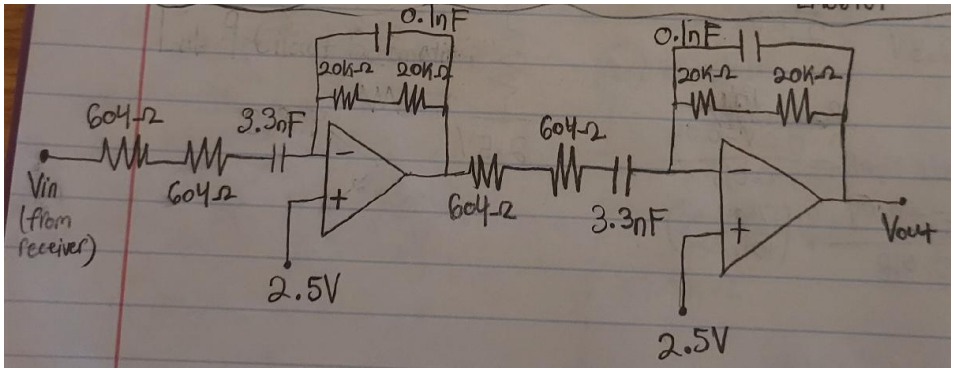
Lab 9

Circuit Diagram



Circuit diagram for an ultrasonic range finder using a transmitter and receiver.

Photo of Circuit

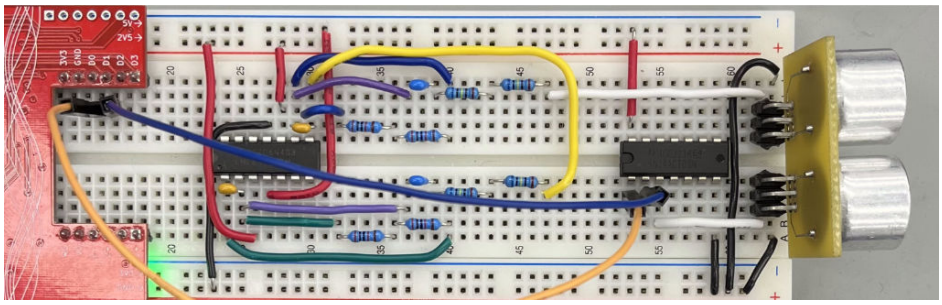
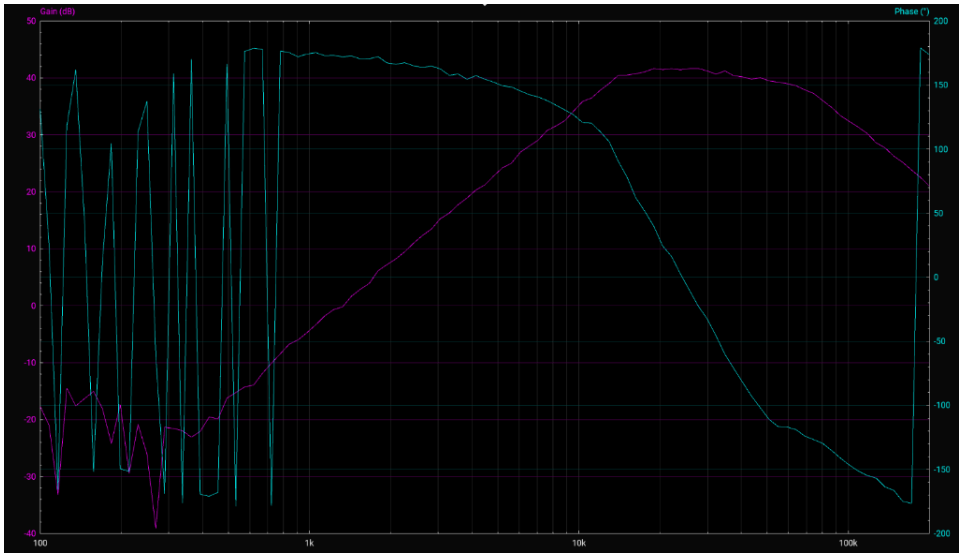


