```

```
Private Sub Command3_Click()
    srv4 = 0
    Command3.Enabled = False
    Command4.Enabled = True
End Sub
```

```
Private Sub Command4_Click()
    srv4 = 90
    Command4.Enabled = False
    Command3.Enabled = True
End Sub
```

```
Private Sub Command5_Click()
    MSComm1.Output = "0"
    Label1.Caption = "CHOOSE A MODE"
    Label1.Visible = True
    Label2.Visible = False
    HScroll1.Visible = False
    HScroll2.Visible = False
    HScroll3(0).Visible = False
    HScroll3(1).Visible = False
    Command1.Visible = True
    Command2.Visible = True
    Command3.Visible = False
    Command4.Visible = False
    Command5.Visible = False
    Command7.Visible = False
    Command8.Visible = False
    Command9.Visible = False
    Text1.Visible = False
    Text2.Visible = False
    Text3.Visible = False
    Text4.Visible = False
    Text5.Visible = False
    Line1.Visible = False
    Line2.Visible = False
    Line3.Visible = False
    Line4.Visible = False
    Line5.Visible = False
    Line6.Visible = False
    Line7.Visible = False
    Timer1.Enabled = False
    HScroll1.Value = 0
    HScroll2.Value = 30
    HScroll3(0).Value = 50
    HScroll3(1).Value = 0
End Sub
```

```
Private Sub Command6_Click()
End
End Sub
```

```
Private Sub Command7_Click()
    Timer1.Enabled = False
```

```

If dc = 0 Then
dc = dc
ElseIf dc <> 0 Then
MSComm1.Output = "5"
Call Pause(1)
If dc = 10 Then
MSComm1.Output = "a"
ElseIf dc = 20 Then
MSComm1.Output = "b"
ElseIf dc = 30 Then
MSComm1.Output = "c"
ElseIf dc = 40 Then
MSComm1.Output = "d"
ElseIf dc = 50 Then
MSComm1.Output = "e"
ElseIf dc = 60 Then
MSComm1.Output = "f"
ElseIf dc = 70 Then
MSComm1.Output = "g"
ElseIf dc = 80 Then
MSComm1.Output = "h"
ElseIf dc = 90 Then
MSComm1.Output = "i"
ElseIf dc = 100 Then
MSComm1.Output = "j"
ElseIf dc = 110 Then
MSComm1.Output = "k"
ElseIf dc = 120 Then
MSComm1.Output = "l"
ElseIf dc = 130 Then
MSComm1.Output = "m"
ElseIf dc = 140 Then
MSComm1.Output = "n"
ElseIf dc = 150 Then
MSComm1.Output = "o"
ElseIf dc = 160 Then
MSComm1.Output = "p"
ElseIf dc = 170 Then
MSComm1.Output = "q"
ElseIf dc = 180 Then
MSComm1.Output = "r"
End If
End If
Timer1.Enabled = True
End Sub

```

```

Private Sub Command8_Click()
Timer1.Enabled = False
If dc = 0 Then
dc = dc
ElseIf dc <> 0 Then
MSComm1.Output = "6"
Call Pause(1)
If dc = 10 Then
MSComm1.Output = "a"
ElseIf dc = 20 Then
MSComm1.Output = "b"
ElseIf dc = 30 Then

```

```

MSComm1.Output = "c"
ElseIf dc = 40 Then
MSComm1.Output = "d"
ElseIf dc = 50 Then
MSComm1.Output = "e"
ElseIf dc = 60 Then
MSComm1.Output = "f"
ElseIf dc = 70 Then
MSComm1.Output = "g"
ElseIf dc = 80 Then
MSComm1.Output = "h"
ElseIf dc = 90 Then
MSComm1.Output = "i"
ElseIf dc = 100 Then
MSComm1.Output = "j"
ElseIf dc = 110 Then
MSComm1.Output = "k"
ElseIf dc = 120 Then
MSComm1.Output = "l"
ElseIf dc = 130 Then
MSComm1.Output = "m"
ElseIf dc = 140 Then
MSComm1.Output = "n"
ElseIf dc = 150 Then
MSComm1.Output = "o"
ElseIf dc = 160 Then
MSComm1.Output = "p"
ElseIf dc = 170 Then
MSComm1.Output = "q"
ElseIf dc = 180 Then
MSComm1.Output = "r"
End If
End If
Timer1.Enabled = True
End Sub

```

