ECEn 390
Milestone 1 Report
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For this Milestone, we made sure that our Receiver Board and Transmitter Board from ECEn 340 were still functioning and met the specifications for this lab.

First, we plugged in the Receiver Board to ensure that it worked from long range. We saved 50,000 samples of data in a CSV file, then imported that data to MATLAB. Here is a MATLAB plot of the data from the oscilloscope when the Receiver Board was hit from long range.

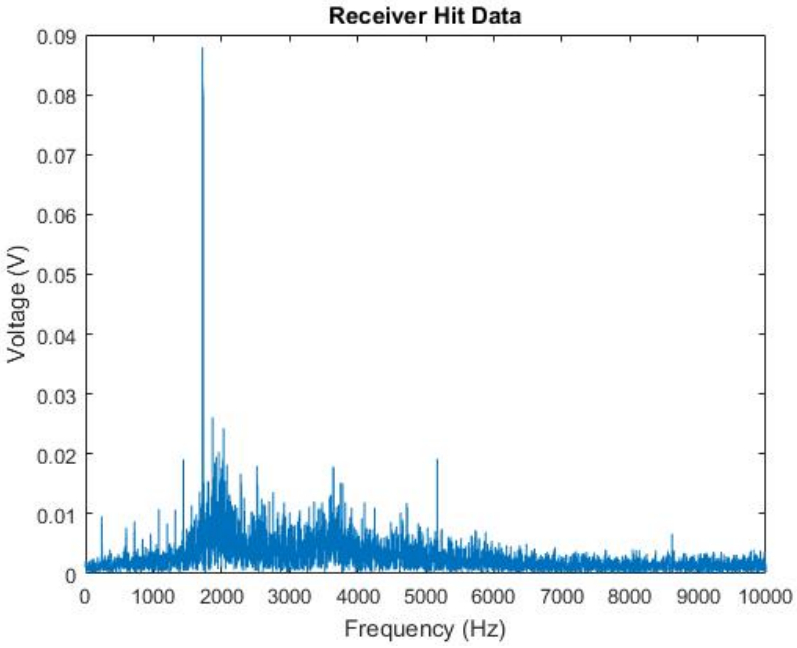

Figure 1: MATLAB Plot of Receiver Board registering a hit

Note that the signal is at approximately 1.75kHz, which is at the corresponding player channel frequency that the gun was firing at. Also, the signal has an amplitude of almost 90mV, which is plenty high enough. This shows that our Receiver Board meets the specifications for a "hit" signal.

After that, we did the same thing, but with our hand blocking the signal from entering the photodiode. Here is a MATLAB plot for the blocked signal.

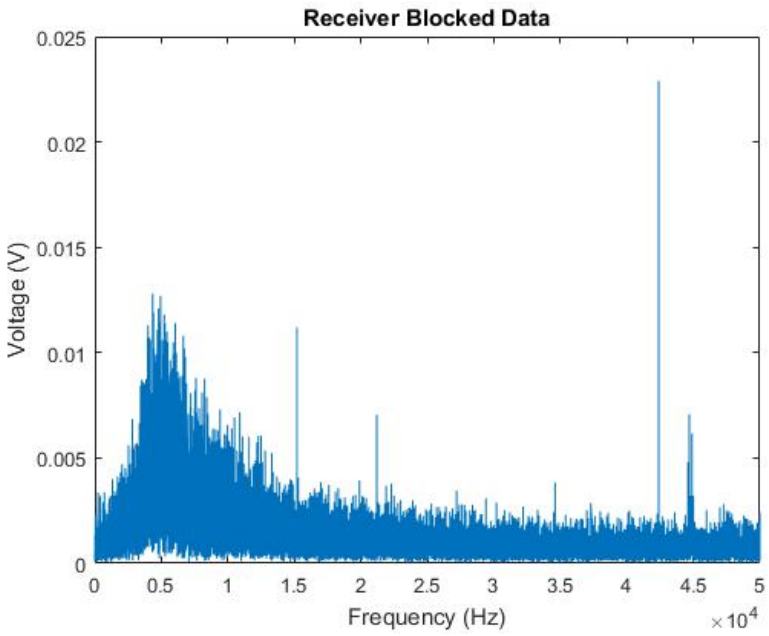

Figure 2: MATLAB Plot of Receiver Board registering a blocked signal

None of the signals have an amplitude of above 25mV and none of them are centered around any particular frequency. All of these signals are just noise from the ambient light in the room, and therefore shouldn't register as a hit. This shows that our Receiver Board meets the specifications for a "blocked" signal.

One other thing to note, which isn't shown in these plots, is that we analyzed the actual incoming signal (not the FFT) and made sure that the peak-to-peak voltage of the signal was not greater than 1V. At most, we got around 750mV, so we should be good on that front.

Finally, we did one final experiment to test our Receiver Board at close ranges, as well as if our Transmitter Board was still functioning properly. Using another chassis with our Transmitter Board, we "shot" the chassis with our Receiver Board, and got the following signal.

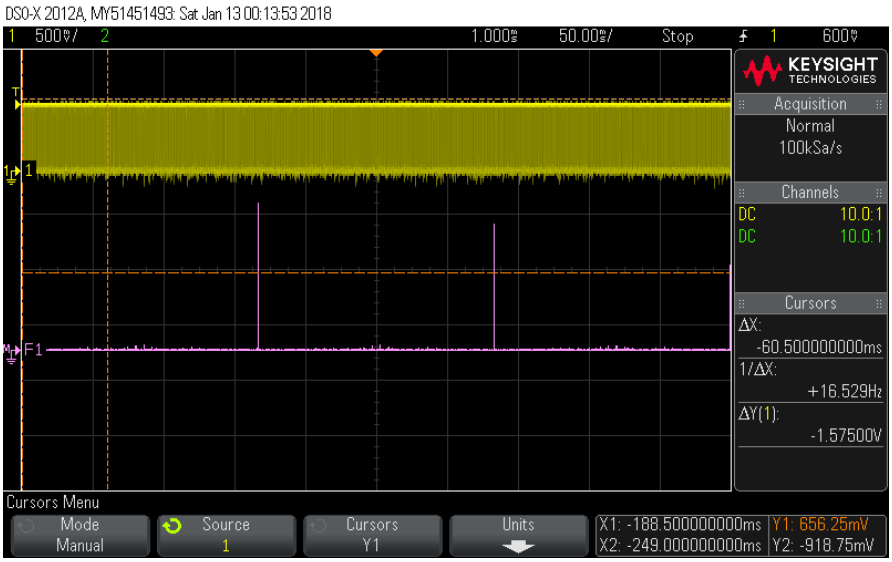

Figure 3: Oscilloscope plot of short-range shot

It's not completely obvious from just looking at the signal, but it shows that the signal does in fact clip where it needs to. Our Receiver Board successfully handles short-range shots.

Now that we have confirmed that our Receiver Board and Transmitter Board both work, we can move on to the next lab and hopefully not encounter too many problems with the boards.