Lab 5

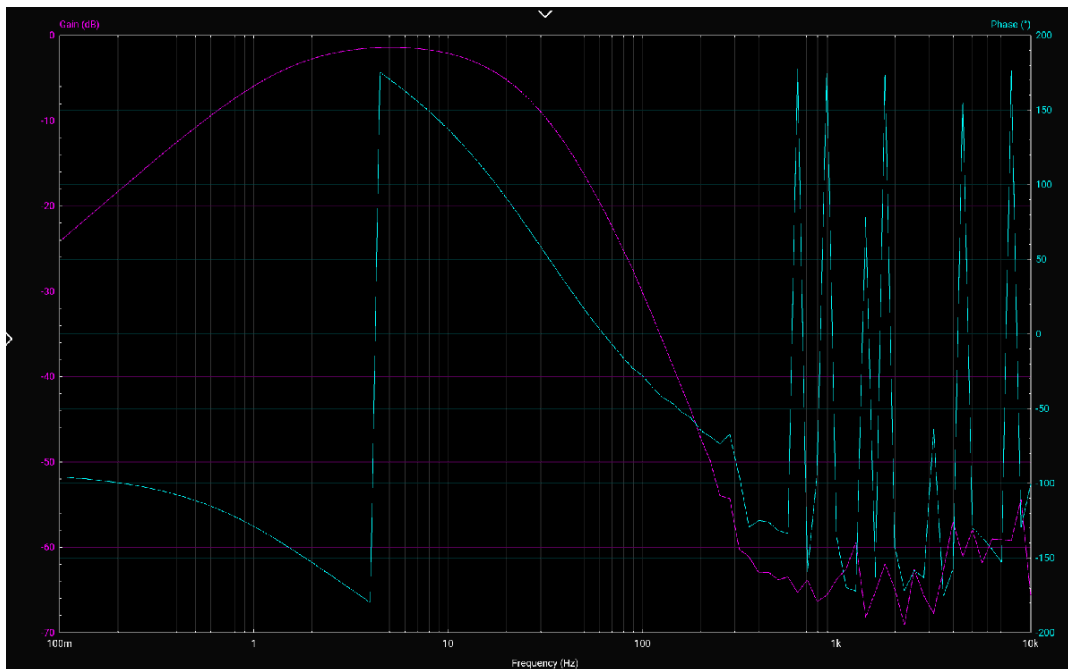## Bode Plot

The bode plot (Gain (dB) vs. Frequency (Hz)) used to measure the amplitude of the EKG circuit.

