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Laboratory Task Sheet 06

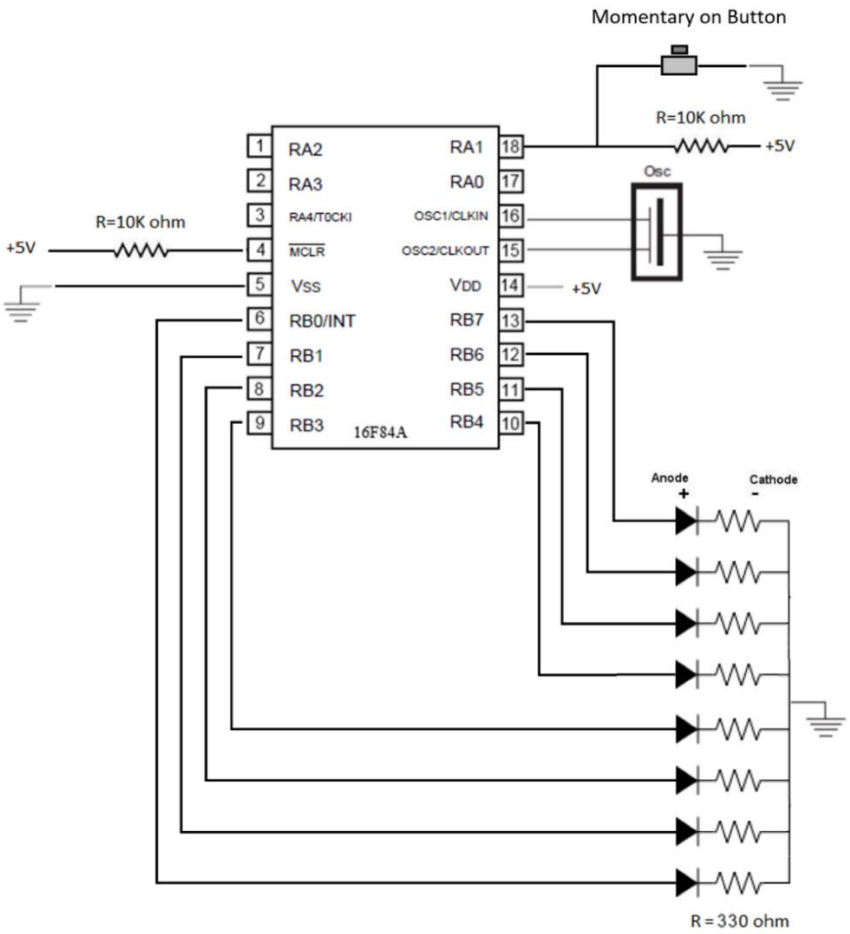
Title: Nightrider with Timer

Registers to be learned: TMR0 & OPTION_REG & INTCON,T0IF

Objective: Program the microcontroller such that by keeping the push button pressed, the linear array of LEDs displays only one active LED at a time, starting from the rightmost LED (PORTB0), and **every time the Timer0 overflow happens** the active LED shifts one bit to the left. When the active LED reaches the leftmost LED (PORTB7), reverse the direction and consequently when the active LED reaches the rightmost LED reverse the direction again. When the button is not pressed all the LEDs must turn off.

Tasks

1. Create the circuit below using a linear array of LEDs, a bank of resistors, and a push button.



2. Make a copy of the P16f84A_Template file and name it TASK06Group00. Open the file in MPLAB Software and use the table below to construct the code

Suggested Code Structure
Define Bits as memory file Define Direction as memory bit
Start
Call Initialization **Go to Main**
Main Turn off all the LEDs Check if the button is pressed If it is not pressed, stay here If it is pressed, go ahead Turn ON the most right-hand side LED, connected to PORTB0 Clear Direction Clear STATUS C Go to Loop
Loop Call Delay Call CheckDirection Call Rotate Check if the button is still pressed If it is still pressed, go to Loop If it is not pressed anymore, go to Main
CheckDirection Check if the most right-hand side LED, connected to PORTB0, is ON If it is ON, clear Direction Check if the most left-hand side LED, connected to PORTB7, is ON If it is ON, set Direction Return
Rotate Check Direction Based on the value of Direction, rotate PORTB to the left or right and then return
Delay Clear TMR0 Register Use INTCON Register to clear TMR0 Overflow Flag bit Use INTCON Register to check TMR0 Overflow Flag bit If Timer0 Overflow has not happened yet, stay here If Timer0 Overflow has happened, go ahead Return

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Initialization
Bank1
Use TRISA Register to define PORTA1 as input
Use TRISB Register to define PORTB (all pins) as output
Use OPTION_REG Register to choose the longest possible pre-scaler rate
Use OPTION_REG Register to assign the pre-scaler to the Timer0 module
Use OPTION_REG Register to define Internal Oscillator as the Timer0 clock source
Bank0
Initialize PORTB (all the pins) to turn off all the LEDs
Return

end
```

3. Program the microcontroller and test it on the circuit.
4. Demonstrate the result to the instructor.
5. Upload the code on D2L and save it for yourself.