FRC Base

Summary

Organization: *Ten Ton Robotics Academy (First Robotics Competition)*
Role: *Assemble and design electronics layout*
Duration: *Sept. 2024 - Dec. 2024*
Team size: *3*
Tools: *CAD (Onshape, Fusion 360), 3D printer, Wood Tools, Welding, Soldering, Powert tools*
Skills: *Documenting progress, soldering, CAD modeling*
Outcome: *Working base with swerve drive*

Problem

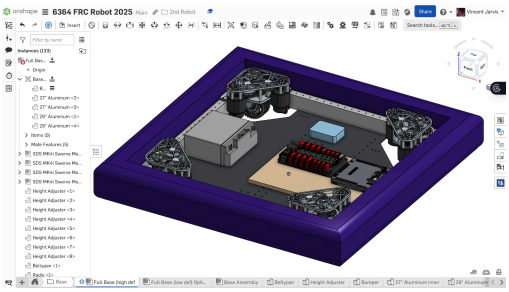
The game objective was to score game objects called “Algae” into a reef-like structure in the middle of the field.

- Autonomous periods had certain objects that had to be completed without driver input.
- A reliable base design would ensure consistent scoring and precision during autonomous periods.
- The base also had to be maneuverable (fast acceleration and changes in direction was necessary)

Requirements

- The base had to be heavy as a low center of mass would prevent tipping
- The base had to be perfectly square and parallel so steering and autonomous control would be easy.
- Wiring had to be efficient and repairable
- Swerve drive instead of tank
- The base had to provide enough protection for the battery and electronic components
- The base that we wanted had been done in previous years however we had to consider the extra weight needed since we were planning on a tall elevator mechanism.

CAD Drawings



The base design was standard from previous years

Process

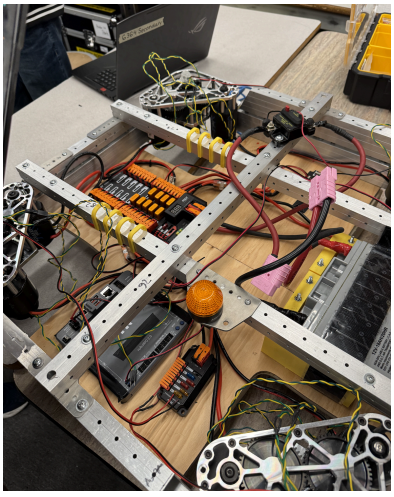
- Measured and cut all necessary pieces (aluminum channels)
    - Layed out pieces on a wooden plank to ensure that our measurements were precise

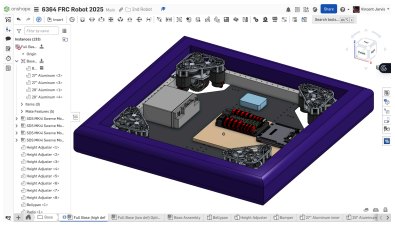
- Created a wooden jig to screw into our layout to ensure that our joints were exactly 90 degrees before welding.
- Since we needed swerve modules at each corner, we had to cut out circular holes in the aluminum using an angle grinder. This made it tricky to weld and eventually caused bending in the frame since it made the joints thinner.
    - To fix this, we attached supports over top the base to keep it square.
- The first time we finished the base we realized that the angles were warped and not 90 degrees.
    - We had to break the welds and re-do it with a stronger jig.
- The battery and the breaker board were spaced on opposite sides of the base to have an equal weight distribution
- We decided to run the wires under the top supports using 3D printed wire holders.
- We tested each connection with a multimeter

Considerations/Decisions

- Instead of a wooden plank at the bottom, we decided to use a steel plate cut from a water jet to get a lower center of mass.

Media

Image	Description	Designer(s)
	• **Base design before wiring**	Full team

	• **Finished Robot** • Elevator and claw mechanism	Entire Team
	• **Base CAD** • Only changes we made were the over-top supports and the steel plate	Mechanical subteam