EKG Trace

```
%take in data from csv file
tname='lab5data.csv'; % <-input your data file's name! test2.csv was exported from
O-scope software with a line of headers
datatable  = readtable(tname);%makes data table with headers

%interpret data as times and voltages
time1  = datatable.t1; % stores the t1 column of data in a variable called time1
V1     = datatable.ch1; % stores the ch1 column of data in a variable called V1
time2    = datatable.t2; %stores the t2 column of data in a variable called time2
V2 = datatable.ch2; %stores the ch2 column of data in a variable called V2

%plot (you can change this section to suit your plotting needs!)
plot(time1,V1, 'r')
hold on
plot(time2, V2, 'b')%plots first channel
xlabel('Time (seconds)'); % add x axis label
ylabel('Voltage (V)'); % add y axis label
title('EKG Trace Voltage vs. Time')
```
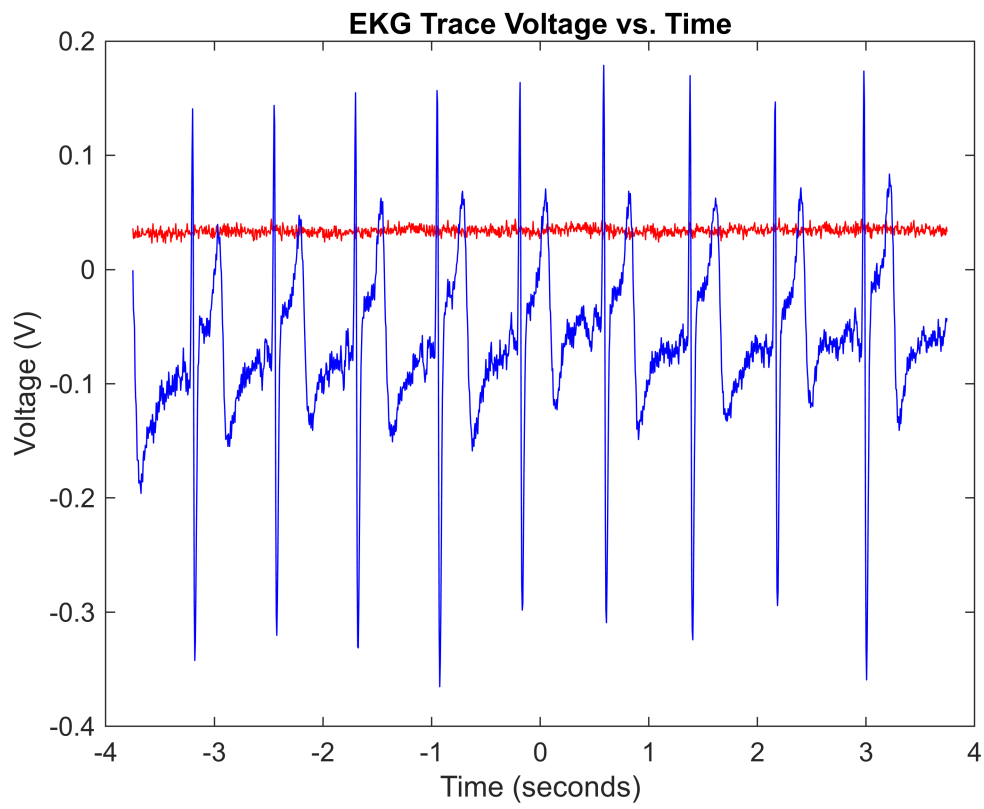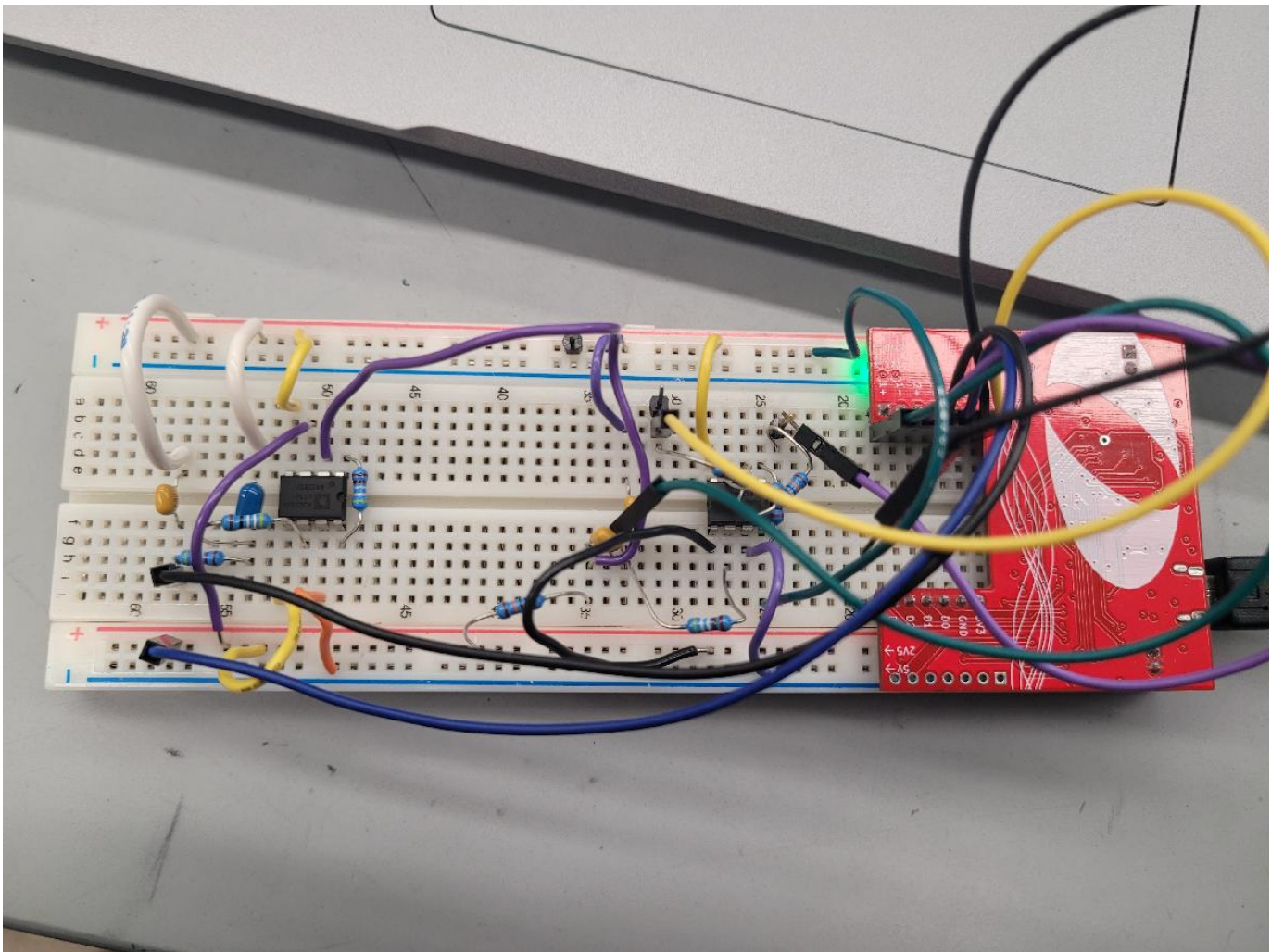
A graph of the EKG trace taken by place electrodes on the wrist.

Circuit

How Does the Circuit Function?

The EKG circuit is made up of two stages of filtering and amplification. The first stage uses a AD623 amplifier chip with a passive band-pass filter that filters out both high and low frequencies. The second stage has 2 RC circuits in series which form 2 low-pass filters. The characteristic frequencies of the circuit range from about 1 Hz to 20 Hz. For the first stage, the gain is set to 51, and in the second, it's 21, causing the output voltage to be amplified by a factor of about 1000. This ensures that the EKG signal is effectively captured while minimizing noise interference.