Lab4 description

Lab 4

System A

- For safety, remember and make sure to unplug your Launchpad from the USB port before making any hardware changes.
- The connection diagram is shown in Figure 1. Connect your breadboard jumper wires. Students need to bring their own breadboard jumper wires to perform the laboratory tasks.
- For reference, 12 male-to-female breadboard jumper wires were used.

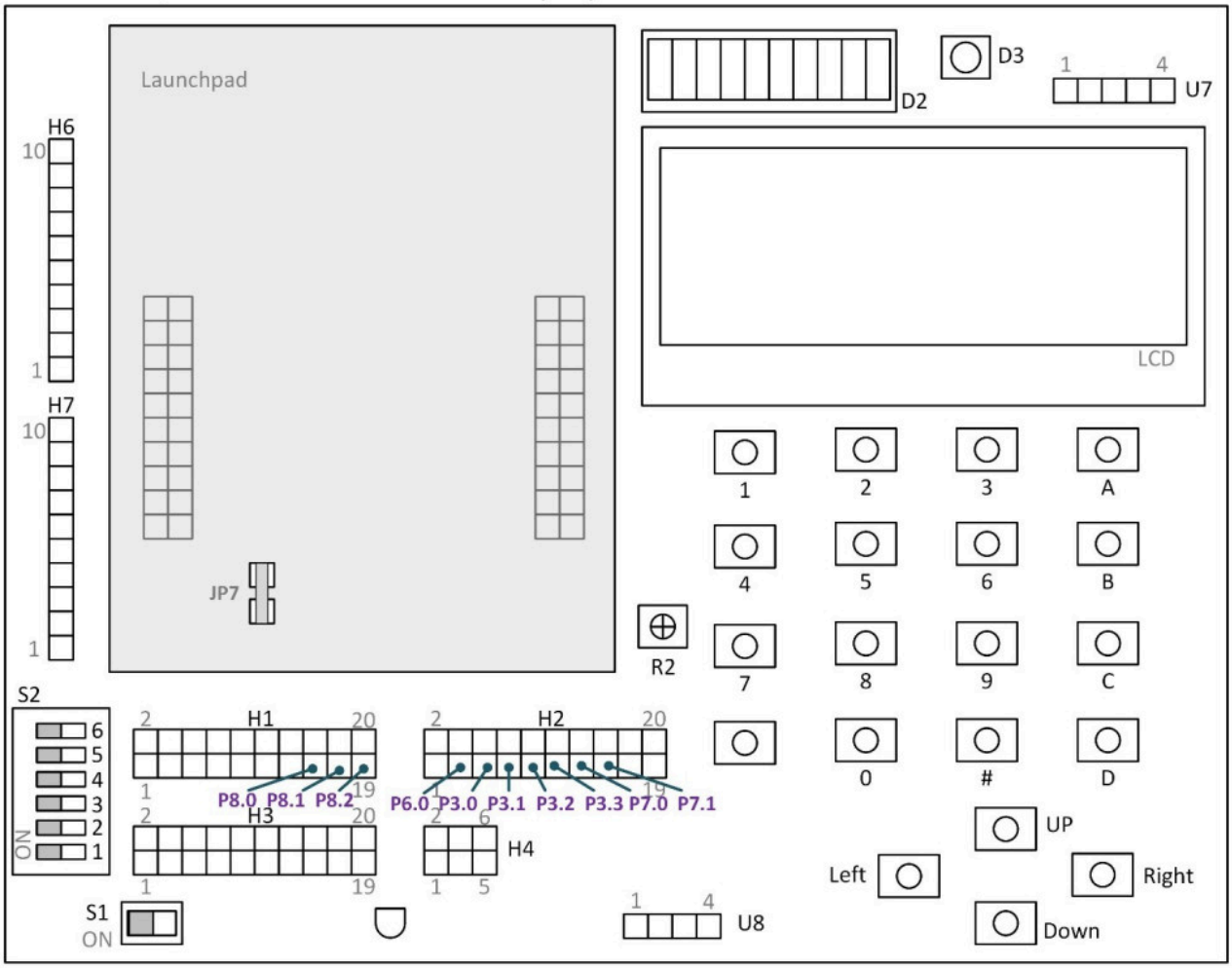


Figure 1. Connection diagram

- Using two male-to-female jumper wires, you can extend the connection to the probe plugged into an oscilloscope as shown in the test connection diagram in Figure 2.
  (NOTE) Do not connect the probe directly to the pins of the launchpad board. Use extended connections using jumper wires as described.

