یا لطیف

دانشکده مهندسی برق

گزارش کار آزمایشگاه ریزپردازنده

آزمایش شماره ۷: تولید پالس به کمک تایمر

تهیه کننده و نویسنده:

رضا آدینه پور

استاد مربوطه:

جناب اقای مهندس میثمی فر

تاریخ تهیه و ارائه:

آذر ماه ۱۴۰۱

```c
#include <mega32.h>

interrupt [TIM1_OVF] void timer1_ovf_isr(void)
{
    TCNT1H=0xFCE0 >> 8;
    TCNT1L=0xFCE0 & 0xff;
}

void main(void)
{
    DDRA = 0x00;
    PORTA = 0x00;

    DDRB = 0x00;
    PORTB = 0x00;

    DDRC = 0x00;
    PORTC = 0x00;

    DDRD = 0x20;
    PORTD = 0x00;


    TCCR0=(0<<WGM00) | (0<<COM01) | (0<<COM00) | (0<<WGM01) | (0<<CS02) |
(0<<CS01) | (0<<CS00);
    TCNT0=0x00;
    OCR0=0x00;


    TCCR1A=(0<<COM1A1) | (1<<COM1A0) | (0<<COM1B1) | (0<<COM1B0) | (0<<WGM11)
| (0<<WGM10);
    TCCR1B=(0<<ICNC1) | (0<<ICES1) | (0<<WGM13) | (0<<WGM12) | (0<<CS12) |
(0<<CS11) | (1<<CS10);
    TCNT1H=0xFC;
    TCNT1L=0xE0;
    ICR1H=0x00;
    ICR1L=0x00;
    OCR1AH=0x00;
    OCR1AL=0x00;
    OCR1BH=0x00;
    OCR1BL=0x00;
```

```c
    ASSR=0<<AS2;
    TCCR2=(0<<PWM2) | (0<<COM21) | (0<<COM20) | (0<<CTC2) | (0<<CS22) |
(0<<CS21) | (0<<CS20);
    TCNT2=0x00;
    OCR2=0x00;

    // Timer(s)/Counter(s) Interrupt(s) initialization
    TIMSK=(0<<OCIE2) | (0<<TOIE2) | (0<<TICIE1) | (0<<OCIE1A) | (0<<OCIE1B) |
(1<<TOIE1) | (0<<OCIE0) | (0<<TOIE0);

    MCUCR=(0<<ISC11) | (0<<ISC10) | (0<<ISC01) | (0<<ISC00);
    MCUCSR=(0<<ISC2);

    UCSRB=(0<<RXCIE) | (0<<TXCIE) | (0<<UDRIE) | (0<<RXEN) | (0<<TXEN) |
(0<<UCSZ2) | (0<<RXB8) | (0<<TXB8);

    ACSR=(1<<ACD) | (0<<ACBG) | (0<<ACO) | (0<<ACI) | (0<<ACIE) | (0<<ACIC) |
(0<<ACIS1) | (0<<ACIS0);
    SFIOR=(0<<ACME);

    // ADC initialization
    // ADC disabled
    ADCSRA=(0<<ADEN) | (0<<ADSC) | (0<<ADATE) | (0<<ADIF) | (0<<ADIE) |
(0<<ADPS2) | (0<<ADPS1) | (0<<ADPS0);

    // SPI initialization
    // SPI disabled
    SPCR=(0<<SPIE) | (0<<SPE) | (0<<DORD) | (0<<MSTR) | (0<<CPOL) | (0<<CPHA)
| (0<<SPR1) | (0<<SPR0);

    // TWI initialization
    // TWI disabled
    TWCR=(0<<TWEA) | (0<<TWSTA) | (0<<TWSTO) | (0<<TWEN) | (0<<TWIE);

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

    while (1)
    {

    }
}
```

```c
#include <mega32.h>


void main(void)
{
    DDRA = 0x00;
    PORTA = 0x00;

    DDRB = 0x00;
    PORTB = 0x00;

    DDRC = 0x00;
    PORTC = 0x00;

    DDRD = 0x20;
    PORTD = 0x00;


    TCCR0=(0<<WGM00) | (0<<COM01) | (0<<COM00) | (0<<WGM01) | (0<<CS02) |
(0<<CS01) | (0<<CS00);
    TCNT0=0x00;
    OCR0=0x00;


    TCCR1A=(0<<COM1A1) | (1<<COM1A0) | (0<<COM1B1) | (0<<COM1B0) | (0<<WGM11)
| (0<<WGM10);
    TCCR1B=(0<<ICNC1) | (0<<ICES1) | (0<<WGM13) | (1<<WGM12) | (0<<CS12) |
(0<<CS11) | (1<<CS10);
    TCNT1H=0x00;
    TCNT1L=0x00;
    ICR1H=0x00;
    ICR1L=0x00;
    OCR1AH=0x01;
    OCR1AL=0x8F;
    OCR1BH=0x00;
    OCR1BL=0x00;


    ASSR=0<<AS2;
    TCCR2=(0<<PWM2) | (0<<COM21) | (0<<COM20) | (0<<CTC2) | (0<<CS22) |
(0<<CS21) | (0<<CS20);
    TCNT2=0x00;
    OCR2=0x00;
```

```c
    // Timer(s)/Counter(s) Interrupt(s) initialization
    TIMSK=(0<<OCIE2) | (0<<TOIE2) | (0<<TICIE1) | (0<<OCIE1A) | (0<<OCIE1B) |
(0<<TOIE1) | (0<<OCIE0) | (0<<TOIE0);


    MCUCR=(0<<ISC11) | (0<<ISC10) | (0<<ISC01) | (0<<ISC00);
    MCUCSR=(0<<ISC2);


    UCSRB=(0<<RXCIE) | (0<<TXCIE) | (0<<UDRIE) | (0<<RXEN) | (0<<TXEN) |
(0<<UCSZ2) | (0<<RXB8) | (0<<TXB8);

    ACSR=(1<<ACD) | (0<<ACBG) | (0<<ACO) | (0<<ACI) | (0<<ACIE) | (0<<ACIC) |
(0<<ACIS1) | (0<<ACIS0);
    SFIOR=(0<<ACME);

    // ADC initialization
    // ADC disabled
    ADCSRA=(0<<ADEN) | (0<<ADSC) | (0<<ADATE) | (0<<ADIF) | (0<<ADIE) |
(0<<ADPS2) | (0<<ADPS1) | (0<<ADPS0);

    // SPI initialization
    // SPI disabled
    SPCR=(0<<SPIE) | (0<<SPE) | (0<<DORD) | (0<<MSTR) | (0<<CPOL) | (0<<CPHA)
| (0<<SPR1) | (0<<SPR0);

    // TWI initialization
    // TWI disabled
    TWCR=(0<<TWEA) | (0<<TWSTA) | (0<<TWSTO) | (0<<TWEN) | (0<<TWIE);

    while (1)
    {

    }
}
```

