Project Team Charter

MIME 497: Capstone I

Signature Cover Page

Each team member will copy the following statement in their own handwriting (LEGIBLY) in one of the designated areas below:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Print Name: Clay McLeod **Signature:** C. McLeod

Handwritten Statement:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Print Name: Gavin Branch **Signature:** Gavin B.

Handwritten Statement:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Print Name: Ethan Shingleton **Signature:**

Handwritten Statement:

I agree to do an equal amount of work in the team. I understand that my grade will reflect my effort in the team.

Print Name: _____ **Signature:** _____

Handwritten Statement:

Print Name: _____ **Signature:** _____

Handwritten Statement:

Team Charter for Senior Capstone Design Project

Team Purpose

Our team is working with the student-led High Altitude Liquid Engine Rocket program (HALE) where we will be aligned with the structures and recovery subteam. The HALE program is competing in the Base 11 Space Challenge which is a race for a university team to reach the Karmin Line (100 Km) with a single stage liquid bi-propellent rocket. The structures and recovery subteam has integrated a passive control system for their current rocket CLETUS. However, the long term goal of achieving a higher apogee with a full scale rocket necessitates the use of active control systems. Our team's goal will be to develop an active aerodynamic control system that could be integrated into this full scale design.

Expectations are to document research and complete a functioning prototype that displays active control. The prototype will be 3-d printed and demonstrate a fully working system for future integration. The prototype should have active control on roll authority. The prototype will demonstrate a fully functional code, electrical, and mechanical package deliverable to HALE.

Team Goals

The primary goal for the structure and recovery team is to implement an active aero system into the current design of the rocket. In terms of quality and performance, this team's objective is to produce a reliable system that operates under any given condition. This team is aiming for a course grade of A.

For our team to successfully reach this goal, many customer requirements must be met. The first customer requirement that must be met is that the rocket must remain stable throughout its ascent trajectory within the atmosphere, and must not destruct. The rocket also must be able to adjust its roll rate. Finally, an essential requirement for this rocket is that it must not be capable of being guided to any target.

Roles and Responsibilities

Names	High5 Strengths	Role Title	Email	Responsibilities
Ethan Shingleton	**Self Believer Winner Commander Philomath Believer**	**CAD Engineer Documenter**	**shinglee@oregonstate.edu**	**Keeps track of files and makes them easily accessible. Ensuring they stay up to date with relevant notes. Acts as the point of contact for the team, keeping information easily accessible and available. Sets and manages meeting times. Use Ansys to complete FEA of system components**
Clay McLeod	**Coach Problem Solver Strategist Catalyst Optimist**	**Equity Manager Test Engineer**	**mcleocla@oregonstate.edu**	**Makes sure everyone contributes evenly and gives time for everyone to be able to speak. Design, develop, and execute tests. Use Ansys to complete FEA of system components**

Gavin Branch	**Analyst Problem Solver Catalyst Strategist Focus Expert**	**Manufacturing Engineer Simulation Engineer**	**branchg@oregonstate.edu**	**Manufacture components for prototypes utilizing tools such as 3-d printers Use Ansys to complete FEA of system components**

Be sure this section includes each team member's High5 Strengths, what they bring to the group, and their roles. Their role should reflect what they bring to the group.

Ground Rules

The team will meet every week on Wednesdays at 6 pm. This weekly meeting will include our immediate capstone group members as well as our subteam lead. In addition to the weekly team meeting, this group will attend the weekly club meetings on Monday at 6 pm and the weekly structures and recovery meeting on Thursdays at 5 pm.

This team's primary form of communication will be through text message, with communication with sponsors through discord. Discord will be used for daily communication between subteams and informational updates. Text messages will also serve as a second form of communication between our immediate capstone group members.

Communication between the team and subteam leads will be conducted respectfully. For important decisions, a consensus will be made through group discussion and project requirements. If opposing views arise throughout any process of this project, all perspectives will be heard and analyzed. Maintaining healthy communication between group members is of utmost importance.

Each team member will be expected to complete an equal number of tasks before the required deadline. As tasks begin to evolve, the number of tasks and the scope of work may be redistributed evenly among the group. This team will expect all of its group members to be consistently engaged, eager to work, and prepared for meetings and various tasks throughout the course of the project.

Potential Barriers and Coping Strategies

Team Barriers

One major barrier to effective teamwork often manifests itself as a failure of time management. This would result in ineffective groupwork between members as some would be ahead while others fall behind, inhibiting the rest of the team. If this were to occur, then the group members who are ahead will reach out to the members who are behind and see how they may help or what still needs to be done. This is usually a common occurrence where one person in the group does inadequate or missing work, which usually comes about from a lack of communication. So in order to fix this problem before it even begins, creating an initial level of trust and accountability that allows members to thrive together. Through setting initial expectations and having relaxed, open dialogues, a strong foundation and precedent will be established.

Sponsor Barriers

Being involved in such a dynamic team can often lead to miscommunication or errors in judgement. With one particular issue being the stretching of resources between subgroups as our sponsor is a student that is also directly responsible for the entire structures section of HALE. This could result in our sponsor being possibly stretched thin so that they are not always available. To counteract this issue and capitalize on everyone's time, establishing a strong initial set of goals and a good support network is crucial to minimizing the required aid from the sponsor. So by establishing other contacts within the HALE team, setting very clear expectations from the onset, and creating a consistent meeting time/location with the sponsor will be vital in this team's success.

Prototyping Strategies

Our team will only begin prototyping once we have a complete working cad model that has been tested with ANSYS, that operates efficiently, accurately modeling flight and proving successful. We will be developing an entirely new product that the club expects to see on future missions, not the current launch. So factoring this in, the team has been given substantially more freedom to work within the scope of the project. To account for this flexibility, guidelines have been well established to set clear goals. These guidelines include making an active reactionary fin system that receives stimulus from onboard sensors and control loops, then adjusts control surface deflection towards an ideal attitude. Our code will be limited to controlling the rocket's roll rate.

A working prototype will only begin production once a code has been written. A detailed and complete CAD model visually represents our design. And all the materials and necessary products have been chosen, such as servos. The next steps, once the prototype has been built, would be to establish a clear system for testing. This would include putting the rocket against a powerful fan to simulate it passing through the atmosphere, then spinning the rocket and observing the effects. If it stabilizes and counteracts the roll, then the team has succeeded. And can now move on to the stretch goal of tackling pitch and yaw movements. Shipping and management should not be an issue for this product, as components will be chosen not just on quality, but also on accessibility. Much of the prototype will be machined in house with 3D printers. And products that cannot, will be ordered from reputable sites with very quick shipping times.

In order to determine how a component failed, we will first do back-of-the-envelope calculations to verify that it can do the predicted objective in the first place. Doing this first will eliminate any concerns over the design itself and instead center all issues around an iterative method that looks more closely at our process and how it works. To increase the speed of production with an underperforming model, we will build a modular system that operates off replaceable and easily inspectable components. This, combined with building safety nets into the code, will ensure quick turnaround between prototypes. To document knowledge gained from each test, a Google document will be created where each attempt has a short questionnaire to be filled out that asks deeper questions to look below the surface and record situations that wouldn’t necessarily first be remembered. Our sponsor, being a student himself, has been included in our group chat and so sees every detail that occurs throughout. He is privy to all information gathered and discussed, and will be capable of jumping in at any point. We will inform our sponsor of important decisions and updates as the project progresses and dictates.