wE85: Digital Design and Computer Engineering
Lab 7: Simon

Objective

The purpose of this lab is to write embedded software using general-purpose I/Os. Specifically, you will write a C program to play the game of Simon on a Nucleo board.

1. System Requirements

Your system should have two LEDs and two pushbutton switches on a breadboard wired to your Nucleo with appropriate resistors. Use 3V3 from the Nucleo rather than the breadboard to power your circuits so that your circuits automatically power off when the Nucleo is unplugged.

The system will flash the LEDs in an interesting predetermined sequence at a reasonable speed, and then check that you press the switches in the corresponding sequence. The sequence will start with length of 2, and increase in length by 1 each time you correctly play back the sequence until the length reaches a maximum of 12. If you play the sequence incorrectly, the game will revert to the length 2.

The user should be able to hold a pushbutton down for any length of time, then release it. Remember that a switch bounces open and closed for a few milliseconds when it is pushed or released. If you sample the switch too fast, you may capture the bounce and misconstrue it as a very fast button push. You can avoid this problem by sampling slowly enough that you never take multiple readings during the bounce interval, yet fast enough to never miss a real push.

2. Extra Credit

Add a feature to make your game more fun. For example, vary your sequence unpredictably each time the game starts, or add LEDs for winning and losing.

What to Turn In

1. Please indicate how many hours you spent on this lab. This will be helpful for calibrating the workload for next time the course is taught.

2. Schematic of the circuit on your breadboard, including which Nucleo pins are connected.

3. C code for your Simon program.

4. Does your Simon program work? Can you play it all the way to the length 12 sequence?

5. Extra credit, if applicable.

If you have suggestions for further improvements of this lab, you're welcome to include them at the end of your lab.