٣) به کمک **Fast PWM** یک پالس ۳ کیلوهرتز با **dc=30%** تولید کنید.

```c
#include <mega32.h>



void main(void)
{
    DDRA = 0x00;
    PORTA = 0x00;

    DDRB = 0x00;
    PORTB = 0x00;

    DDRC = 0x00;
    PORTC = 0x00;

    DDRD = 0x20;
    PORTD = 0x00;


    TCCR0=(0<<WGM00) | (0<<COM01) | (0<<COM00) | (0<<WGM01) | (0<<CS02) |
(0<<CS01) | (0<<CS00);
    TCNT0=0x00;
    OCR0=0x00;


    TCCR1A=(1<<COM1A1) | (0<<COM1A0) | (0<<COM1B1) | (0<<COM1B0) | (0<<WGM11)
| (1<<WGM10);
    TCCR1B=(0<<ICNC1) | (0<<ICES1) | (0<<WGM13) | (1<<WGM12) | (0<<CS12) |
(1<<CS11) | (0<<CS10);
    TCNT1H=0x00;
    TCNT1L=0x00;
    ICR1H=0x00;
    ICR1L=0x00;
    OCR1AH=0x00;
    OCR1AL=0x4C;
    OCR1BH=0x00;
    OCR1BL=0x00;


    ASSR=0<<AS2;
    TCCR2=(0<<PWM2) | (0<<COM21) | (0<<COM20) | (0<<CTC2) | (0<<CS22) |
(0<<CS21) | (0<<CS20);
    TCNT2=0x00;
    OCR2=0x00;
```

```c
    // Timer(s)/Counter(s) Interrupt(s) initialization
    TIMSK=(0<<OCIE2) | (0<<TOIE2) | (0<<TICIE1) | (0<<OCIE1A) | (0<<OCIE1B) |
(0<<TOIE1) | (0<<OCIE0) | (0<<TOIE0);


    MCUCR=(0<<ISC11) | (0<<ISC10) | (0<<ISC01) | (0<<ISC00);
    MCUCSR=(0<<ISC2);

    // USART initialization
    // USART disabled
    UCSRB=(0<<RXCIE) | (0<<TXCIE) | (0<<UDRIE) | (0<<RXEN) | (0<<TXEN) |
(0<<UCSZ2) | (0<<RXB8) | (0<<TXB8);

    // Analog Comparator initialization
    // Analog Comparator: Off
    // The Analog Comparator's positive input is
    // connected to the AIN0 pin
    // The Analog Comparator's negative input is
    // connected to the AIN1 pin
    ACSR=(1<<ACD) | (0<<ACBG) | (0<<ACO) | (0<<ACI) | (0<<ACIE) | (0<<ACIC) |
(0<<ACIS1) | (0<<ACIS0);
    SFIOR=(0<<ACME);

    // ADC initialization
    // ADC disabled
    ADCSRA=(0<<ADEN) | (0<<ADSC) | (0<<ADATE) | (0<<ADIF) | (0<<ADIE) |
(0<<ADPS2) | (0<<ADPS1) | (0<<ADPS0);

    // SPI initialization
    // SPI disabled
    SPCR=(0<<SPIE) | (0<<SPE) | (0<<DORD) | (0<<MSTR) | (0<<CPOL) | (0<<CPHA)
| (0<<SPR1) | (0<<SPR0);

    // TWI initialization
    // TWI disabled
    TWCR=(0<<TWEA) | (0<<TWSTA) | (0<<TWSTO) | (0<<TWEN) | (0<<TWIE);

    while (1)
    {

    }
}
```

