Due on: December 8, 2022

Introduction to Microcomputers

Lab5: LED Walk

The goal of this lab is to use the LEDs on the PICSIM emulator, which are connected to PORTD of PIC16F877A.

Assignment

You are asked implement a program that lights up the LEDs similar to how they light in front of KITT, the car used in Knight Rider, as follows:

```
void Delay(){
  __delay_ms(250);
//   __delay_ms(500);
} // end-Delay

void main(){
   TRISD = 0;  // Make all pins of PORTD output pins
   TRISB = 0;  // Make all pins of PORTB output pins
   PORTB = 0;  // Turn of all LEDs connected to PORTB on PICSIM

   #define MOVE_LEFT     0
   #define MOVE_RIGHT    1

   uint8_t dir = MOVE_LEFT; // Move left
   uint8_t val = 0x1;
   uint8_t count = 0;
   while (1){
       PORTD = val;
       Delay();    // Delay amount must be tunable.

       // Did we complete one tour? Then flash all LEDs twice
       count++;
        if (count == 15){
             PORTD = 0;  // Turn off all LEDs
             Delay();
             PORTD = 0xFF;  // Turn on all LEDs
             Delay();
             PORTD = 0;  // Turn off all LEDs
             Delay();
             PORTD = 0xFF;  // Turn on all LEDs
             Delay();
             PORTD = 0;  // Turn off all LEDs
             Delay();
             val = 0x1;
             count = 0;
```

```
            dir = MOVE_LEFT; // Change direction

        } else {
          // Do we need to change direction?
          if (val == 0x80) dir = MOVE_RIGHT;

          if (dir == MOVE_LEFT){
              val = val << 1;
          } else {
              val = val >> 1;
         } //end-else
      } // end-else
   } //end-while
} // end-main
```

The idea is to walk over the LEDs first from the right to the left lighting up one LED at a time. When we have reached the last LED, we change direction and start walking to the right until we reach the first LED. This completes a cycle. When the cycle is completed, we flash the LEDs twice. To do this, turn off all LEDs, then wait for the delay amount, then turn on all LEDs, then wait for the delay amount and do this twice. Then the cycle starts all over again.

The delay must be tunable. The TA will change the delay during grading. You must be able to demonstrate delays of 250ms and 500msec. You can simply implement the delay codes we have covered in class, make each a separate function and call the appropriate delay function as requested.