EE/CprE/SE 491 WEEKLY REPORT 08

11/1/2024 – 11/7/2024

number: 36

Project title: ***Ultrasonic Object Detector***

Client &/Advisor: Professor Jiming Song

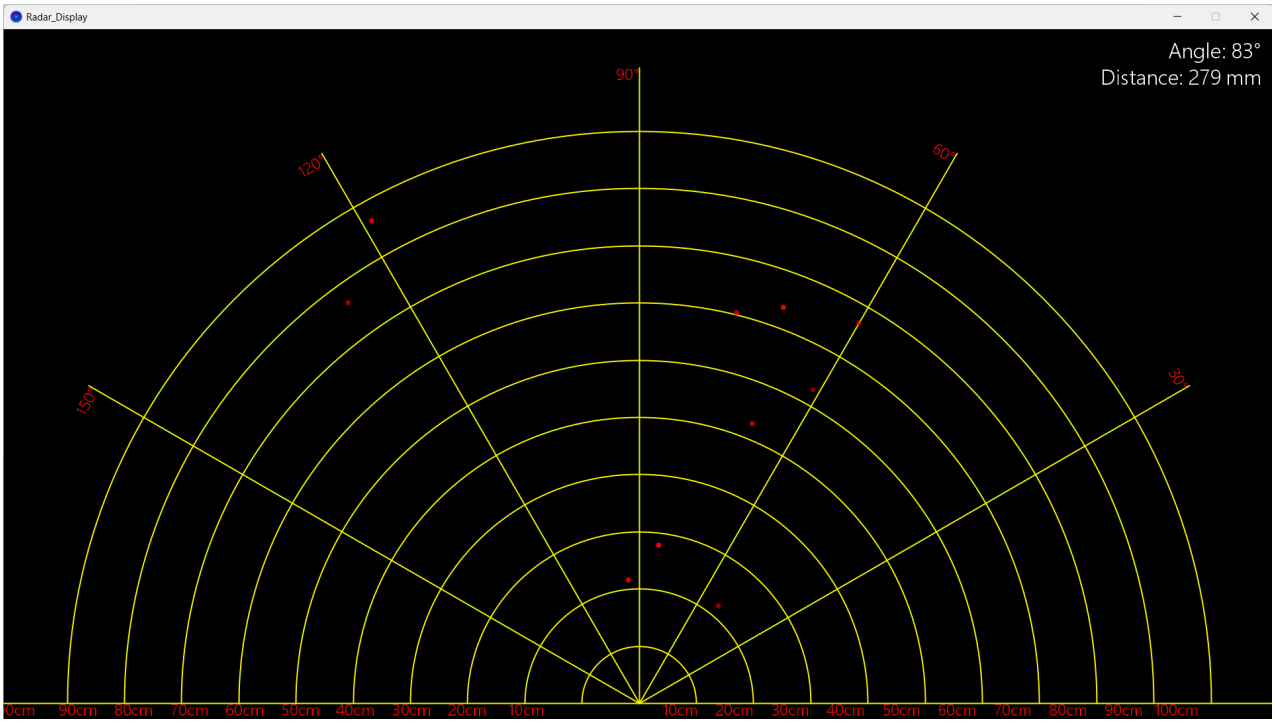
Team Members/Role:
Nathaniel Clarke - Project Software Designer
Brock Dykhuis - Circuit Analysis
Nicholas Jacobs - Electronics
Jonathon Madden - UI Designer & Software Tester

