

Team Position	<i>Mechanical System Design Member</i>
Project Lead	<i>Andy Chu (andy.chu@stonybrook.edu)</i>

Position Summary

The purpose of this team position is to design and manufacture the mechanical power transmission for the boat. The system should be well integrated with the electrical components of the boat. It should be designed in a way that does not require advanced manufacturing methods, easy assembly is key. It is critical to understand the power transmission is taking the electrical energy from the batteries and converting it to mechanical energy. We need to an efficient design to have minimal losses from the batteries energy to the thrust of the propeller.

Duties and responsibilities

- You will need to be comfortable with not knowing answers to problems and try to find solutions to them based on your engineering knowledge.

Preferred Qualifications

Qualifications include:

- Beginner to intermediate knowledge SolidWorks 2015
- Must be willing to learn and research on your own time and effort
- MEC 363 (Shear-Moment Diagrams), MEC410 (Design of Machine Elements)
 - In my opinion, you can learn most of this knowledge on your own, do not need to have taken these classes
- Basic machining skills (MEC 225 experience), only if you are machining.
- Finite Element Analysis or Computational Fluid Dynamics
 - Both of the skills are rare, but very valuable for students to learn. Stony Brook University does not provide the knowledge for the undergraduate level. Self-learning is a huge factor for those two skills.

Available Projects

Implementing SolidWorks 2015 to create an accurate CAD model of the boat

- Difficulty: Basic to Intermediate
- Proper usage of mechanical tools to measure the angles and slopes of the boat
- Using SolidWorks 2015 lofting feature to CAD the boat (Not too difficult).
- Please contact project lead for more details

Battery Mounting System

- Difficulty: Basic to Intermediate
- Designing an enclosure for the batteries to prevent them from moving while the boat is in motion
- System should be relatively easy to manufacture and assemble
- You will learn how to make design decisions on which material to purchase

Power Transmission System of the Boat

- Difficulty: Intermediate to Advance
- Chain tension on the sprocket must be designed to reduce slip
- From consulting with industry experts, the gear ratio that should be implemented should be 2.54:1
- Using SolidWorks 2015 to aid in construction of the power transmission system
- Read into power transmission textbooks to develop background knowledge of gear trains
- Help manufacture and assemble the boat drive train, then follow up testing of the new mechanism to determine improvements
- Required to meet on Saturdays or during the week for design meeting (must be prepared beforehand)
- Should be comfortable with getting your hands and cloths dirty

Using ANSYS Fluent to determine drag of boat

- Difficulty: Super Advance
- Learning and using ANSYS Fluent 16.2 to determine the CFD of the boat in a multiphase zone
 - This is a very difficult project to do, if you are determined to start this project I can show you what is necessary for you to accomplish it. This project will look great to employers.

Using ANSYS 16.2 FEA along with SolidWorks FEA to analyze the stress on the shaft

- Difficulty: Super Advance
- This project uses FEA to help understand the stress happening on our rotary equipment which will otherwise be too difficult to analyze using analytical methods.
 - This is also a difficult project because there are not a lot of resources at Stony Brook to learn FEA, contact the team lead and he or she will show you ways to achieve this.

Projects Already Assigned

The following projects have already been taken. If you would like to take part in any projects listed below, please contact the project lead.

- Chain tension on the motor
- CAD of the boat
- Battery Mount System

