Systems and Industrial Engineering
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SIE 370 – Embedded Computer Systems

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Lab 3

Lab Report

Guided Questions

a) What pins support Interrupts on the Arduino Uno? On the Arduino Mega 2560?

Uno interrupt pins: 2, 3
Mega 2560 interrupt pins: 2, 3, 18, 19, 20, 21

b) What does Blum have to say about the tradeoffs between Polling and Interrupting?

When implementing interrupts, the device notifies the CPU that it requires attention while, in the case of polling, the CPU continuously checks the status of the device to find whether it requires attention.

i. What Resistor did you use for the Push Button Switch?

220-ohm resistor

ii. Why? (Please don't answer because you were asked to do this, I'm looking for the reason)

This resistor is needed in the circuit for the voltage level to drop when the button is pressed (LOW).

b. What did you name your ISR?

stateFlag

c. What value did you use for the mode parameter of the attachInterrupt() function? Why?

The push button pin number

d. Review the pin initialization call for the LCD. What are the parameters it takes and what is the purpose of each one?

```
// Initialize LCD object with the above pin numbers
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

e. What is the purpose of the Potentiometer used in this lab?

On an LCD the potentiometer is used to adjust the bias level of the LCD - that is the contrast.

1. Task Prototyping (Tinkercad Simulation)

For Task 1: Tinkercad LCD Starter: 2 wire LCD, I designed the circuit simulation in Tinkercad to reflect the schematic provided in the Lab 3 document. After creating the simple LCD circuit, I was able to add the push button as well as the RGB LED to the circuit and write the code for the irrigation system as required for Task 2: Irrigation System. However, when executing my code in Tinkercad, the push button switch would not end the loop of Zone 1 and Zone 2. The rest of the requirements for the irrigation system were met with the program I created, but I was unable to successfully implement the push button functionality to my program in Tinkercad. The Acceptance Test for the Prototyping Task 1 and Task 2 were passed.

2. Task Experiment (Physical Arduino)

For the physical Arduino task experiment, I wired my circuit correctly and implemented the same code used for Tinkercad. However, the push button was still not working. I tried reconnecting my wires as well as the push button switch on the breadboard but the program would still not register the change of state when pressing the button for the termination of the Zone 1 and Zone 2 display on the LCD screen. The RGB LED worked as expected and displayed the correct colors when switching between the different irrigation zones displayed on the LCD screen. The Acceptance Test for this Task was partially passed.