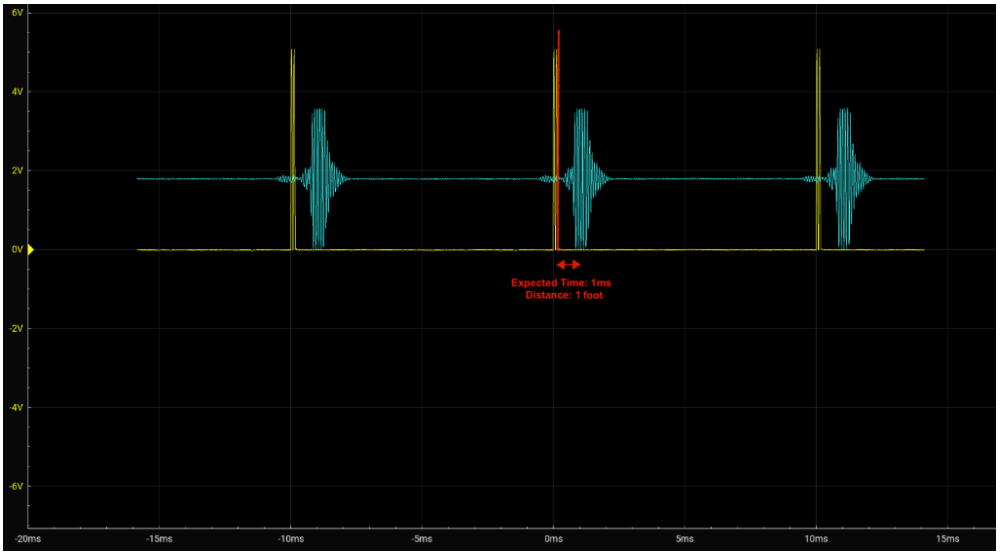
Photo of ultrasonic range finder built using the diagram above.

Bode Plot



Bode plot for the receiver circuit.

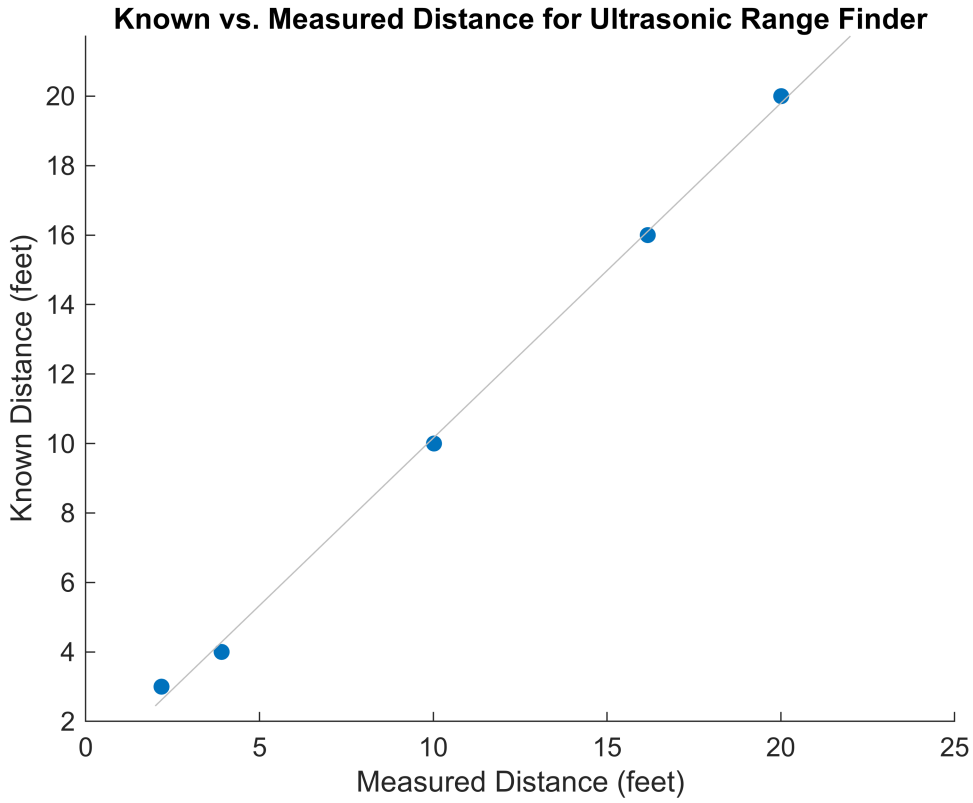
Signal Plot



Plot with transmitted and received signals. Light travels at 1 foot per millisecond. Red line indicates where echo is expected to be returned.

Plot of Measured Distance from Ultrasonic Range Finder

```
known_distances = [3 4 10 16 20];
measured_distances = [2.18 3.91 10.02 16.17 20.01];
scatter(measured_distances, known_distances, 'filled')
lsline
title('Measured vs. Known Distance for Ultrasonic Range Finder');
xlabel('Measured Distance (feet)');
ylabel('Known Distance (feet)');
```



Plot showing measured vs. known distance for the ultrasonic range finder circuit.

The plot indicates a near-perfect linear relationship, meaning that my circuit works very well. The linear relationship shows that for all the distances I measured, the measured distances were almost exactly the same as the known distances.

I mostly trust my range finder for short distances that are less than 20-25 feet. I believe it is also important to use the range finder in a space with few objects or people, as these can affect the received signal.