Jordan Ditzler
ECE 447-201

Lab 4 Report

Introduction

This lab has tasked us with adding functionalities to the Simon Says game we created in the last lab. Specifically, using timers to output PWM (Pulse Width Modulation) to a Piezo buzzer. All output GPIO pins (3.0-3 + 2.4) will be timer outputs, which is the focus of this lab. They will be connected to 4 LEDs (red, yellow, green, blue) and a Piezo buzzer. The LEDs will blink when pressed and act as input for the Simon Says game while the buzzer will play a tone when an LED blinks and when the user loses/wins the game. The inputs are still onboard buttons S1 and S2 and GPIO pins 2.0-3, which are all tied to interrupts.

Microcontroller Concept

Microcontroller on-chip peripherals used:

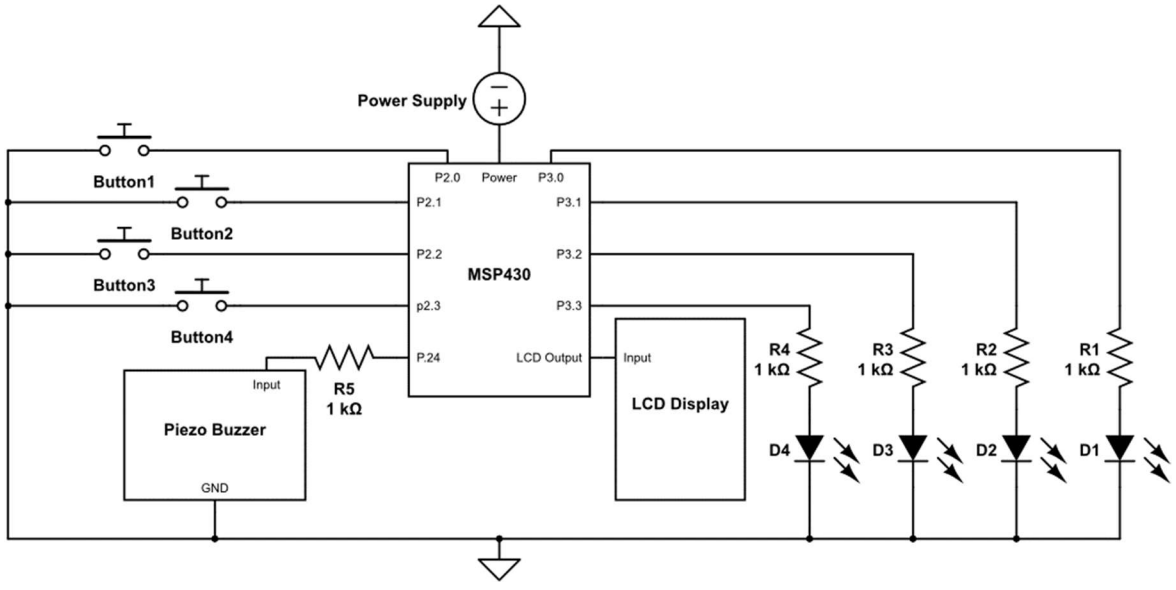
- GPIO pin 2.0-4, 3.0-3
- LCD Display
- Button S1, S2

GPIO pins 2.0-3 are used for the input from external buttons because we needed a set of pins to act as the data input pins. The 3.0-3 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. Pin 2.4 will be the Piezo buzzer output because we need another output pin. This pin's output will be changing constantly from the PWM data being fed to it.

The LCD Display is used to show the user's score because this is the best to show numeric data.

