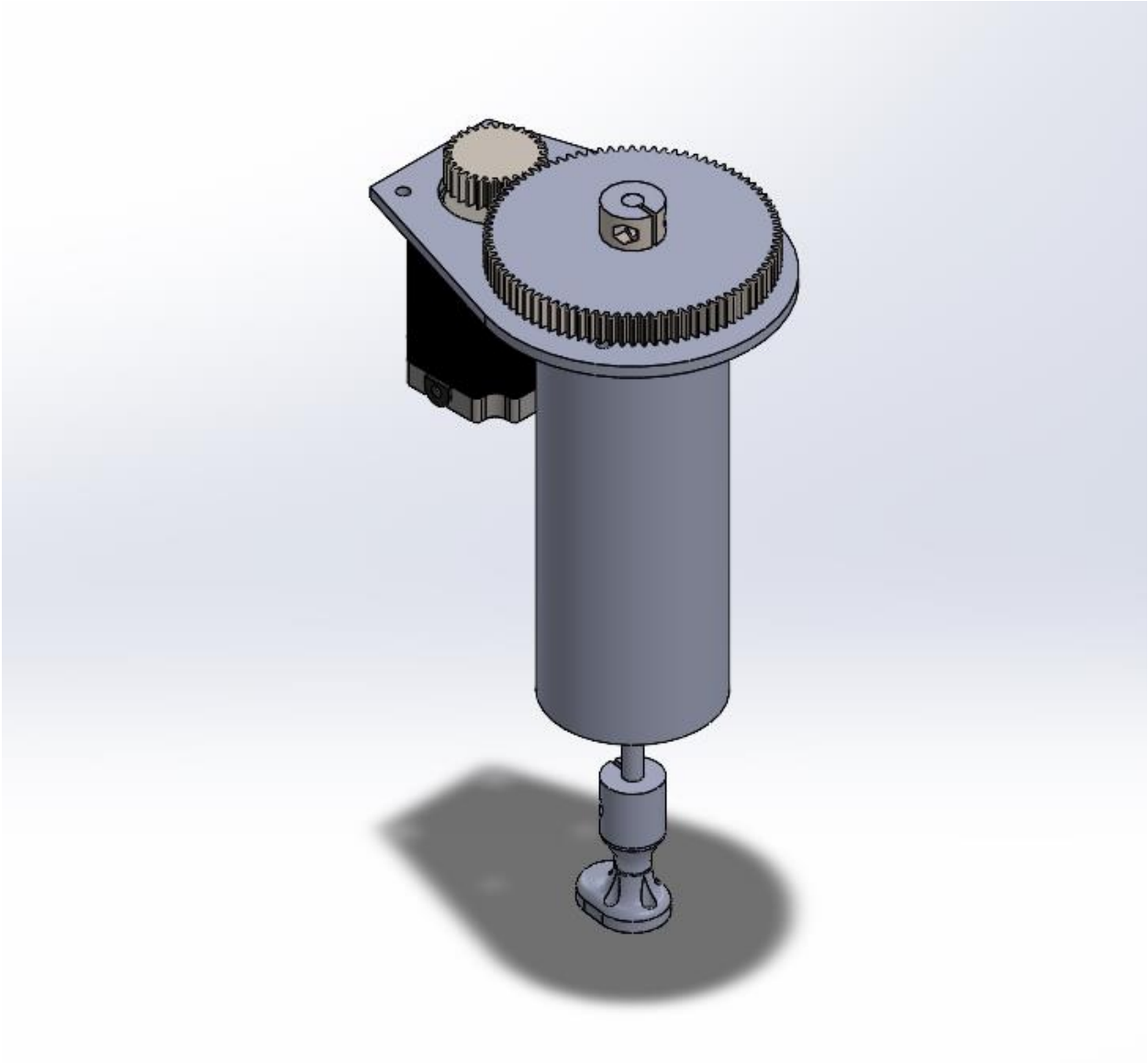
aQuatonomous Azimuth Thruster

Project Portfolio



Park Lan-Liu

Mechanical Engineering Student at Queen's University

Soft skills:
Mechanical design, Additive Manufacturing knowledge
Technologies:
SolidWorks, Bambu Slicer software