Weekly Summary

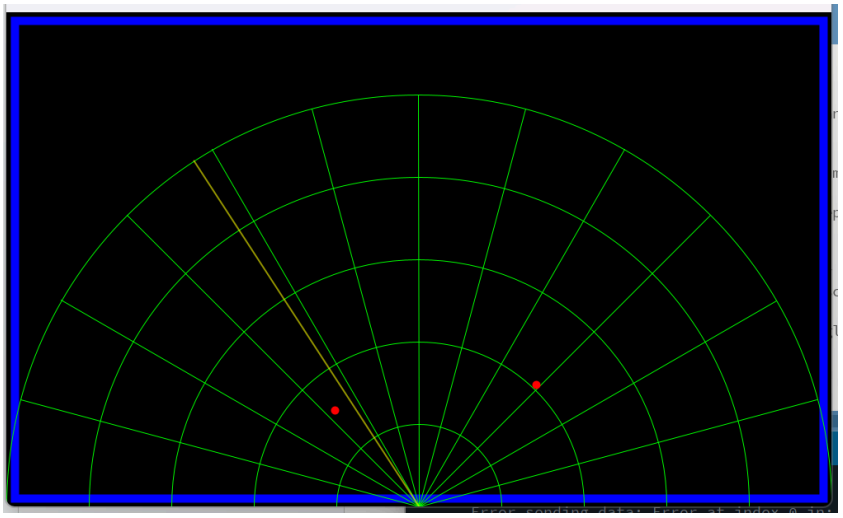
This week we ordered the ESP32-S3-DevKitC-1-N8R8 MCU which we will begin programming in the future. We have begun testing the transducers that have arrived and will continue to evaluate which components are needed. We began designing a display that should be sufficient for displaying future data.

Past week accomplishments

- Radar Detection Simulations and Calculations **-Nicholas Jacobs**
  - Ran NROTCl radar simulations to test and enhance detection capabilities, focusing on scenarios relevant to operational needs
- Signal Amplification Calibration **-Nicholas Jacobs**
  - Conducted theoretical calculations to adjust and optimize signal amplification, balancing sensitivity with clarity to improve overall radar accuracy
- Looked into how to program the microcontroller - **Brock Dykhuis**
  - We plan on using the Arduino IDE to program out ESP32
    - To do this we have to install the ESP32 extension to the IDE
  - The Arduino IDE uses C/C++
- Designed a display using random data, which will later use the real data from the radar system - **Nathaniel Clarke**
  - There is a small error in the placement of the cm labels.
  - The display shows the data for the last measured value and shows only the 10 most recent data points at a time.



- Worked on figuring out how the Raspberry Pi and display will communicate - **Jonathon Madden**
    - Experimented with mock data and better figuring out how our display will work
    - Will need to add more labels on next mock display



Individual contributions

NAME	Individual Contributions	Hours this week	HOURS cumulative
Nathaniel Clarke	Designed a display with randomly generated data values (made by a C file), and ordered the MCU.	7	52

Brock Dykhuis	Looked into setting up and installing the Arduino IDE, we will use this to program the microcontroller	6	47
Jonathon Madden	Experiemented more with mock data trying to figure out how the display will take data as a string	6	44
Nicholas Jacobs	Conducted NROTC radar simulations to optimize detection capabilities and performed theoretical calculations to calibrate signal amplification, balancing sensitivity, and clarity for improved accuracy.	6	47

Comments and extended discussion

Currently waiting for the microcontroller to be delivered, this should come in before next week.

Plans for the upcoming week

Jonathon Madden - My plan is to try to figure out how to best have the display and Raspberry Pi communicate.

Brock Dykhuis - Once we get the microcontroller, this will happen early next week, I plan on writing simple code and trying to get it connected to the Raspberry Pi.

Nicholas Jacobs - The plan is to implement last week's theoretical calculations into practical radar testing. This will start with applying low-sensitivity settings, then gradually increasing to assess clarity and sensitivity improvements under real conditions. Additionally, refining the signal processing and filtering methods will be a priority, aiming to address any noise or inconsistencies observed in initial test results and enhancing the radar's ability to distinguish relevant signals. This approach will provide a clearer picture of the effectiveness of recent calculations and highlight further areas for refinement in radar performance.

Nathaniel Clarke - I plan to look into beginning to program the MCU and examine past implementations of the Arduino code.

Summary of weekly advisor meeting

Talked about ordering our microcontroller, ESP32-S3-DevKitC-1-N8R8 MCU, which we got permission to order. After the meeting, we sent the order to ETG.