SYSC 3203
Project Title: EMG-Controlled Mouse
Lab Milestone #4A: Comparator and Trigger

In the previous lab, we obtained at the output of the integrator a signal indicating the intensity of the muscle contraction. The next step is to have a circuit that triggers for a given time whenever the intensity reaches a certain threshold. The goal for milestone #4 is to implement such a circuit by combining a comparator followed by a monostable circuit. In this lab you will implement the first part of this, consisting of a comparator followed by an edge trigger circuit.

1. Comparator

Design a comparator using the LT1011 voltage comparator that will compare the output of the integrator from the previous lab to an adjustable threshold (via a 10 kΩ potentiometer). The output of the comparator should be -3V or +3V.

1.1: Sketch the circuit diagram for your voltage comparator.

1.2: Sketch a schematic of the chip layout for the LT1011 voltage comparator and labeling the terminals. Please label the testing points for your circuit.

Build your comparator and test it using a function generator and an oscilloscope. You can use a sawtooth or triangular wave to show the comparator is working properly.

1.3: Demonstrate your working comparator to your TA.

2. Trigger circuit

The 555 monostable circuit that you will use in the next lab is a *negative edge triggered* device. In order to interface it to the comparator, a trigger circuit as represented in Figure 1 is required.
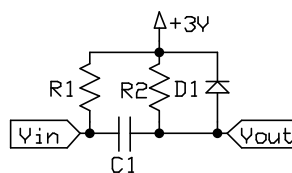

Figure 1: Trigger circuit

2.1: Analyze the trigger circuit to figure out what it does. Draw the V_{out} signal if a square wave was present at the V_{in} input.

2.2: Select values for R1, R2, and C1 based on your desired time constant.

2.3: Sketch the circuit diagram for your trigger circuit, showing how it will connect to the voltage comparator.

2.4: Demonstrate your working trigger circuit to your TA.