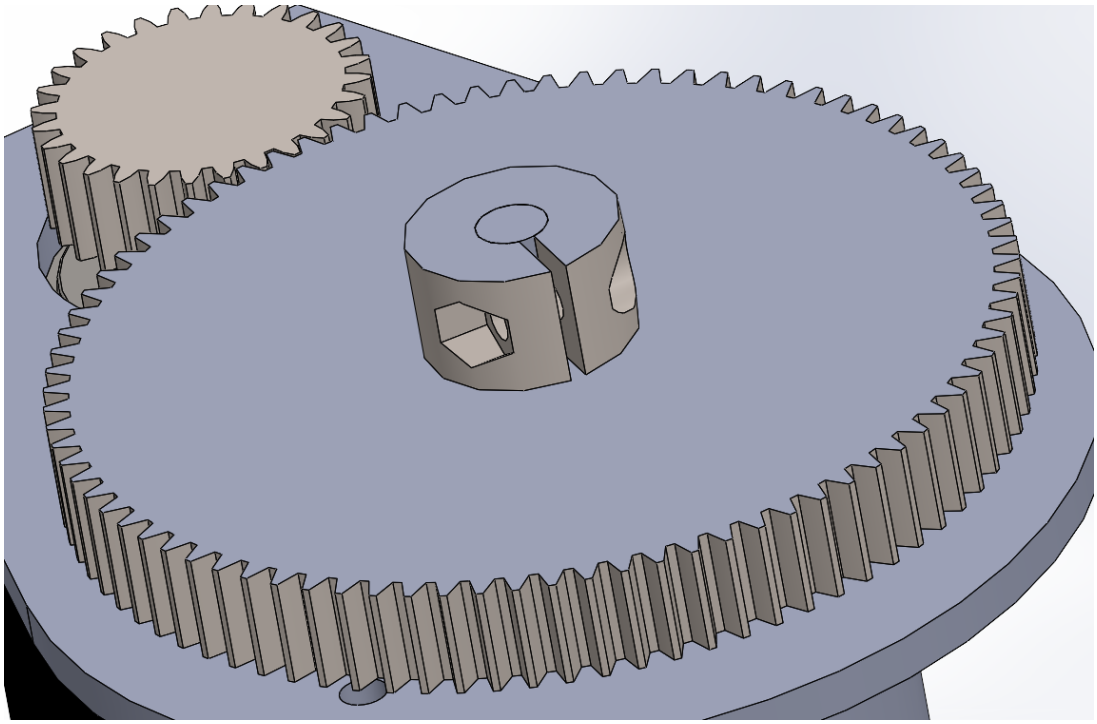
As the Mechanical Team Lead for Queen's University's aQuatonomous Design Team, I led the design and development of a dual azimuth thruster system for an autonomous boat competing in the RoboBoat Competition. Utilizing BlueRobotics T200 Thrusters, I engineered the thruster system to provide precise control and propulsion, enhancing the boat's maneuverability and performance. The system was modeled in SolidWorks, and printed with Bambu Slicer software. This project demonstrates my expertise in mechanical design, precision control systems, and prototyping.

The BlueRobotics T200 thrusters used in the assembly.

Gear Reduction Placement for Easy Access and Durability

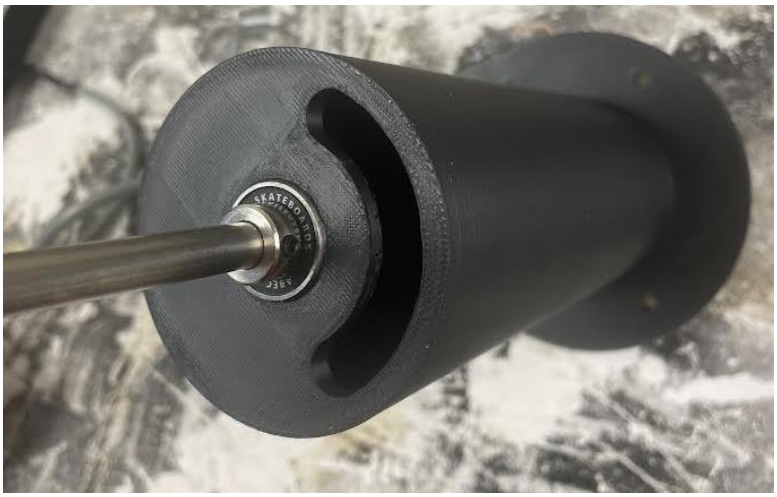
To streamline the process of adjusting gear ratios during testing, the gear reduction system was strategically placed on top of the assembly. This design allows for quick and easy access when switching between different gear configurations, significantly reducing downtime and improving the efficiency of testing. Additionally, the stepper motor was mounted higher up in the system to minimize the risk of water damage, a critical factor for maintaining reliability in marine environments.

Shaft Compatibility and Gear Clamping Design



For compatibility and cost-effectiveness, the gears were designed to clamp onto a standard 8mm shaft, chosen specifically for its compatibility with readily available skateboard bearings. This design leverages the affordability and ease of access to these bearings while maintaining robust functionality. The gears are securely fastened using M4 screws, providing a simple yet reliable method for quick assembly and disassembly when needed.

Hot-Swappable System and Cable Management



The entire thruster system was designed to be self-contained, making it easily hot-swappable. This modularity allows for quick replacement or upgrading of individual units without the need for extensive reassembly. Additionally, the system features an empty cavity within the housing, which serves as an ideal cable passthrough, keeping the Thruster cable organized and protected while maintaining clean, efficient routing within the system. This design ensures both practicality and ease of maintenance.