1. Team Purpose:

The team was formed with the primary goal of accelerating the development of the electrostatic strain wave motor. This innovative project not only represents an opportunity to contribute to advancing the field of robotic actuation but also serves as the central focus of the team's senior capstone design project. By working collaboratively, the team can combine individual skills and perspectives to design, build, and test what could become the world's first electrostatic strain wave motor. In doing so, the team aims to push the boundaries of what is currently possible in robotics and explore the viability of this novel approach to motor design.

Another important purpose of the team is to fulfill the academic requirements necessary for graduation. This project offers a unique opportunity to bridge classroom knowledge with practical, hands-on engineering experience. The primary stakeholder is the project sponsor, Professor Brian Do, who expects the team to deliver a functioning prototype and an informed evaluation of its effectiveness as a robotic actuator. Meeting these expectations requires not only technical innovation but also strong communication, time management, and teamwork. Ultimately, the team's purpose is to demonstrate both technical competence and creativity while contributing to the advancement of electromechanical systems in robotics.

2. Team Goals:

Our team's primary project goal is to design and construct a working and durable prototype. While we recognize that the components and materials we use may not be of production-level quality, we want our prototype to be functional, reliable, and able to demonstrate the intended design. We believe that a successful project is one that not only meets the course requirements but also gives us the opportunity to showcase engineering creativity and problem-solving skills. By focusing on durability and functionality, we can ensure that our final deliverable represents a realistic step toward a production-level solution.

In terms of process goals, we want to maintain an efficient and organized workflow. This means identifying and addressing errors as early as possible to avoid setbacks later in the project. A smooth prototyping process will allow us to test, iterate, and improve our design quickly while keeping the team's progress on track. To achieve this, we are committed to clear communication, division of tasks based on individual strengths, and maintaining accountability throughout the project timeline. These practices will help us maximize productivity and ensure that challenges are addressed collaboratively rather than individually.

Quality goals are equally important for our team. Although the prototype itself may not include production-grade components, we are committed to upholding high standards in how we design, build, and present our work. This includes producing clean documentation, thorough testing, and careful attention to detail in the assembly and evaluation stages. By prioritizing quality in both the process and the final product, we aim to create a project that we can confidently stand behind and present with pride. As part of the effort to create clean

documentation, we have been and will continue to document all progress (and barriers) in Notion.

Finally, as a collective, our team is aiming to achieve an A in this course. To reach this academic goal, we understand that each member must be willing to commit significant time and effort. This includes not only contributing to technical work but also actively participating in discussions, meetings, and decision-making processes. By holding ourselves and each other accountable to this standard, we believe we can exceed expectations and deliver both a strong project and a strong academic performance.

3. Team Member Personalities, Roles, and Responsibilities:

High Five Strengths:

Joseph Serra:

1. Strategist
2. Commander
3. Self-Believer
4. Winner
5. Philomath

Alexander Roller:

1. Problem Solver
2. Self-Believer
3. Philomath
4. Coach
5. Catalyst

Ben Cantero:

1. Philomath
2. Brainstormer
3. Catalyst
4. Optimist
5. Deliverer

Joshua Elliott:

1. Coach
2. Storyteller
3. Analyst
4. Believer
5. Catalyst

Team Member Name	Role Title	Role Description
Joseph Serra	Systems Strategist	Drives the project vision and ensures all design decisions align with long-term goals. As a *Strategist* and *Commander*, he coordinates tasks across the team, makes critical trade-off decisions, and keeps the project moving on schedule. His *Winner* and *Self-Believer* strengths give confidence to the group, while his *Philomath* trait supports learning about advanced motor technologies
Alexander Roller	Lead Engineer, Problem-Solving Specialist, & Minister of electricity	Takes the lead on solving the most complex technical challenges in motor design. His *Problem Solver* and *Catalyst* strengths make him ideal for breaking down difficult engineering issues and sparking technical innovation. As a *Philomath*, he ensures the team is backed by strong technical research, while his *Coach* trait helps him support peers who get stuck.

Ben Centarero	Team, Innovation & Prototyping Lead	Drives creative ideation and ensures concepts become tangible outcomes. As a *Brainstormer* and *Optimist*, he brings energy and keeps the team positive through setbacks. His *Catalyst* helps initiate new ideas, while his *Deliverer* strength ensures follow-through from concept sketches to working prototypes. With his *Philomath* trait, he can quickly absorb new fabrication or testing methods
Joshua Elliott	Communication & Integration Lead	Ensures the team's technical story is clear and compelling for advisors, clients, and final presentations. His *Storyteller* and *Believer* strengths make him ideal for crafting reports and presentations that connect the design to its purpose. As a *Coach* and *Catalyst*, he motivates peers and makes sure collaboration stays smooth. His *Analyst* strength keeps communication fact-based and accurate.