۴) به کمک مد **Phase Correct PWM** یک پالس با **dc=40%** تولید کنید.

```c
#include <mega32.h>


void main(void)
{
    DDRA = 0x00;
    PORTA = 0x00;

    DDRB = 0x00;
    PORTB = 0x00;

    DDRC = 0x00;
    PORTC = 0x00;

    DDRD = 0x20;
    PORTD = 0x00;


    TCCR0=(0<<WGM00) | (0<<COM01) | (0<<COM00) | (0<<WGM01) | (0<<CS02) |
(0<<CS01) | (0<<CS00);
    TCNT0=0x00;
    OCR0=0x00;


    TCCR1A=(1<<COM1A1) | (1<<COM1A0) | (0<<COM1B1) | (0<<COM1B0) | (0<<WGM11)
| (1<<WGM10);
    TCCR1B=(0<<ICNC1) | (0<<ICES1) | (0<<WGM13) | (0<<WGM12) | (0<<CS12) |
(0<<CS11) | (1<<CS10);
    TCNT1H=0x00;
    TCNT1L=0x00;
    ICR1H=0x00;
    ICR1L=0x00;
    OCR1AH=0x00;
    OCR1AL=0x99;
    OCR1BH=0x00;
    OCR1BL=0x00;

    ASSR=0<<AS2;
    TCCR2=(0<<PWM2) | (0<<COM21) | (0<<COM20) | (0<<CTC2) | (0<<CS22) |
(0<<CS21) | (0<<CS20);
    TCNT2=0x00;
    OCR2=0x00;

    // Timer(s)/Counter(s) Interrupt(s) initialization
```

```c
    TIMSK=(0<<OCIE2) | (0<<TOIE2) | (0<<TICIE1) | (0<<OCIE1A) | (0<<OCIE1B) |
(0<<TOIE1) | (0<<OCIE0) | (0<<TOIE0);


    MCUCR=(0<<ISC11) | (0<<ISC10) | (0<<ISC01) | (0<<ISC00);
    MCUCSR=(0<<ISC2);


    UCSRB=(0<<RXCIE) | (0<<TXCIE) | (0<<UDRIE) | (0<<RXEN) | (0<<TXEN) |
(0<<UCSZ2) | (0<<RXB8) | (0<<TXB8);


    ACSR=(1<<ACD) | (0<<ACBG) | (0<<ACO) | (0<<ACI) | (0<<ACIE) | (0<<ACIC) |
(0<<ACIS1) | (0<<ACIS0);
    SFIOR=(0<<ACME);

    // ADC initialization
    // ADC disabled
    ADCSRA=(0<<ADEN) | (0<<ADSC) | (0<<ADATE) | (0<<ADIF) | (0<<ADIE) |
(0<<ADPS2) | (0<<ADPS1) | (0<<ADPS0);

    // SPI initialization
    // SPI disabled
    SPCR=(0<<SPIE) | (0<<SPE) | (0<<DORD) | (0<<MSTR) | (0<<CPOL) | (0<<CPHA)
| (0<<SPR1) | (0<<SPR0);

    // TWI initialization
    // TWI disabled
    TWCR=(0<<TWEA) | (0<<TWSTA) | (0<<TWSTO) | (0<<TWEN) | (0<<TWIE);

    while (1)
    {

    }
}
```