```

Private Sub Command9_Click()
MSComm1.Output = "4"
Call Pause(1)
If srv1 = 0 Then
MSComm1.Output = "a"
ElseIf srv1 = 10 Then
MSComm1.Output = "b"
ElseIf srv1 = 20 Then
MSComm1.Output = "c"
ElseIf srv1 = 30 Then
MSComm1.Output = "d"
ElseIf srv1 = 40 Then
MSComm1.Output = "e"
ElseIf srv1 = 50 Then
MSComm1.Output = "f"
ElseIf srv1 = 60 Then
MSComm1.Output = "g"
ElseIf srv1 = 70 Then
MSComm1.Output = "h"
ElseIf srv1 = 80 Then
MSComm1.Output = "i"
ElseIf srv1 = 90 Then

```

```
MSComm1.Output = "j"  
End If  
Call Pause(1)
```

```
For i = 0 To 1  
x = HScroll3(i).Value  
If i = 0 Then  
MSComm1.Output = "1"  
ElseIf i = 1 Then  
MSComm1.Output = "2"  
End If  
Call Pause(1)  
If x = 0 Then  
MSComm1.Output = "a"  
ElseIf x = 10 Then  
MSComm1.Output = "b"  
ElseIf x = 20 Then  
MSComm1.Output = "c"  
ElseIf x = 30 Then  
MSComm1.Output = "d"  
ElseIf x = 40 Then  
MSComm1.Output = "e"  
ElseIf x = 50 Then  
MSComm1.Output = "f"  
ElseIf x = 60 Then  
MSComm1.Output = "g"  
ElseIf x = 70 Then  
MSComm1.Output = "h"  
ElseIf x = 80 Then  
MSComm1.Output = "i"  
ElseIf x = 90 Then  
MSComm1.Output = "j"  
ElseIf x = 100 Then  
MSComm1.Output = "k"  
ElseIf x = 110 Then  
MSComm1.Output = "l"  
ElseIf x = 120 Then  
MSComm1.Output = "m"  
ElseIf x = 130 Then  
MSComm1.Output = "n"  
ElseIf x = 140 Then  
MSComm1.Output = "o"  
ElseIf x = 150 Then  
MSComm1.Output = "p"  
ElseIf x = 160 Then  
MSComm1.Output = "q"  
ElseIf x = 170 Then  
MSComm1.Output = "r"  
ElseIf x = 180 Then  
MSComm1.Output = "s"  
End If  
Call Pause(1)  
Next
```

```
MSComm1.Output = "3"  
Call Pause(1)  
If srv4 = 0 Then
```

```

MSComm1.Output = "a"
ElseIf srv4 = 90 Then
MSComm1.Output = "j"
End If
End Sub

```

```

Private Sub Form_Load()
MSComm1.CommPort = 1
MSComm1.Settings = "9600,N,8,1"
MSComm1.InputLen = 0
MSComm1.PortOpen = True
srv1 = 0
srv2 = 0
srv3 = 0
srv4 = 0
dc = 0
Timer1.Enabled = False
Command3.Enabled = False
Command5.Visible = False
Label1.Caption = "CHOOSE A MODE"
Label1.Visible = True
End Sub

```

```

Private Sub Timer1_Timer()
i1 = HScroll1.Value
i1 = i1 \ 10
HScroll1.Value = i1 * 10
Text1.Text = HScroll1.Value
dc = HScroll1.Value

```

```

i1 = HScroll2.Value
i1 = i1 \ 10
HScroll2.Value = i1 * 10
Text2.Text = HScroll2.Value
srv1 = HScroll2.Value

```

```

i1 = HScroll3(0).Value
i1 = i1 \ 10
HScroll3(0).Value = i1 * 10
Text3.Text = HScroll3(0).Value

```

