Lab 2: Morse Code Decoder

ESE350: Embedded Systems & Microcontroller Laboratory
University of Pennsylvania

In this document, you'll fill out your responses to the questions listed in the Lab 2 Manual. Please fill out your name and link your Github repository below to begin. Be sure that your code on the repo is up-to-date before submission!

For all the questions that require a video, provide a link to the video (e.g. youtube, google drive, etc.).

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GitHub Repository:

1.

```
11  int main(void)
12  {
13      /* Replace with your application code */
14      while (1)
15      {
16          PORTB |= (1 << PORTB1);
17          PORTB |= (1 << PORTB2);
18          PORTB |= (1 << PORTB3);
19          PORTB |= (1 << PORTB4);
20      }
21  }
22
```

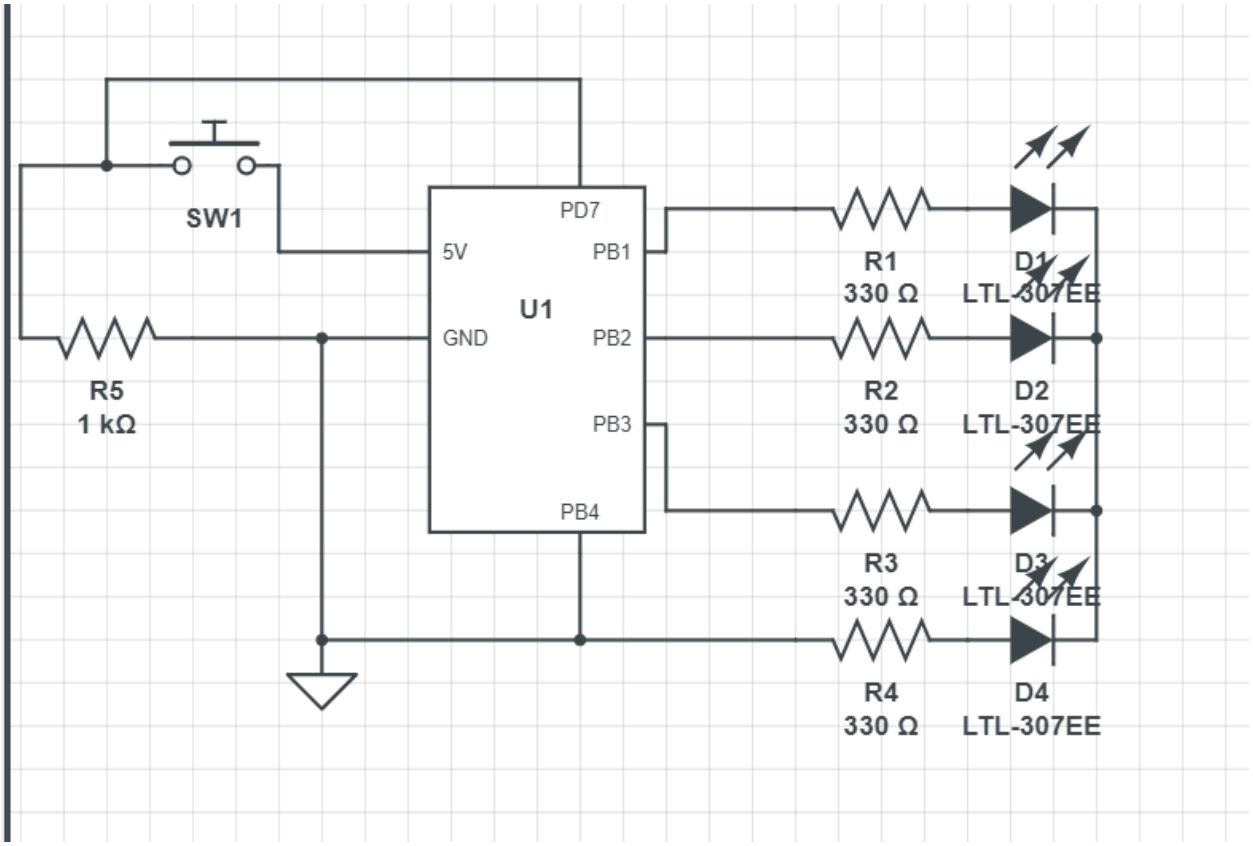
```
int main(void)
{
    DDRD |= (0<<DDD7);
    PORTD |= (0 << PORTD7);
    PORTB |= (0 << PORTB1);
    PORTB |= (0 << PORTB2);
    PORTB |= (0 << PORTB3);
    PORTB |= (0 << PORTB4);
    while (1)
    {
        if(PIND & (1<<PIND7)){
        PORTB |= (1 << PORTB1);
        PORTB |= (1 << PORTB2);
        PORTB |= (1 << PORTB3);
        PORTB |= (1 << PORTB4);

        }
        else{
            PORTB &= (0 << PORTB1);
            PORTB &= (0 << PORTB2);
            PORTB &= (0 << PORTB3);
            PORTB &= (0 << PORTB4);
            }
    }
}
```

2.

3.

```
int main(void)
{

   DDRD &= ~(1<<DDD7);
   PORTD &= ~(1 << PORTD7);
   PORTB &= ~(1 << PORTB1);
   PORTB &= ~(1 << PORTB2);
   PORTB &= ~(1 << PORTB3);
   PORTB &= ~(1 << PORTB4);
   int count = 0;
   while (1)
   {
       if(PIND & (1<<PIND7)){
           if(count == 0){
             PORTB |= (1 << PORTB1);
             PORTB &= ~(1 << PORTB4);
             count=1;
             _delay_ms(20000);

           }
           else if(count == 1){
               PORTB &= ~(1 << PORTB1);
               PORTB |= (1 << PORTB2);
               count=2;
               _delay_ms(20000);


            }
            else if(count == 2){
                PORTB |= (1 << PORTB3);
                PORTB &= ~(1 << PORTB2);
                count=3;
                _delay_ms(20000);
            }
            else if(count == 3){
                PORTB |= (1 << PORTB4);
                PORTB &= ~(1 << PORTB3);
                count=0;
                _delay_ms(20000);
            }

        }
    }
}
```

4.



5. Interrupts save computing power by not having to constantly check whether or not the button is pressed. It does require more lines of code, also code can be stalled if an interrupt is accidentally activated. This could be caused by hardware unpredictability such as bouncing.
6. 30ms = 480,000 ticks, 200ms = 3,200,000 ticks, 400ms = 6,400,000 ticks
7. A prescaler divides the frequency of ticks to make the clock essentially slower. This allows it to use multiple frequencies. For example, a 16MHz clock with a prescaler at 8, runs at 2 MHz.
8. https://imgur.com/a/rOeFtkR
9. Some day I will rule you all
10.
11.
12.