

SYSC 3203

Project Title: EMG-Controlled Mouse

Lab Milestone #4B: Monostable

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 Show your design and component values to the instructor and have him/her sign your lab book.

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

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 for instance a sawtooth or triangular wave form. Test that you can easily adjust the threshold with the potentiometer.

2.1 Show the instructor that the whole circuit is behaving properly and that you can adjust the threshold. Have him/her sign your lab book.

Using the function generator, test what happens when you send two pulses separated by less than 100 ms. Is your monostable retriggerable or not? How will this impact the current project?

2.2 Show your answers to the instructor and have him/her sign your lab book.

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

2.2 Show your answer to the instructor and have him/her sign your lab book.