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ECE 447-201

Lab 3 Report

Introduction

This lab has tasked us with making a Simon Says game on our MSP430 board using external LEDs buttons. Instead of polling the buttons for input like our previous lab, we will be using a different method of collecting input data called interrupts. Interrupts are usually reserved for high-priority tasks that require certain code to be executed immediately. All sequence input will be external via GPIO 2.x pins with button S1 and S2 controlling the game variables. All output will be using the GPIO 3.x pins and will light 4 distinct LEDs when applicable.

Microcontroller Concept
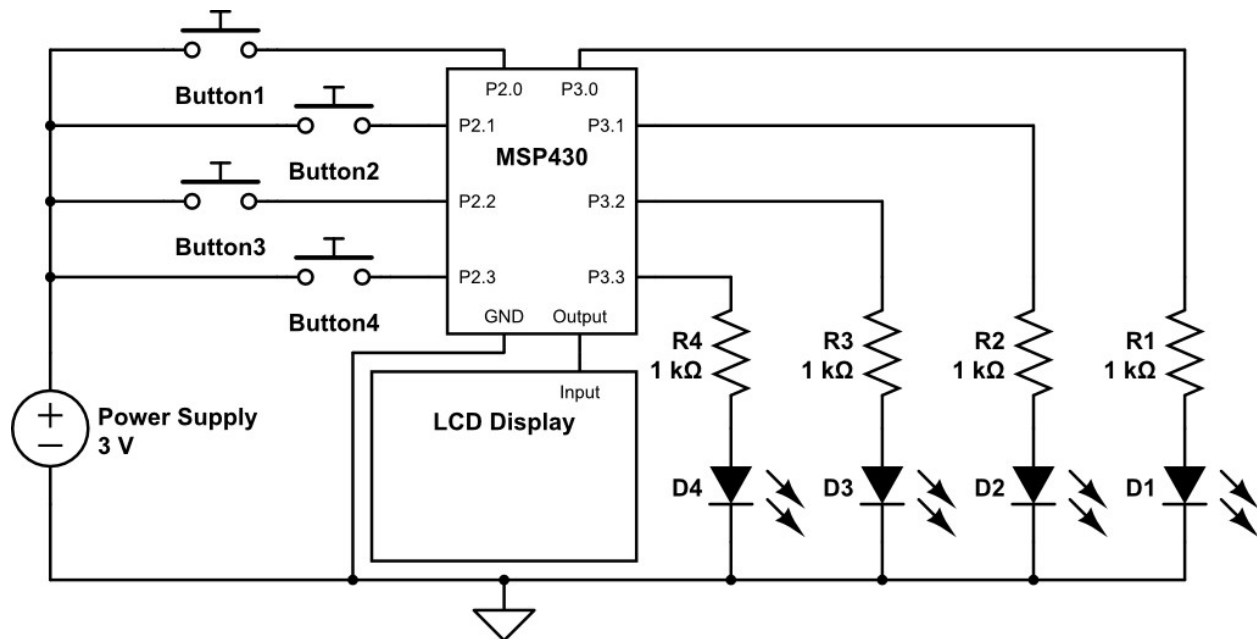
Microcontroller on-chip peripherals used:

