

SYSC 3203

Project Title: EMG-Controlled Mouse

Laboratory: Deliverable #1B: Amplifier / gain stage

Introduction

The magnitude of surface electromyographic (sEMG) signals is typically only a few millivolts (mV). In Milestone #2 you will be constructing an [instrumentation amplifier](#) to take the raw signal from the forearm muscles (Figure 1), however its designed voltage gain will only be approximately x10. In order to “see” the signal from your muscles on an oscilloscope, you will almost certainly need an additional gain stage. This stage will be used later in the project to amplify the signal between the band-pass filter and integrator.

If time permits, you can optionally modify the gain stage to improve the noise rejection by rolling off the gain at high frequency.

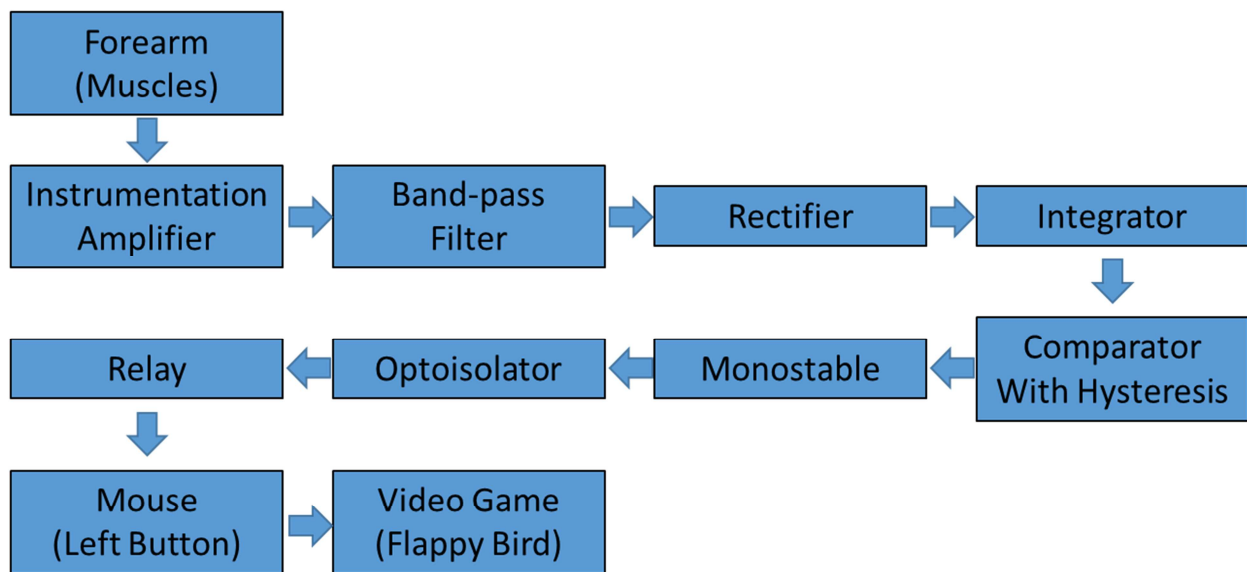


Figure 1: Block diagram for the whole EMG-controlled mouse project.

Gain stage design

The gain stage should be a simple non-inverting op-amp design as shown in Figure 2.

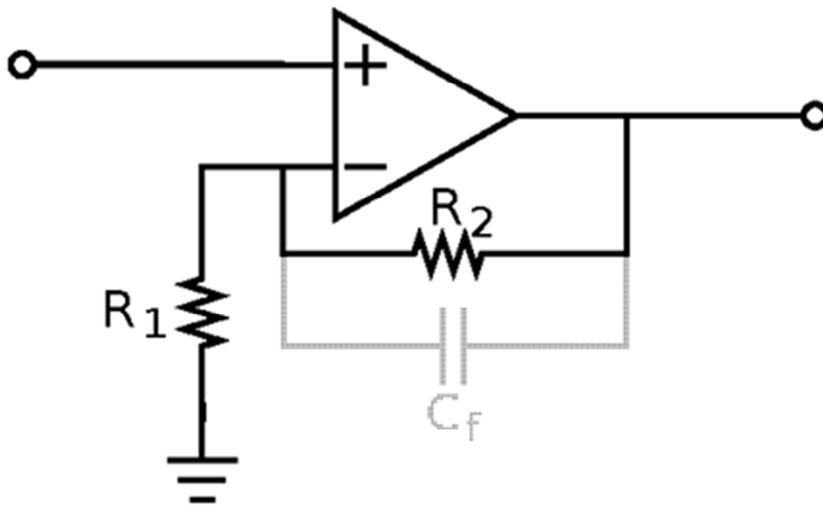


Figure 2: gain stage with optional low pass filtering

- Choose resistors R_1 and R_2 from your kit to give a gain of 40

Optional:

- Choose C_f to make the gain of your circuit start to roll off above approximately 1 kHz

Gain stage assembly and test

Implement your gain stage using an OP97 op-amp from your kit. Using the function generator and oscilloscope:

- Verify that your circuit achieves the designed gain value

If you included C_f in your design, also

- Verify the frequency response of your circuit

Show your testing results and assembled circuit to the instructor and have him/her fill and sign the instructor verification sheet.

SYSC 3203: Fall 2016 Instructor Verification Sheet

Submit this page to the lab instructor.

Name: _____ Student ID: _____
Name: _____ Student ID: _____

1.1: Show the instructor your calculations for the gain stage's resistors R1 and R2

Verified: _____ Date/Time: _____

1.2: *[optional]* Show the instructor your calculations for gain stage capacitor Cf

Verified: _____ Date/Time: _____

1.3: Demonstrate the correct operation of your gain stage to the instructor

Verified: _____ Date/Time: _____