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EXPERIMENT-9

INTERRUPT

AIM: To execute the given programs on interrupts (8051).

SOFTWARE USED: Keil uvision **TASK-1**:

Use 16-bit timer in mode 1:

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

Steps involved:

   a) T = 1 / f = 1 / 2 kHz = 500 us the period of square wave.
   b) 1 / 2 of it for the high and low portion of the pulse is 250 us.
   c) 250 us / 1.085 us = 230 and 65536 – 230 = 65306 which in hex FF1AH.
   d) TL = 1A and TH = FF, all in hex.

CODE:
```
#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=0xFF;
TH0=0x1A; //for delay
IE=0x82; //enable interrupt for timer 0
TR0=1;
while (1)
{
```

IND=SW; //send switch to LED
}
}


```c
2   sbit SW =P1^7;
3   sbit IND =P1^0;
4   sbit WAVE =P1^5;
5   void timer0(void) interrupt 1
6   {
7   WAVE=~WAVE; //toggle pin
8   }
9   void main()
10  {
11  SW=1; //make switch input
12  TMOD=0x01;
13  TL0=0xFF;
14  TH0=0x1A; //for delay
15  IE=0x82; //enable interrupt for timer 0
16  TR0=1;
17  while (1)
18  {
19  IND=SW; //send switch to LED
20  }
21  }
22
```

Parallel Port 1

Port 1
P1: 0xFF   7   Bits   0
Pins: 0xFF


```c
2   sbit SW =P1^7;
3   sbit IND =P1^0;
4   sbit WAVE =P1^5;
5   void timer0(void) interrupt 1
6   {
7   WAVE=~WAVE; //toggle pin
8   }
9   void main()
10  {
11  SW=1; //make switch input
12  TMOD=0x01;
13  TL0=0xFF;
14  TH0=0x1A; //for delay
15  IE=0x82; //enable interrupt for timer 0
16  TR0=1;
17  while (1)
18  {
19  IND=SW; //send switch to LED
20  }
21  }
22
```
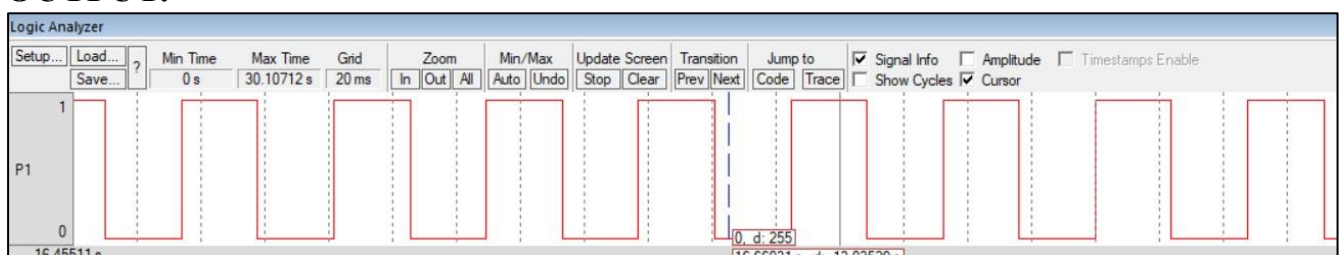
Parallel Port 1

Port 1
P1: 0xDF   7   Bits   0
Pins: 0xDF

OUTPUT:

TASK-2:

(Use 8-bit auto-reload)

Write a C program that continuously gets a single bit of data from PI. 7 and sends it to P1.0, while simultaneously creating a square wave of 200us (as period) on pin P1.5. Use timer 0 in mode 2 to create the square wave. Assume that XTAL = 11.0592 MHz.

CODE:

```c
#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=0x02;
TH0=0xA4; //TH0=-92
IE=0x82; //enable interrupt for timer 0
TR0=1;  while
(1)
{
IND=SW; //send switch to LED
}
}
```

