ENME 501 (Fall 2023)
Individual Contribution Report

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Team Number: Group #10

1. List and briefly describe your contributions of engineering design, project management and communication to the capstone design project. You may also discuss any other types of your contributions to the project.

I have contributed to the engineering design of the project by

- researching different types of UAVs and their advantages/disadvantages (with Allen),
- researching materials and their manufacturing processes (with Allen),
- providing information on electronics and software available from my previous experiences,
- calculating the aerodynamic parameters using the equations and theory learned in ENAE 410,
- creating charts and trend analysis for the aerodynamic performance (results from the calculations),
- researching potential electronic components better suited for our use case.

I have contributed to the project management of the project by

- helping document meetings and new findings on our shared Google Drive (with team),
- assisting in project timelines and deliverables (with team).

I have contributed to the communication of the project by

- assisting in the writing of the design review presentation (with team),
- updating our sponsor representative of mech sub-team progress through email (with Allen),
- responding to team messages as soon as possible.

2. Identify and explain two contributions that you are most proud of.

Since the last session, I have continued visiting the makerspace for information on their courses and getting training on using the machines/tools available to aid us in our construction of the fixed-wing components.

I am most proud of my contributions on helping with the electronics and software components. Since I had prior knowledge of building and piloting drones, I was able to help guide the electrical and software teams on the components/packages required.

For the electrical sub-team (Anhela and Frank), since I was familiar with the terms and had shopped for them before, I was able to give recommendations and details on advantages and disadvantages of the options. Also, I provided useful reading material and described the connections that most drones have (like FC and ESC connections, what they’re used for, list of officially compatible FC’s for ArduPilot).

For the software packages, I gave details of ROS2, ArduPilot, PX4, and Gazebo to the software sub-team (Adam and Luis). While we are not going to use ROS2 or PX4, I was able to give them ideas that helped them understand what software is available. Also, I plan on continuing my active involvement with the software sub-team since I have experience using Gazebo and ArduPilot.

The second contribution that I am proud of is assisting Allen with the research of materials, manufacturing processes, and prices. I have visited the makerspace and grad students in the UAV rooms in EEEL to get more information on different ways we can build our drone. For example, I visited the UAV room in EEEL this past Tuesday and gained information on info of 3D printing carbon fibre. That conversation led to unexpected learnings like we could print the propellors using common PLA or ABS and painting them so that they don't fray at the ends. Also, that we can use shrouds to protect the propellors and decrease the tip vortices. I have also spent significant time learning the different manufacturing options we have available at the University of Calgary, since we are constrained by our budget and looking for more economic alternatives will help us build our prototype / proof of concept.

3. Identify and explain one contribution that you would plan to do differently if there is a second chance.

After the mechanical sub-team discussed our scope with Dr. Hinman who was extremely concerned with our scope due to our plan of conducting a CFD analysis using OpenFOAM and how it wasn't a realistic timeline because we are only two students and we wouldn't have the time to invest into it with our course load. However, after the meeting, I felt that Allen wanted to continue pursuing CFD because that is where his interests lay, why he chose this project, and his aerospace minor. Whereas I am more interested in the electrical and software design.

I think I did poorly by not pushing to stop our plans of conducting an in-depth CFD analysis and I felt like I was taking the main learning opportunity that Allen signed up for. By letting my emotions dictate my decision, I hurt the team's progress but eventually had to ask Allen if we could not pursue CFD anyways. Overall, I failed effectively communicating my concerns with my sub-team partner, Allen.

4. Describe a scenario where you find the importance of teamwork collaboration toward the quality of your project delivery.

I really think every part of our project has relied heavily on teamwork collaboration. From helping each other with our project contributions (e.g., time, research, etc.) to making our design review presentation, teamwork was necessary.

All of us comes with different ideas and different levels of understanding of the same material. I think that we have grown a lot as individuals at a professional and academic level because of the collaboration pushing and guiding us through the challenges we've been facing.

For example, I am not familiar with electrical design software, and the electrical sub-team (Anhela and Frank) helped me learn the basics so I could understand what they were working on. They provided details and resources to help me understand their results.

Another example is the software and electrical teams needing to understand each other to a high level because the software needs to be compatible with the electronics (and vice-versa). The mechanical team needs to know the electrical components so we can design our frame to accommodate the electronics.

Overall, I think that our collaboration is the leading reason of why we have learned as much as we have (albeit a tiny fraction of the whole subject) in the past couple months.