

EE / CPrE / SE 492 – sdmay21-07

Small Rotor-Craft Obstacle Avoidance Radar System

Week 2 Report

Fall 2020 – Spring 2021

Feb 9 – Feb 22

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 Bertocello Machado – PCB Design

Weekly Summary

The overall objective for this week of work was to create dimensioned drawings for the antenna for use during CNC fabrication. Once this is completed, we will begin reaching out to potential CNC creation sources.

This week also served as a study week for the signal processing aspect of the project. The group will be using antenna arrays to gather angle and distance.

Lastly, this week the PCB design is further developed with the hopes of finalizing soon after. A major focus on fixing any violations and ensuring that the priority lines (RF lines) are fully drawn with the power divider implemented.

Past Week Accomplishments

Formatting of Antenna for CNC creation – Matt Bahr

- Formatted antenna to have correct screw hole sizes and locations.
- Created dimensioned drawings for use in CNC creation of the antenna. This was done through Solidworks.
- Contacted the ETG to work out the details with them for use of their CNC machine.

PCB design

- Continued design of PCB, only requiring the ADC addition to finalize.

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">• Created proper screw holes for antenna model• Finalized dimensioned drawings	10	25
Joshua Welton	<ul style="list-style-type: none">• Continued schematic for onboard ADC• Continued schematic for MCU integration	5	10
Felipe Varela Carvalho	<ul style="list-style-type: none">• Studied antenna arrays and ways of processing incoming data from antennas• Studied potential python libraries for the job.• Helped with antenna design	4	9
Matt McDermott	<ul style="list-style-type: none">• Continued finalizing the last schematic builds for our PCB design.• Continued to provide feedback for the PCB layout.	3	9
Michael Ostrow	<ul style="list-style-type: none">• Begun startup environment for register values to be initialized and main loop to be implemented	2	7
Leonardo Bertencello Machado	<ul style="list-style-type: none">• Fixed net errors within schematics to ensure clear connection between different document ports	7	14

	<ul style="list-style-type: none"> Imported previously made schematics to PCB layout in Altium Designer 		
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Note: Hours Cumulative is for this semester of class only.

Plans for the Upcoming Week

Antenna – Matt Bahr

- Begin testing of the physical antenna
 - Compare these test results with simulation results.
 - If test results are unsatisfactory, antenna model will be redesigned

Signal Processing – Felipe Varela Carvalho

- Use Data Generation program to start design of signal processing algorithm using Python
 - Waiting on algorithm for data generation
- Help with Antenna Design and communication with the ETG lab

PCB Design – Joshua Welton, Leonardo Bertoncello Machado, and Matt McDermott

- Finalize schematic for ADC and help with PCB layout
 - Includes interface between Raspberry Pi and ADC/Antenna ICs
 - With interface design fleshed out, should be relatively easy
- Finalize PCB outline and make significant advancements in the traces of each component
 - Verify that each component's trace is in the appropriate layer of the PCB

Raspberry Pi Environment – Mike Ostrow

- Finish building the environment so that a register setting initial code can be run on startup.

Summary of Weekly Advisor Meeting

The meetings with our advisor Dr. Al Qaseer these past two weeks briefly dealt with getting the antenna ready to be dimensioned by helping with the screw hole placements in our antenna. Our advisor continued helping the individuals assigned to IC creation by providing needed background information and tips for PCB creation which should lead to a complete design.

When it comes to the signal processing and software aspect of the project, our advisor was willing to help by providing a data simulation algorithm so that the group can start developing the software before having the hardware done.