- GPIO pin 2.0,1,2,3 + 3.0,1,2,3
- LCD Display
- Button S1, S2

GPIO pins 2.x are used for the input from external buttons because we needed a set of pins to act as the data input pins. The 3.x pins are used to output the color-coded pattern to external LEDs because we needed a set of pins to act as the data output pins.
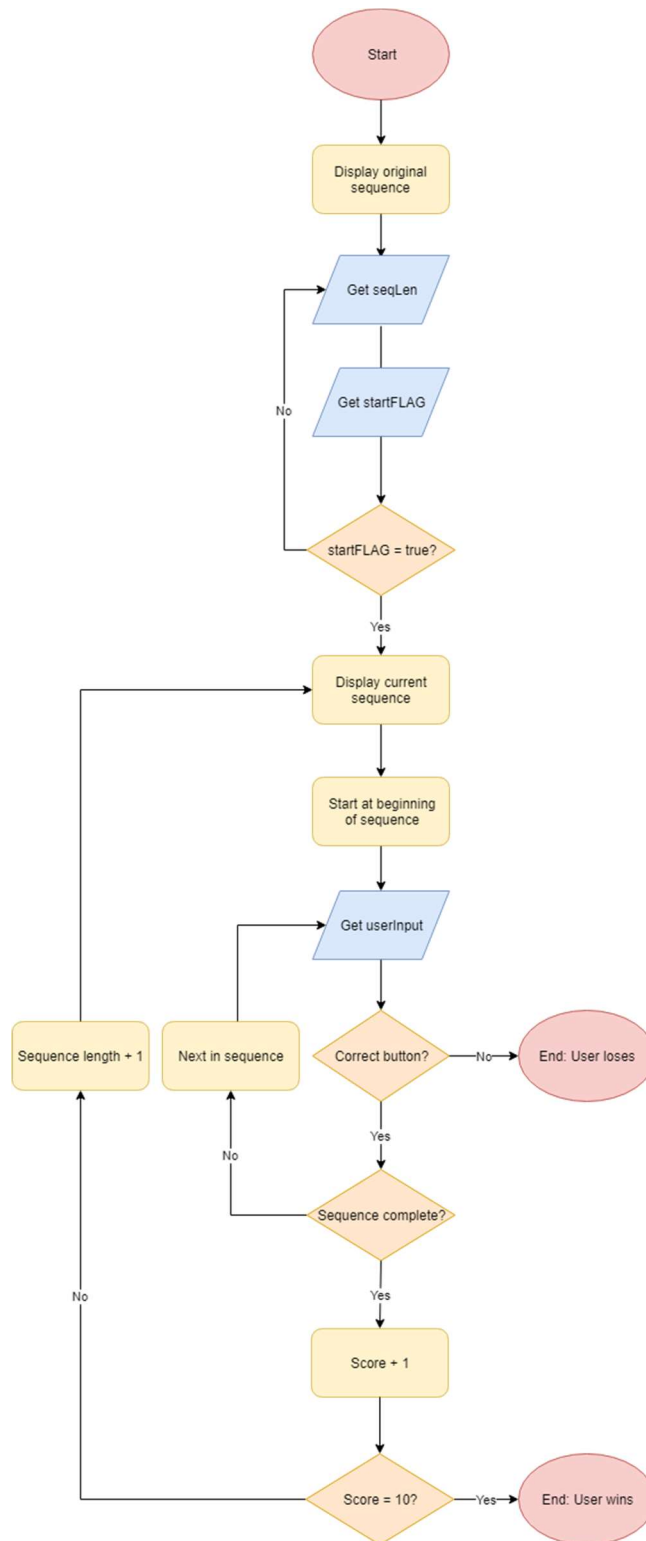
The LCD Display is used to show the user's score because this is the best to show numeric data.

Onboard buttons S1 and S2 are used to start/restart and increase the sequence length respectively because they are the most readily available buttons.

Hardware Design

Software Design

```
                    ┌─────────┐
                    │  Start  │
                    └────┬────┘
                         │
              ┌──────────▼──────────┐
              │  Display original   │
              │     sequence        │
              └──────────┬──────────┘
                         │
                   ╱ Get seqLen ╱
                         │
                  ╱ Get startFLAG ╱
                         │
              ◇ startFLAG = true? ◇── No
                         │ Yes
              ┌──────────▼──────────┐
              │  Display current    │
              │     sequence        │
              └──────────┬──────────┘
                         │
              ┌──────────▼──────────┐
              │  Start at beginning │
              │    of sequence      │
              └──────────┬──────────┘
                         │
                   ╱ Get userInput ╱
                         │
              ◇ Correct button? ◇── No ──▶ End: User loses
                         │ Yes
              ◇ Sequence complete? ◇── No ──▶ Next in sequence
                         │ Yes
              ┌──────────▼──────────┐
              │      Score + 1      │
              └──────────┬──────────┘
                         │
              ◇ Score = 10? ◇── Yes ──▶ End: User wins
                         │ No
              Sequence length + 1
```

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Conclusion

My lab's outcome was a successful rendition of the game Simon Says on the MSP430. There were a few errors because I was working with a new concept and getting the interrupts to work correctly took some time, but the game has no errors remaining. All desired functions are accounted for including implementation of the LSFR.