

EE / CPrE / SE 492 – sdmay21-07

## Small Rotor-Craft Obstacle Avoidance Radar System

### Week 5 Report

Fall 2020 – Spring 2021

Mar 15 – Mar 29

Faculty Advisor: Dr. Al Qaseer

#### Team Members:

Matt Bahr – Antenna Designer

Joshua Welton – RADAR Firmware/PCB Design

Felipe Varela Carvalho – Signal Processing

Matt McDermott – PCB Design

Mike Ostrow – Pi Data Flow

Leonardo Bertoncello Machado – PCB Design

#### Weekly Summary

This week we fixed issues with our original antenna design so that the antenna model would be suitable for testing. We began testing with the antenna to begin the process of simulation of data. This data is currently being analyzed so that in the near future we can have software that can more accurately interpret the data from the antennas.

After meeting with our advisor, both PCBs had issues that needed reworked. These included grounding plane issues, along with RF design intricacies that we were not aware of. These changes were made, and we have sent the redesign to our advisor for checking.

#### Past Week Accomplishments

This past week, we were able to get into our advisor's lab to test the prototype antenna that we had fabricated. The results were suitable, considering our project is a proof of concept. For full testing, we are going to get more antennas fabricated to suit our needs

#### Pending Issues

There are no issues that the group is facing at this. We are steadily working through the required work for this project.

## Individual Contributions

<u>Name</u>	<u>Individual Contributions</u>	<u>Hours worked this week</u>	<u>Hours Cumulative</u>
Matt Bahr	<ul style="list-style-type: none"> <li>• Cut SMA connectors for antenna to PCB integration.</li> <li>• Redesigned the antenna model for simulation based on notes from first testing session.</li> <li>• Created Solidworks drawings based off of the models for CNC purposes.</li> <li>• Began communication with both advisor and CNC owner for creation of antenna.</li> </ul>	10	39
Joshua Welton	<ul style="list-style-type: none"> <li>• Reworked correction on ADC PCB</li> <li>• Exported Gerber files for fabrication</li> <li>• Made spreadsheet for reference designator list, entailing package, value, etc.</li> </ul>	3	35
Felipe Varela Carvalho	<ul style="list-style-type: none"> <li>• Created a program to process and organize data in Python</li> <li>• Studied and wrote MATLAB code to process data</li> <li>• Started script using OpenCV to read data and interpret it</li> <li>• Lightly helped in the antenna design</li> </ul>	10	28
Matt McDermott	<ul style="list-style-type: none"> <li>• Finalized the list of components for our Bill of Materials and made the necessary preparations for everything to be ordered through the ETG.</li> <li>• Began initial testing and setup for our antenna with Dr. Al Qaseer.</li> <li>• Constructed a device which will give us accurate data when testing the antenna's functionality.</li> </ul>	11	29
Michael Ostrow	<ul style="list-style-type: none"> <li>• Tested antenna, and gathered data in txt file format for software implementation of detection algorithm</li> <li>• Continued work on SPI between PCB and pi</li> </ul>	4	17
Leonardo Bertoncello Machado	<ul style="list-style-type: none"> <li>• Made last-minute changes to PCB/schematic design errors in order to ensure a working model is shipped</li> <li>• Met with Dr. Al Qaseer to figure out how to test the antenna</li> </ul>	5	45

Note: Hours Cumulative is for this semester of class only.

### Plans for the Upcoming Week

We plan on getting a second antenna created to speed the testing results up. The team is also planning on slightly refining the original antenna even more to produce better data in future testing. Furthermore, we are preparing for simulation testing with the two antennas inside the laboratory of Dr. Al Qaseer utilizing a piece of relatively thick wire as our target, with various angles for data interpretation

Finalize all component ordering through the ETG and begin preparation for assembly once they have arrived.

Code data processing and develop filtering algorithm.

Finalize designs for fabrication, and send out relevant files for our desired manufacturer, JLC PCB.

### Summary of Weekly Advisor Meeting

The past weekly meeting consisted of going over both Main and ADC PCBs. Our advisor was happy with our progress, but gave us minimal changes that would help the functionality of the boards. He also went over the antenna design, and talked logistics about how we would commence testing the current antenna that we have.

