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CS2330
A5: Color Selector
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Assignment Five: Project Proposal

- Introduction

For CS2230's final assignment, I have decided to complete the project given to us by Professor MacCreery. This project requires the use of the MSP430, a single RGB LED, the potentiometer, and the 7-segment display. Using the button on the MSP430, the user will be able to select either Red (Default start-up color), Green or Blue as the color of the RGB LED. Using the potentiometer, the user can furthermore set the intensity / brightness of the LED. The 7-segment display will then utilize this information by displaying a single letter to denote the color ('r' for red, 'b' for blue & 'g' for green), and the brightness (Converted from 0-1023 to the range of 0-255) in hexadecimal (0 – FF). Lastly, the MSP430 will also periodically output to the host (Using cio_printf()) to print the current color which is determined by the original color and the brightness. The color is determined by using the provided color array file.

- Components and Modules

The following components will be used in this project:

- MSP430
- MSP430 Button Functionality (Using P1.3)
- Wires (17 in total)
- A Single RGB LED
- The Potentiometer
- The 7-Segment Display

A visual is provided under the "Schematic Draft" section for a visual representation of how the MSP430 and breadboard will look like with all attachments and wires.

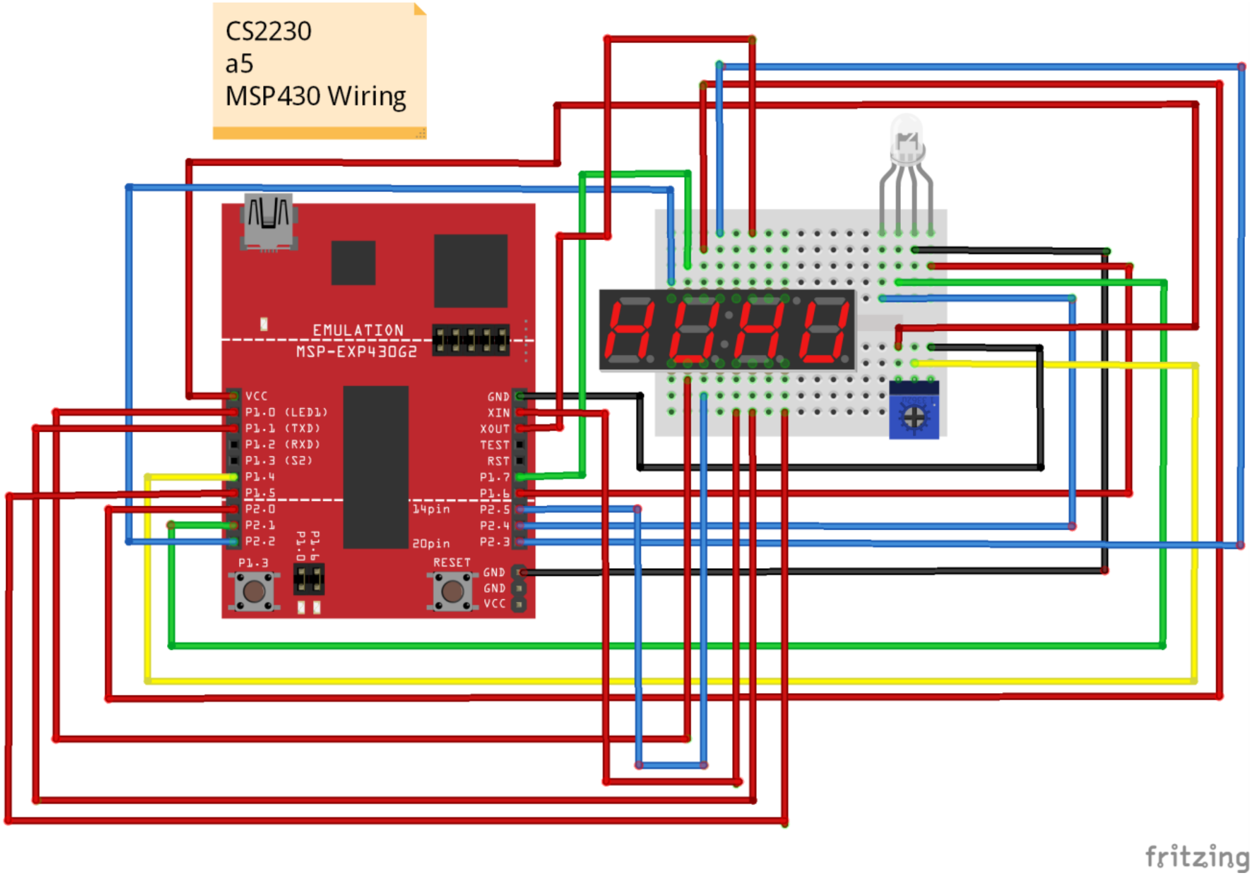
The wiring will contain the following connections:

- The RGB LED is connected to ground, P1.6 (red), P2.1 (green) and P2.4 (blue)
- The Potentiometer is connected to ground, VCC and P1.4 for communication
- The 7-Segment Display is connected to P2.2 (B), P1.7 (G), P2.0 (A), P2.3 (C), P2.7 (F), P2.5 (D), P2.6 (E) for the segments and P1.0 (D1), P1.1 (D2) and P1.5 (D3) for the 3 digits.

<u>Functionality:</u>

The functionalities on the MSP430 being used in this project are three interrupts (2 timer, 1 button), Pulse Width Modulation (Timers), the potentiometer, and the P1.3 Button. The timers are used to set the intensity of the displayed color via the potentiometer, and the button switches colors.

- Schematic Draft



- Pseudocode

Multiple Files?

This program will be run from a single C file, as there is no need to use multiple files for this project.

Multiple Functions?

From brainstorming and practicing with some code, I believe there should be 3 functions being implemented in my project. The Main function will have the watch dog timer set up, infinite for loop, setting all the P1 pins and most other standard code from our previous projects. There will also be a Button Interrupt function used to change between the 3 colors on the RGB LED. Finally, there will be a Timer Interrupt used to display the information on the display.

Organization:

Global variables (Such as color, intensity, current color)

Main

```
Watch Dog Timer Set Up
Enable Output Pins
Enable Interrupts
Initialize TA0
Initialize TA1
Initialize ADC10
Set ADC10 result to TA1CCR1
Infinite For Loop
    Print the current color to host
Return 0 (Never reach this!)
```

Button Interrupt

```
Color = red
    Red = TA1CCR1
    Select Green Pin as current for click
Color = green
    Green = TA0CCR1
    Select Blue Pin as current for click
Color = blue
    Blue = TA0CCR1
    Enable TA1CCTL1
    Select Red Pin as current for click
```

Timer Interrupt

```
If Statements for Current Color

Determine which letter to display based on If Statements

Display the hex number for brightness / intensity alongside letter

    This is where I will also scale from 0-1023 to 0-255
```