Lab Worksheet

**Lab Number (circle this week’s lab)**

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

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**Lab Section**: 1

**Lab Partner Name**: Ruiyu Sun

This lab worksheet is the final deliverable for a lab. You will usually have three deliverables for a lab:

1. **Prelab assignment BEFORE LAB**: Posted with the lab manual, typically involves a system sketch, submitted in Canvas before the start of your lab section, may be worked on and used by lab partners in class on Tuesday during lab planning
2. **Demonstrations IN LAB**: Demonstrated/discussed with a TA in lab and recorded using a demo evaluation sheet to be printed and signed in lab (functional demo of a lab milestone, debug demo using debugging tools to explain something about the internal workings of your system, Q&A demo showing ability to formulate and respond to questions)
3. **Postlab assignment AFTER LAB**: Submitted in Canvas before the start of your next lab section, may be reviewed by lab partners in class on Tuesday during lab retrospective, consists of three items (prelab planning boards, lab notes, and lab retrospective)

Deliverable #1 has its own Canvas assignment submission. (10 points)

Deliverable #2 has an evaluation sheet that is printed in lab, used as a checklist, and submitted to your TA. The TA will enter points in Canvas based on the demo evaluation sheet. (40 points)

Deliverable #3 has its own Canvas assignment submission. (30 points)

This worksheet will help you develop the items needed for deliverable #3.

1. **PRELAB PLANNING BOARDS**
2. Question Board: What are the three priority questions from your lab planning work?
   1. How to tackle bitwise operations with structed pairing?
   2. Understanding how to get push buttons to work with highest order?
   3. How does the software work with the hardware?
3. Task Board: What are several tasks you identified in your planning (for you and lab partner)?
   1. We would both work through the lab understanding both the binary and hex representation
   2. Knowing which ports to use and which bits corresponded with the LCD buttons
   3. Effectively setting up the correct bit representation
   4. Working through how to have a higher order when the buttons are being pressed.
4. **LAB NOTES**

During lab, keep notes about the following so that you can submit information with this deliverable.

1. Results related to the three priority questions (might be answers, might be more questions, write brief summaries, don’t include code files)
   1. As me and my lab partner worked through the lab we opened up the data sheet for the GPIO to understand which ports lined up with the lcd screen. From there we then set the given statements using both a combination of hex and binary representation for the correct bit position. (0b0000 vs 0xF). Once we tested to make sure the buttons were getting the right data, we used a top down conditional approach so that way the right most button pressed is the one that registered. (if and else if statements so only one button could be pressed, and the right had more priority then those to the left of it). Finally, when we moved on the milestone demo part of the lab we used a bitwise operation to set the first button int the low position (turns the light on) and then nested that inside the of conditional to check if the 3rd button was pressed. This helped our understanding of how we can manipulate the hardware to do things we want through software.
2. Any additions, refinements, or corrections to the prelab system sketch based on what you learned (include an updated sketch, or briefly describe at least one update you made)
   1. Didn’t go back and make corrections to my sketch. I used the slides provided which helped a lot.
3. Description of your debug demo (what did you demo and why, what did you find, a paragraph is fine, may want to include a screenshot)
   1. During our debug demo we opened up the variables tab and stepped into our button\_getButton() function which would then go to the conditionals and then read the data for if the button was in the high or low position. Based on doing this after every iteration the hex number shown would change based on which button was being pressed due to the bit position of the buttons. We then opened up the disassembly tab and were able to navigate to where our while loop was running because it was highlighted green.
4. **LAB RETROSPECTIVE**

Take 10-15 minutes and answer these questions as you think about your lab experience. You don’t need to describe everything, try to pick something notable.

1. What did we set out to do?
   1. We set out to finish the lab by understanding how to use bitwise& and bitwise|, we also wanted to complete the lab during the given time period which would require the use of software logic.
2. What actually happened?
   1. We talked through how bitwise oring and anding worked and which made more sense to us collectively and then went down that road for our conditional statements. From there we debugged our demo. We ran into some problems with the last part of the lab (Milestone) we were setting the other buttons to the correct high and low positions (0b001) but the light was always on, with help from the TA they explained to us how the board works a little more. After that we just set all the lights on the LCD screen to be initially off or in the high position. Upon doing this we saw the results we wanted and then demoed so we could complete the lab.
3. Why did it happen?
   1. I feel like this happened because we weren’t leaving things up to chance. Of course we would try to exhaust all our own brain power first but if my lab partner and I ran into a wall we would ask for more clarity so that way we knew exactly what was going on, why it was going on and then what the next steps for the lab were. This helped us complete the lab in the given amount of time.
4. What are we going to do next time (to improve)?
   1. I personally will be looking over and reading parts of the book to reaffirm the ideas addressed in lab about bit positions and bitwise operations