CS443/543 - Embedded Systems

Assignment #3
Fall 2025

The purpose of this assignment is to verify proper operation of the button switches on your Vanduino board. For this exercise, you will need to install the ribbon cable between the two 10-pin headers to the left of the 7-segment displays. This will connect the switches to Arduino pins.

It is very important to configure the Ardiuno pins you are using as `INPUT`s. Typically, the Arduino pins are configured by default as `OUTPUTS`. If you push a button switch in this situation, you will be shorting the pin to ground, which could permanently damage the pin!

Part 1

To test your switches, write an Arduino sketch that lights LED 13 on your Vanduino board whenever the button is pushed. The LED should stay on for as long as the button is pushed. Do this for each of the four awitches on the Vanduino board.

Part 2a

Write a sketch that creates "numbers" in the seven-segment displays, by turning on the proper segments to form the number. For example, the number '1' consists of segments 'b' and 'c', while the number '8' consists of all of the segments. Include the hexadecimal digits A-F.

Part 2b

Switches are mechanical devices, and as a result they tend to bounce especially when closed. This bounce is usually not noticeable within the limit of human perception, except maybe for very large switches, but at processor speeds (even for the Arduino!) these bounces will register as several separate key presses. For this part, write a program that attempts to count the number of bounces that occur when the key is pressed. Once the bouncing concludes, display the number of bounces in one of the digits of the seven-segment display.

Note that the button switches are rather small, so the bouncing is pretty short, and might not always be detected by the Arduino. We will perform the same exercise with the keypad in a subsequent assignment.

Part 3

Implement switch debouncing for the switches on the Vanduino board. Demonstrate its effectiveness by writing a sketch that counts exactly once for each press of the switch. Display the current count in a single digiit of the seven segment display.

Part 4

Write a sketch that reads the voltage on the potentiometer wiper, and displays the result in a single digit of the seven segment display. The reading should be in hexadecimal, and should display the value as a percentage of full scale (ie, a percentage of 5 volts).