

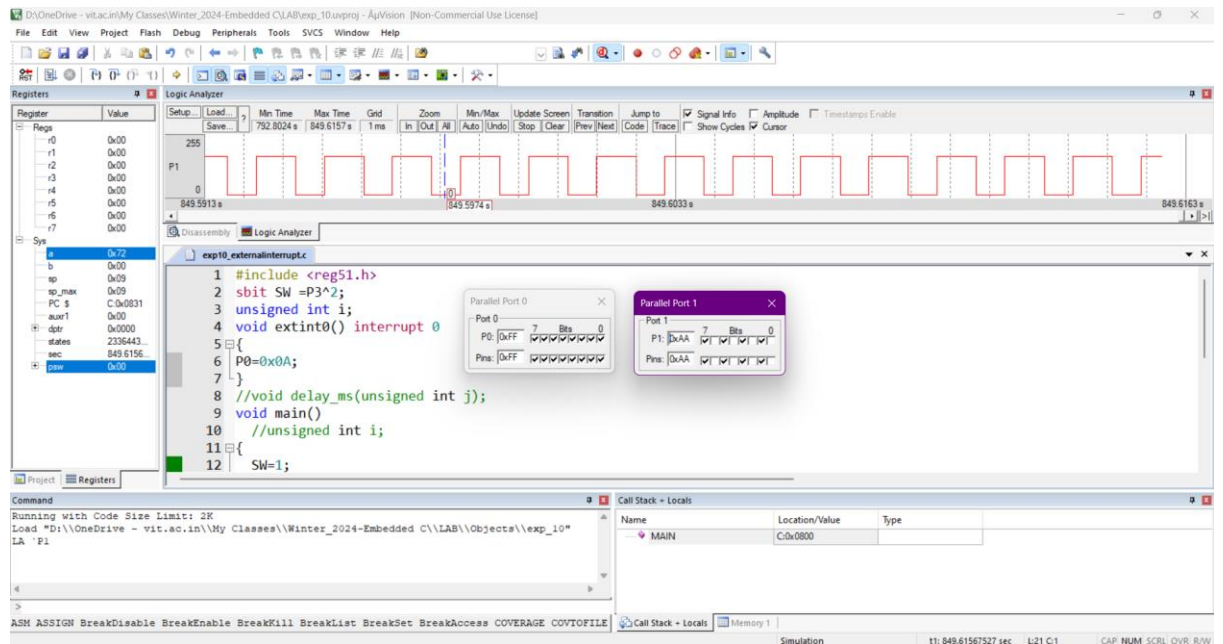
Embedded C Programming
Laboratory 10
Programs on External Interrupts and Hardware on Timer Interrupts

Task 1:

A switch is connected to pin P3.2. When switch is pressed the corresponding line goes low Display 0A at port0. Write a C program to blink alternate LEDS connected to Port 1 Simultaneously.

```
#include <reg51.h>
sbit SW =P3^2;
unsigned int i;
void extint0() interrupt 0
{
    P0=0x0A;
}
//void delay_ms(unsigned int j);
void main()
    //unsigned int i;
{
    SW=1;
    IE=0x81;
    while(1)
    {
        P1=0x00;
        for(i=250;i>0;i--)
        {}
        P1=0xAA;
        for(i=250;i>0;i--)
        {}
    }
}
```

Output:



Task 2:

Assume that XTAL = 11.0592 MHz, write a C program continuously gets a single bit of data from P1. 7 and sends it to P1.0, Simultaneously generate a square wave of 2 kHz frequency on pin P1.5 using timer 0 mode 1. Crystal frequency is 11.0592MHz.

Solution:

(i) **TMOD – Timer 0 mode 1**

Therefore, TMOD = 0000 0001 = 0x01;

(ii) **TH = ?; TL = ?**

Time = $1/f = 1/2 \text{ KHz} = 500 \mu\text{s}$

$\frac{1}{2}$ of the time for the high and low pulse = 250 μs

Time for one machine cycle = 1.085 μs

Total clock to generate delay of 250 μs = $250/1.085 = 230$

Final states – last state = 65536 – 230 = 65306 = FF1AH

Therefore, TH = FF; TL = 1A;

(iii) **IE : Timer 0, so, 1000 0010**

Therefore, IE = 0x82;

`#include <reg51.h>`

`sbit SW = P1^7;`

`sbit IND = P1^0;`

`sbit WAVE = P1^5;`

`void timer0(void) interrupt 1`

```
{  
WAVE=~WAVE; //toggle pin  
}  
void main()  
{  
SW=1; //make switch input  
TMOD=0x01;  
TL0=0x1A;  
TH0=0xFF; //for delay  
IE=0x82; //enable interrupt for timer 0  
TR0=1;  
while (1)  
{  
IND=SW; //send switch to LED  
}  
}
```

Output:

Paste the output here