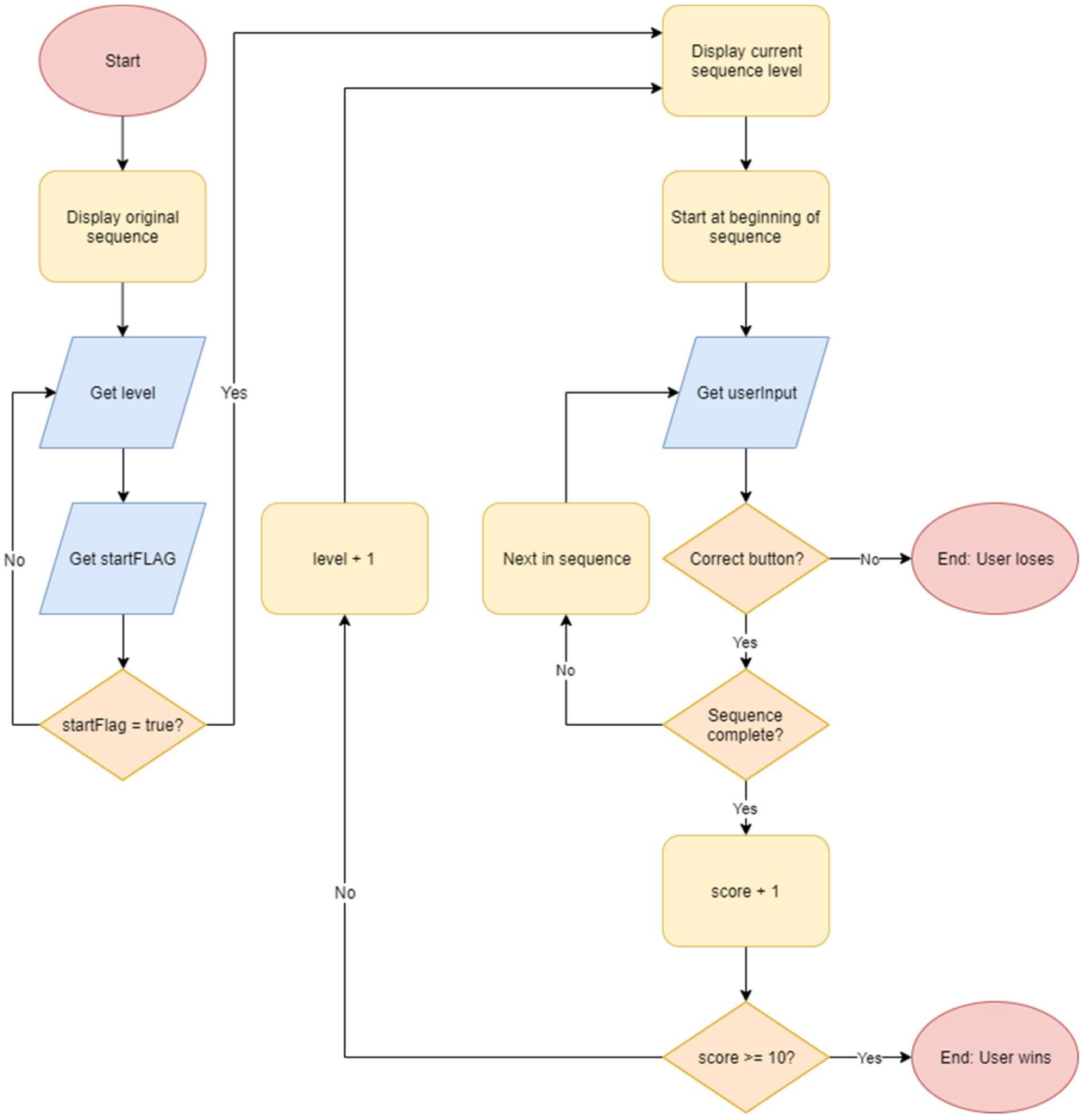
Onboard buttons S1 and S2 are used to start/restart and increase the level respectively because they are the most readily available buttons.

Hardware Design



Jordan Ditzler
ECE 447-201

Software Design



Jordan Ditzler
ECE 447-201

Conclusion

My lab's outcome successfully integrated the buzzer PWM into the Simon Says game. There exists one error still in the game; sometimes when the game has re/started, the sequence will display twice. The bug is not repeatable and does not affect the game's score or play, so it is benign. The LSFR has been integrated properly and all desired functionalities are implemented.