

SYSC 3203

Project Title: EMG-Controlled Mouse Lab Milestone #4B: Monostable Circuit

In the previous lab, you used a comparator as a simple analog-to-digital converter, generating a HIGH (+3V) signal whenever the rectified EMG intensity crossed a preset voltage threshold. In this lab, you will add a monostable circuit in order to turn this signal into well-defined pulses with a fixed duration that the computer will reliably recognize as a sequence of individual mouse clicks.

1. Monostable Design

Design a monostable circuit using the 555 timer, the trigger circuit from Lab 4A, and as many resistors and capacitors as required. Set the monostable pulse width at 100 ms. To be compatible with the optoisolator circuit design during the first milestone, the 555 circuit should be powered with $V_{EE} = 0V$ and $V_{CC} = +3V$.

1.1: Sketch the circuit diagram for your monostable circuit. Include the values of all components on the diagram.

1.2: Sketch a schematic of the circuit, showing the chip layout for the 555 timer and labeling the terminals. Please label the testing points for your circuit.

Build the monostable circuit using the 555 timer from your kit and the trigger circuit from Lab 4A.

1.3: The 555 timer could probably work using the output from the comparator from Lab 4A, but this is not ideal. Why is it a good idea to include a trigger circuit with the 555 timer?

2. Comparator and Monostable Integration and Testing

Connect the comparator and trigger circuit from Lab 4A to the monostable trigger input. Make sure that the output of the comparator is compatible with the input of the monostable circuit. Using a function generator and an oscilloscope test that the whole circuit is behaving as designed. You can use a sawtooth or triangular wave form. Test that you can easily adjust the threshold with the potentiometer.

2.1: Show your TA that the whole circuit is behaving properly and that you can adjust the threshold.

Using the function generator, test what happens when you send two pulses separated by less than 100 ms.

2.2: Is your monostable retriggerable or not? How will this impact the current project?

2.3: What will happen, for the current application, if the monostable pulse width is set too high or too low?