```

i1 = HScroll3(1).Value
i1 = i1 \ 10
HScroll3(1).Value = i1 * 10
Text4.Text = HScroll3(1).Value
End Sub

```

```

Sub Pause(ByVal nSecond As Single)
Dim t0 As Single
t0 = Timer
Do While Timer - t0 < nSecond
Dim dummy As Integer
dummy = DoEvents()
Loop
End Sub

```

LAMPIRAN – C

Sejarah Singkat Program AoS dan Foto Alat

Sejarah Singkat Program AoS

Program AoS v1.0 dibuat pada bulan November 2007. Program ini cukup sederhana, yaitu hanya mengendalikan lengan secara manual saja. Pengiriman data dilakukan secara *real-time* dengan menggunakan sebuah *timer*. Namun program ini memiliki kendala besar, yaitu data yang dikirimkan sering tidak dapat diterima oleh mikrokontroler, sehingga pengaturan lengan menjadi salah.

Kemudian AoS dikembangkan pada AoS v2.0 pada awal bulan Desember 2007. terdapat perubahan yang cukup besar, yaitu mengganti proses pengiriman secara *real-time* dengan sebuah tombol *SEND*. Tombol *SEND* ini akan mengirimkan data yang bersangkutan dengan sendi-sendi pada lengan, dengan *delay* sebesar satu detik pada tiap pengirimannya. Pada AoS v2.0 ini, pengiriman data pengendali lengan telah berfungsi dengan baik, dimana data yang dikirimkan diterima mikrokontroler dan dapat mengendalikan lengan secara akurat.

AoS v2.0 kemudian dikembangkan lagi menjadi AoS v3.0 pada awal bulan Januari 2008. Pada AoS v3.0 ini, ditambahkan tombol *CW* dan *CCW* untuk mengendalikan motor DC (searah dan berlawanan arah jam) yang sebelumnya hanya dapat mengendalikan motor DC searah jam saja, dan penambahan menu awal (sehingga menu pengendali pada program AoS sebelumnya dinamai *TRAINING mode*). Pada versi ini juga ditambahkan menu *PICK and PLACE simulation*. Terdapat beberapa pengembangan minor seperti perubahan gambar dan penambahan garis untuk memperbaiki penampilan program AoS. Dan pada akhir bulan Januari 2008, diselesaikanlah AoS v3.2 yang digunakan dalam Tugas Akhir ini. AoS v3.2 merupakan versi final dari program pengendali lengan robot.

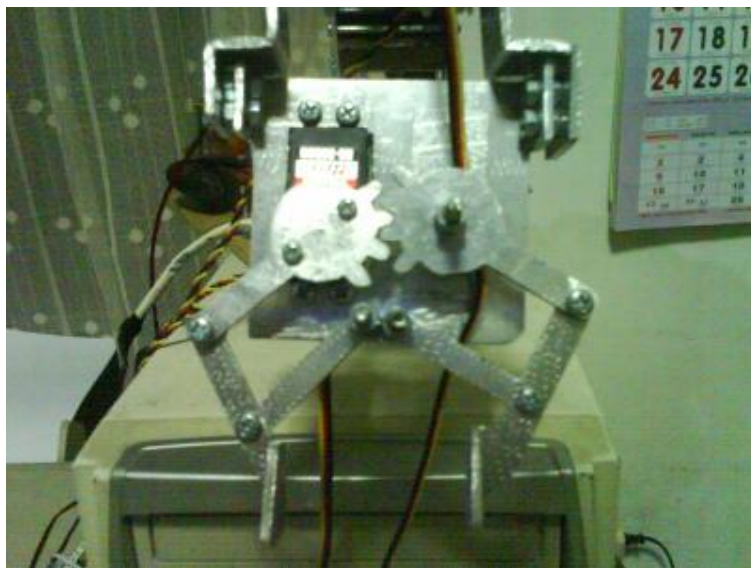
Foto Alat

Lengan Robot





Gripper



Mikrokontroler