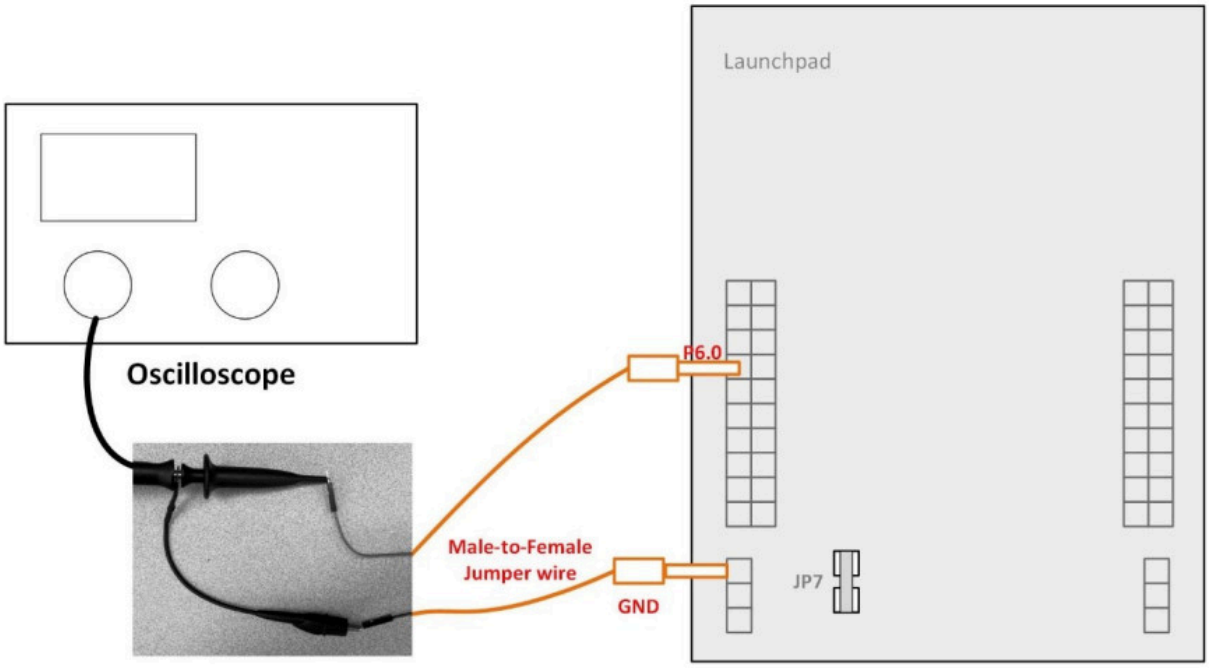


Figure 2.test connection diagram.

- As studied in Chapter 7 and Chapter 8, you can implement one of the examples to generate a periodic signal.
- The frequency of a periodic signal should be between 745 Hz and 755 Hz. The output of the signal should be generated through P6.0. You need to use an oscilloscope to measure the frequency.
- Take a photo of the oscilloscope screen to show the frequency clearly. Make sure to include this table in your lab report.

System B

- Write a program in C/C++ to create associated functions by keypad inputs as shown in Figure 3.

