**Laboratory 2**

**Keyboard Interfacing**

**Pre-Lab**

**Team Number 5**

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**LAB 2 – Keypad Interfacing**

1. **In this lab, we will drive the columns of the display, and read the rows. How do we scan the keypad? How do we know if a switch is pressed? Briefly describe the process.**

1. The keys are in a 'matrix' of sorts. We take advantage of this by driving a single column low. We then scan the rows to see if any button in that column is pressed. We repeat this process for each column. Rows not pressed will be pulled to logic 1, and those pressed will be logic 0. This allows us to determine which key, or keys are pressed. Because of this matrix, there could be a phantom key, but luckily the laboratory specifies that we do not need to concern ourselves with this issue.
2. **What is an open-drain driver? Why do we use them for driving lines low instead of a standard totem-pole driver?**
3. An open-drain driver sinks current in its low voltage state and is high impedance in the high voltage state. Usually, a pull-up resistor is used to hold the signal line high. In the high state, the pull-up will let the wire act at high voltage. If there is a single device in the low voltage state, the wire will be low. A totem-pole driver is only capable of driving active high or active low, but cannot drive high impedance.
4. **Describe how you will efficiently perform debouncing of the switches and detection of new switch events. (The debouncing requirements can be found later in this assignment.) You should be able to accomplish this by using only logical operations and two half-words of memory.**
5. We will read in the contents of GPIO P2 for each instance of a different driven column storing the result. By doing this, we will capture which of all 16 keys are pressed. On the next interrupt, we will repeat the same process, this time comparing the current content of the keypad, with the previous result. If they are not the same, there is a bounce. If they are the same, the signal has become steady, and we can write its value to the display.