Simulated Coin Toss

A simple introduction to PIC programming.

Create the Project

1. Open MPLAB-X
2. File -> New Project -> Microchip Embedded -> Stand Alone
3. Mid-range 8bit -> PIC12F1840
4. Debug Header: None
5. Hardware Tools: Simulator
6. Compiler Toolchain: XC8
7. Project Name: cointoss
8. Finish

Create the file

9. Projects -> Source Files -> New -> C Main File. Name: cointoss.c
10. Add the device specific definitions

```
#include <xc.h>
#include <pic12f1840.h>
#include <stdint.h>
```

11. Window -> PIC Memory Views -> Configuration Bits
    FOSC -> INTOSC
    WDTE -> Off
    MCLRE -> Off

12. Generate Source Code -> Cut and Paste into code.
13. Set the clock speed for various timer routines

```
#define _INT_OSC 500000L
#define _XTAL_FREQ _INT_OSC
```

14. Configuration of the PINS

```
    /* 12.0 page 101 setup the ports */
     TRISAbits.TRISA0 = 0;
     TRISAbits.TRISA1 = 0;
     TRISAbits.TRISA2 = 1;

     /* disable analog features */
     ANSELAbits.ANSA0 = 0;
     ANSELAbits.ANSA1 = 0;
     ANSELAbits.ANSA2 = 0;

     /* page 107 enable weak pullup on A2 */
     WPUAbits.WPUA2 = 1;
     OPTION_REGbits.nWPUEN = 0;
```

15. Random number generator

```
uint8_t random_byte = 0xB4;

void dorand(void)
{
    asm("BCF STATUS,0");
    asm("RRF _random_byte,W");
    asm("BTFSC STATUS,0");
    asm("XORLW 0xB4");
    asm("MOVWF _random_byte");
}
```

16. Now the main code

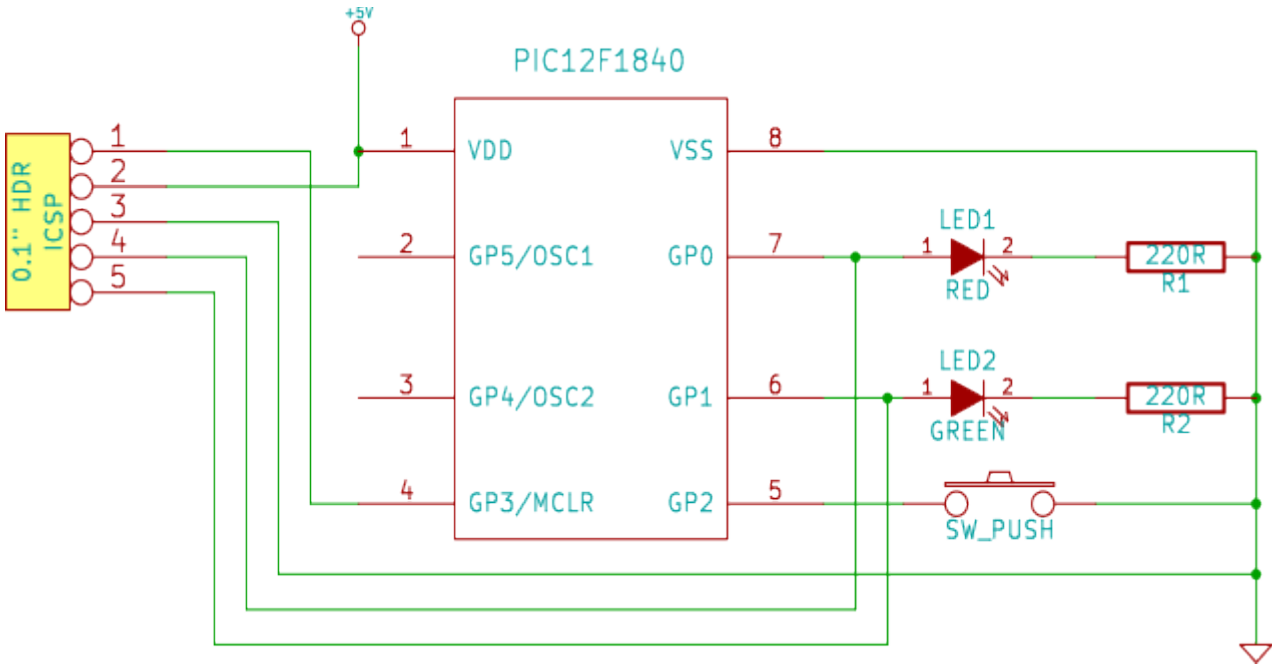
```
while (1) {
        // Wait for the button to press (go low)
        while (PORTAbits.RA2) {};
        // toss the coin
        dorand();
        // set the lights
        if (random_byte & 0x01) {
            PORTAbits.RA0 = 1;
            PORTAbits.RA1 = 0;
        } else {
           PORTAbits.RA0 = 0;
           PORTAbits.RA1 = 1;
        }
   }
```

20. Enhancement: button debounce.

```
#define CHECK_MSEC 5        // sample key every 5 mS
#define PRESS_MSEC 10       // stable before pressed
#define RELEASE_MSEC 100    // stable before released

void KeyPress(void)
{
    uint8_t count = PRESS_MSEC / CHECK_MSEC;

    while (count > 0) {
        if (PORTAbits.RA2 == 0)
            count--;
        else
            count = PRESS_MSEC / CHECK_MSEC;
        __delay_ms(CHECK_MSEC);
    }
    count = RELEASE_MSEC / CHECK_MSEC;
    while (count > 0) {
        if (PORTAbits.RA2 == 1)
            count--;
        else
            count = RELEASE_MSEC / CHECK_MSEC;
        __delay_ms(CHECK_MSEC);
    }
}
```



Component List

- PIC12F1840
- 0.1” square pin header, 5 pins
- 2x standard 5mm LEDs (one red, one green)
- 2x 220ohm resistors
- momentary contact push switch
- 5v power supply
- PIC Programming Interface (eg PicKit 2)