4. Ground Rules:

Our team has established a comprehensive communication and meeting structure to ensure effective collaboration throughout the project. Our primary communication channel will be Discord, which provides us with a centralized platform for ongoing discussions, file sharing, and quick updates. This will be supplemented by text messaging as our secondary method for urgent matters or when team members are away from their computers. We have scheduled our regular team meetings for Mondays from 4:00-5:00 PM, with the understanding that experimental work may occasionally require extended sessions. ~~Additionally, we have reserved Wednesdays at 4:00 PM as a backup meeting time when additional coordination is needed or when Monday conflicts arise.~~

Our team operates under fundamental principles of accountability and mutual respect. The cornerstone of our ground rules is personal responsibility—when a team member commits to completing a task, they will follow through on that commitment. We believe in transparent communication about progress and challenges, ensuring that potential roadblocks are identified early rather than at deadlines. Decisions will be made through a democratic process where all voices are heard and considered, with a majority vote determining the path forward when consensus cannot be reached. We recognize that dissenting views often lead to stronger solutions, so we encourage constructive debate while maintaining respect for all perspectives. To maintain accountability, we will conduct regular check-ins during meetings, send reminder messages for upcoming deadlines, and create a shared task tracker that clearly shows each member's responsibilities and progress.

Communication with our advisors follows a structured approach to keep them informed of our progress and leverage their expertise effectively. We maintain regular contact with Professor Brian Do, our project advisor, through Microsoft Teams, providing updates on our progress and scheduling meetings as needed throughout the week. Our mentor, Dr. Jayani Jayasuriya, meets with us during the designated Friday lecture period, providing us with consistent weekly guidance and feedback on our technical approach and project development. These regular touchpoints ensure that we receive timely input on critical decisions and maintain alignment with project objectives and academic requirements.

Our approach to workload management emphasizes both individual accountability and team flexibility. Each team member is expected to fulfill the specific roles and responsibilities outlined in our team charter, maintaining the specialized expertise that makes our team effective. However, we recognize that project demands can shift unexpectedly, and some phases may require more intensive effort in certain areas. When a team member completes their tasks ahead of schedule and another member faces an overwhelming workload, we will redistribute work based on technical expertise and availability. This dynamic allocation ensures that no single person becomes a bottleneck while respecting the specialized skills each member brings to the project. To ensure everyone's time is used effectively, we maintain a shared project board that displays current task assignments, progress status, and upcoming deadlines, allowing all team members to understand the full scope of work and identify opportunities to provide assistance or request help when needed.

All documents that are class relevant are to be saved in the shared google drive so all team members can access and work on class work as needed.

5. Potential Barriers and Coping Strategies: This section is divided into two subsections regarding potential issues that might arise during the project and how you can address the issues as a team.

5.1 Team Barriers: One barrier we are facing is scheduling. We do have times we will meet consistently but if we need to meet outside of that it will be difficult to do so. To accommodate

our varying schedules we will have to be ok with people not showing up to meetings outside of the designated weekly meetings and make sure we document tests and research well so those not in attendance can stay up to date.

We recognize that everyone is important to this project and might have different ideas on how to tackle the strain wave motor. When it comes to conflict of ideas we will discuss things in a dialectical manner with the main question being “What will build the best strain wave motor”. The two ideas will present their cases using data and whichever one is the best for the strain wave motor we will use. The two people with conflicting ideas must leave their egos behind.

5.2 Sponsor barriers: Communication has been an issue with our sponsor. We will be setting up a Teams chatroom with him at some point. We will also be having weekly meetings with our sponsor updating him on the progress we are making. We will make sure to make sure we set what we believe are reasonable expectations so we do not have conflict with our sponsor due to expectations. But if we do have conflicts due to expectations we will document our efforts to show we are working hard.

6. Prototyping Strategies (only address the subsection that fits your project most: (a) DESIGN-based or (b) PROCESS-based projects)

(a) DESIGN-based Teams: Imagine that you have reached the portion of the course where teams typically start creating their proposed solution. Now that your design is approaching physical realization, how will you determine when it’s mature enough to build into a prototype? Once you have a prototype, how will you test it and how will you validate test results (specifically, how will you gather data to compare your prototype’s performance to the information in your House of Quality?)? How will you plan for potential shipping and availability issues when ordering components? If your prototype fails, how will you determine whether the problem can be solved by iteration or is fundamental to the design? What strategies can you implement now to set yourselves up to react quickly to an underperforming prototype? How will you document the knowledge beyond data that you gain through design and testing? To what degree will you involve your sponsor in the prototyping process?

We will determine whether the design is mature enough to build into a prototype when we have questions to answer that would be faster to test physically instead of modeling.

We will validate results by measuring parameters directly (torque, weight, rpm, etc.)

We will identify fundamental issues with the design by determining the underlying physical phenomena responsible for the issue.

We will document the results of experiments in daily logs using Notion and weekly presentations.

Our sponsor will be involved in the prototyping process through weekly meetings.

We will account for any component availability issues by determining multiple suppliers and/or components for each need. The primary electronic component supplier is Digikey with Mouser Electronics as the backup. All the materials needed for the mechanical aspect we already have on hand.