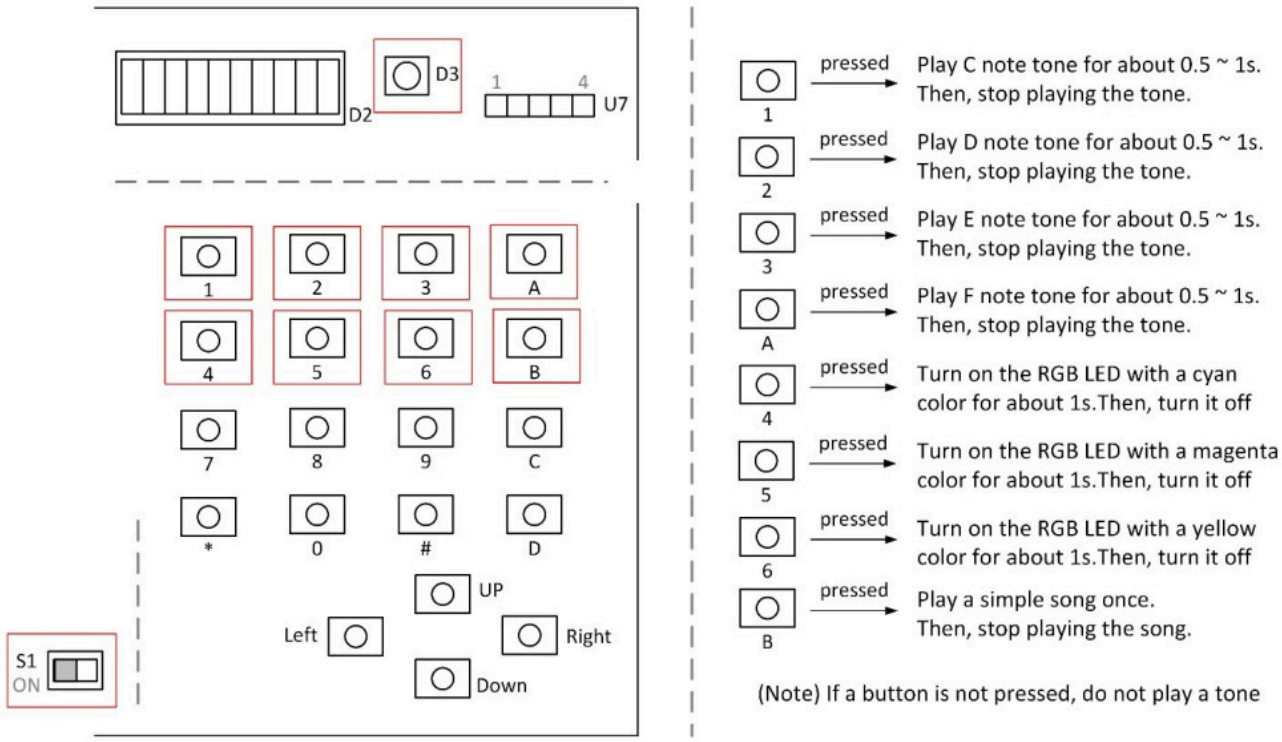
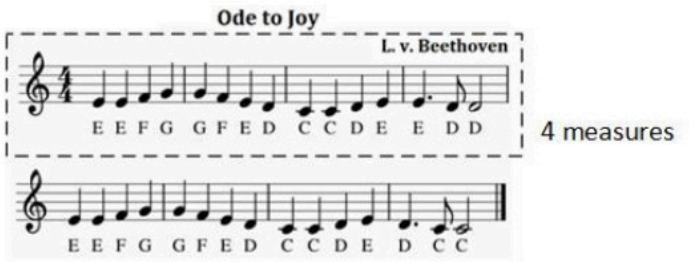


Figure 3. functions

- For the buttons "1", “2”, “3”, and “A”, you need to play a relevant tone once when the corresponding keypad button is pressed as described in Figure 3. Make sure to program to silence the buzzer after playing the tone once.
- For the buttons "4", “5”, and “6”, you need to turn on the RED LED with Cyan, Magenta, or Yellow colors as described in Figure 3. Make sure to program to turn off the LED after turning on for about 1 second.
- For the button "B", you need to play 4 measures of a simple song once. Make sure to program to silence the buzzer after playing the song once.
- (Note) If you choose to implement a long delay using a variable, you may need to use a volatile keyword to avoid unexpected compiler optimization and unexpected results.
  EX) *volatile unsigned int var;*
- As an example, a simple song, “Ode to Joy” by Beethoven is described below, and the sheet music is shown. You can choose to play a different song. However, you must provide/show sheet music. Without the sheet music, the lab instructor may not be able to evaluate your performance. The length of the song should be equal to or longer than 4 measures.



- For debugging purposes, you can silence the buzzer by toggling the switch position (S1). In fact, during this lab, you may need to cut off your buzzer sound using the S1 switch as needed

because playing a single tone for an extended time can bother your and your classmates' ears. Please be mindful of yourself and your classmates.

- Make sure to complete the lab check-off assignment (Lab4-50X) posted on CANVAS before the given deadline. The code files should be submitted as a part of the lab check-off assignment. Laboratory assignment deadlines are 15 minutes before the end of your registered laboratory session.

Reference

- B. Hur, "Learning Embedded Systems with MSP430 FRAM microcontrollers", 2nd ed. 2023.