OUTPUT:
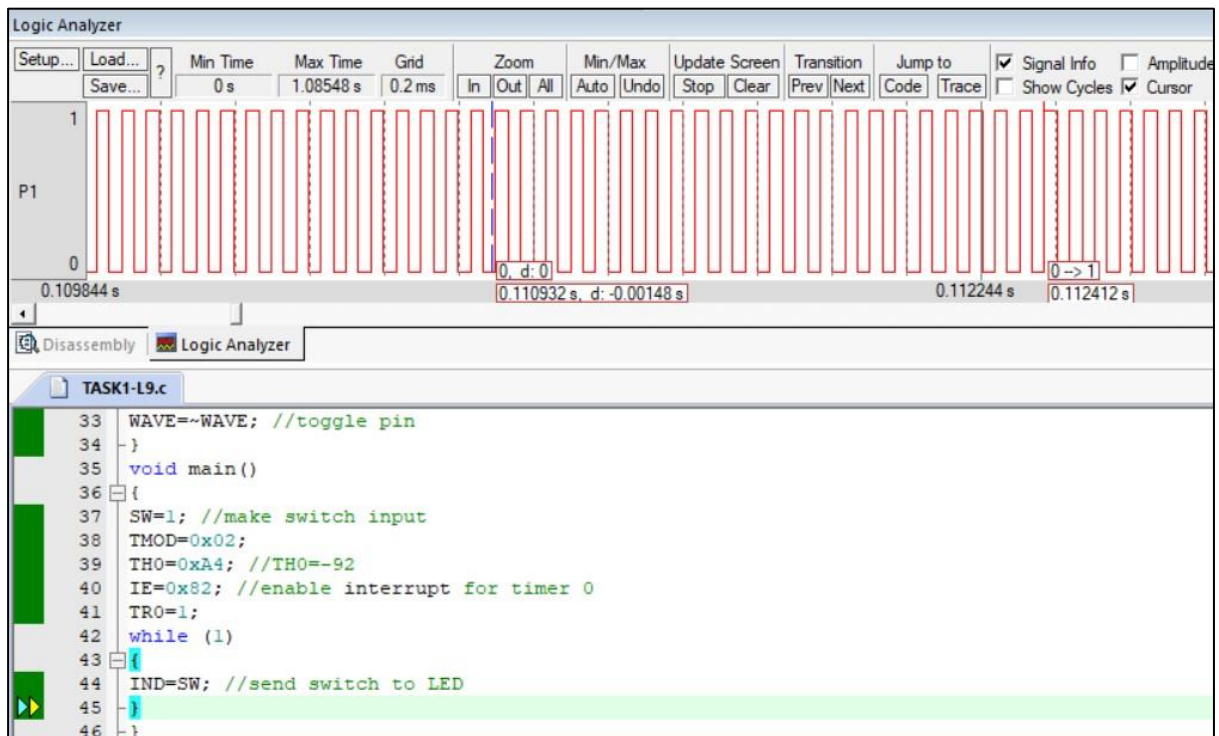
TASK-3

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.

CODE:

```c
#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-4
(Use timer 0 interrupt and external interrupt1)
Write a C program using interrupts to do the following:
(a) Generate a 10 KHz frequency on P2.1 using T0 8-bit auto-reload
(b) Assume that the clock pulse is connected to external interrupt1 EX1. Count the pulses and display it on P0. Assume that XTAL = 11.0592 MHz. Set the baud rate at 9600.

CODE:
```
#include <reg51.h>  sbit
WAVE =P2^1;
unsigned char cnt;  void
timer0() interrupt 1
{
WAVE=~WAVE; //toggle pin
}
//void timer1() interrupt 3
void extint1() interrupt 2
{
cnt++; //increment counter  P0=cnt;
//display value on pins
}
void main()
{
cnt=0; //set counter to 0
TMOD=0x02;
TH0=0x46; //10 KHz
IE=0x86; //enable interrupts  TR0=1;
//start timer 0
while (1); //wait until interrupted  }
```

```
TASK1-L9.c
28
29   //TASK-4
30   #include <reg51.h>
31   sbit WAVE =P2^1;
32   unsigned char cnt;
33   void timer0() interrupt 1
34 ⊟ {
35   WAVE=~WAVE; //toggle pin
36   }
37   //void timer1() interrupt 3
38   void extint1() interrupt 2
39 ⊟ {
40   cnt++; //increment counter
41   P0=cnt; //display value on pins
42   }
43   void main()
```

Parallel Port 2   ✕
┌─ Port 2 ─────────────────────────┐
│   7   Bits   0   │
│ P2: 0xFF ☑☑☑☑☑☑☑☑   │
│   │
│ Pins: 0xFF ☑☑☑☑☑☑☑☑   │
└──────────────────────────────────┘

```
TASK1-L9.c
28
29   //TASK-4
30   #include <reg51.h>
31   sbit WAVE =P2^1;
32   unsigned char cnt;
33   void timer0() interrupt 1
34 ⊟ {
35   WAVE=~WAVE; //toggle pin
36   }
37   //void timer1() interrupt 3
38   void extint1() interrupt 2
39 ⊟ {
40   cnt++; //increment counter
41   P0=cnt; //display value on pins
42   }
43   void main()
```

Parallel Port 2   ✕
┌─ Port 2 ─────────────────────────┐
│   7   Bits   0   │
│ P2: 0xFD ☑☑☑☑☑☑☑ ☑   │
│   │
│ Pins: 0xFD ☑☑☑☑☑☑☑ ☑   │
└──────────────────────────────────┘

RESULT: Programs on interrupts (8051) have been executed.