

EE / CprE / SE 492 – sdmay23-22

Ultrasonic Radar

Week 1 Report

March 4th – March 24th

Client & Faculty Advisor: Jiming Song

Team Members:

Kevin Czerwinski - Electrical Engineer

Derek Thomas - Computer Engineer

Ryan Foster - Electrical Engineer

Samuel Rosette - Electrical Engineer

Jack Riley - Electrical Engineer

Abubaker Abdelrahman - Electrical Engineer

Past Week (s) Accomplishments

- Over the past couple of weeks we have worked on refining the amplifying circuitry for the receivers. The signal that we get as an input is highly noisy and hard to read in so we are testing different stages of amplifiers to see which combination would work the best. We also added a summing amplifier in the input of the receiver so that the voltage is offset and the voltage level never drops into the negative values which is unreadable by the arduino
- We also are attempting to add in capacitors at various levels of the circuit to help smooth out the receiver input because there are a lot of random spikes in the signal.
- The received signal that we have amplified was successfully detected by the arduino with a clear increase in value when an object was held closer to the transmitters.
- Another circuit we have been working on is the transmission amplifiers. We have been testing the amplification of a signal sent into the transmitters as well as beginning the code for the pulsing and the phase array of the transmitters.

Pending Issues

- An issue we are struggling with now is implementing the array code. In this circuit, the transmitters need to be pulsed at very high frequencies so in order to do this we cannot just use the basic code provided by arduino. The digitalWrite command takes a while to actually switch a port to high or low so to avoid this and get much higher speeds, we need to manipulate the ports of the arduino directly. By doing this we can get much higher switching speeds and be much more accurate with the phase array process. This will take a lot of research and testing.
- Another issue we have been running into is the receiver signal being very noisy. This causes issues with reading the values in on the arduino and makes it harder to code. Hopefully fixing and improving the amplification circuitry can solve this problem.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Derek Thomas	<ul style="list-style-type: none"> - Updated website - Contributed to the bi-weekly report - Attended meetings and figured out possible next steps to tackle phase array 	3	18
Kevin Czerwinski	<ul style="list-style-type: none"> - Worked on transmitter code - Worked on improving the receiver amplifier - Contributed to the weekly report 	3	21
Ryan Foster	<ul style="list-style-type: none"> - Testing of amplification circuitry (Input and Output) - Transducer testing - Input manipulation (allows for input to be received by the Arduino) 	3	15
Samuel Rosette	<ul style="list-style-type: none"> - Researched for more accurate transducers - Assisted with the testing of the amplification circuitry(input and output) 	3	15
Jack Riley	<ul style="list-style-type: none"> - Researched shift registers - Made block diagram of full circuit - Researched better transducers 	3	18
Abubaker Abdelrahman	<ul style="list-style-type: none"> - Attended this week and past week meeting - Researched for ideas to put on the circuit design - Met with the client and figured out using amplifiers in Arduino input. 	3	18

Plans for Coming Week

- Determining the optimal method for transmitting pulses via Arduino
- Improve amplification circuits
- Complete the phase array code and figure out how to calculate distances