Appendix – Screen Shots of Progress

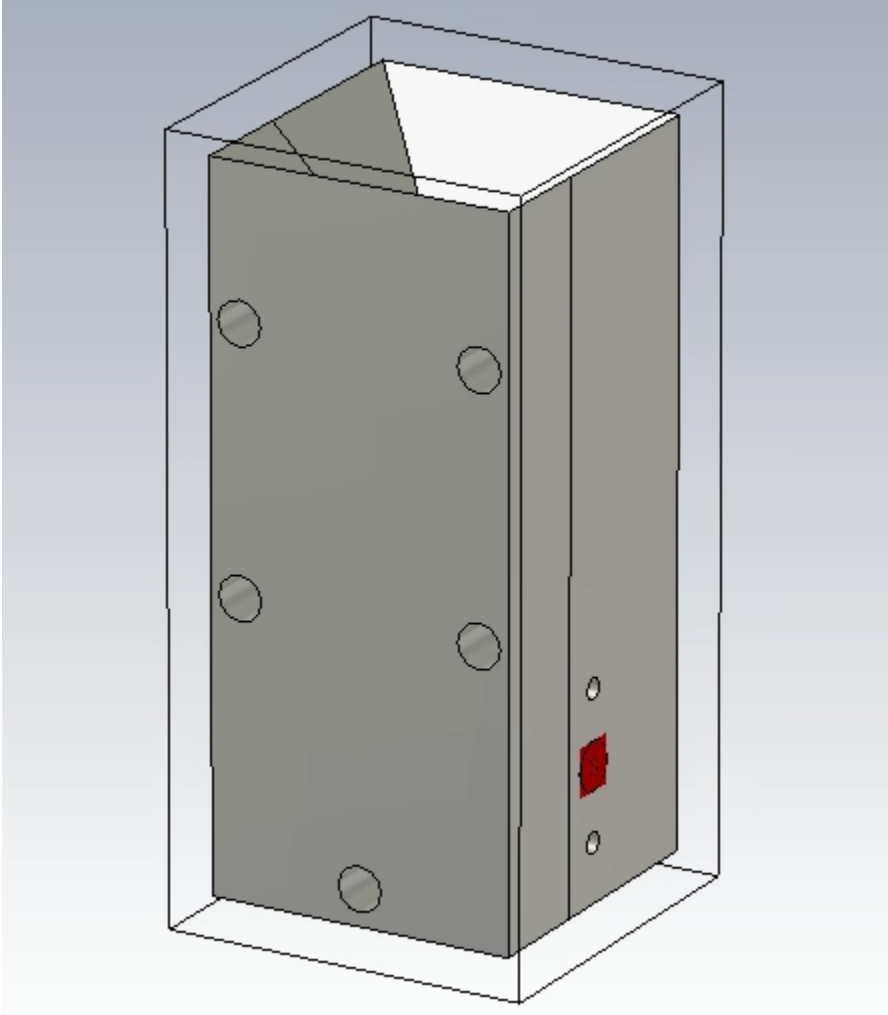


Figure 1: Updated Antenna Model View 1

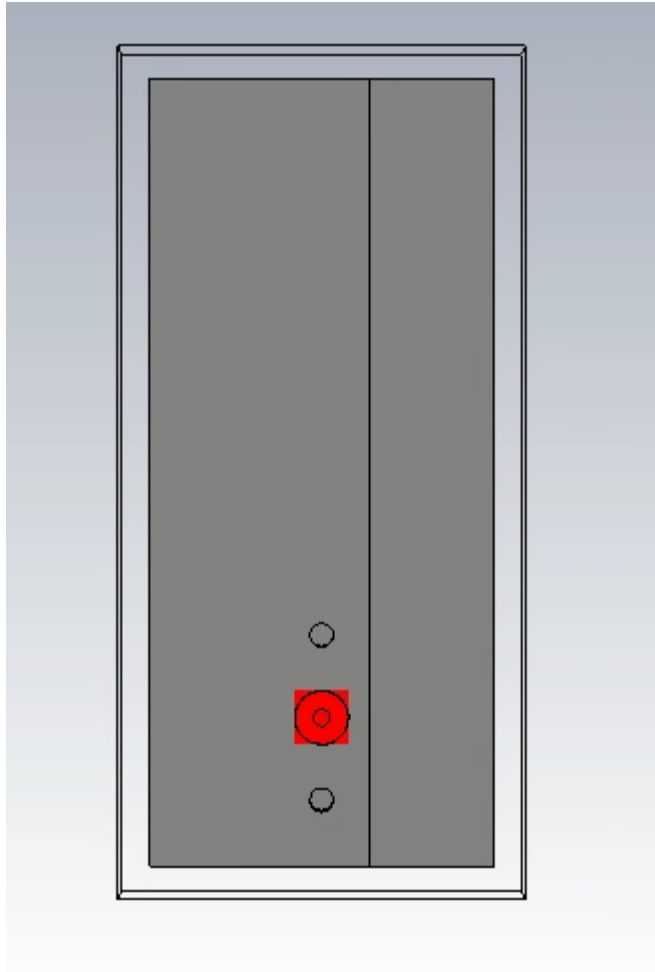


Figure 2: Updated Antenna Model View 2