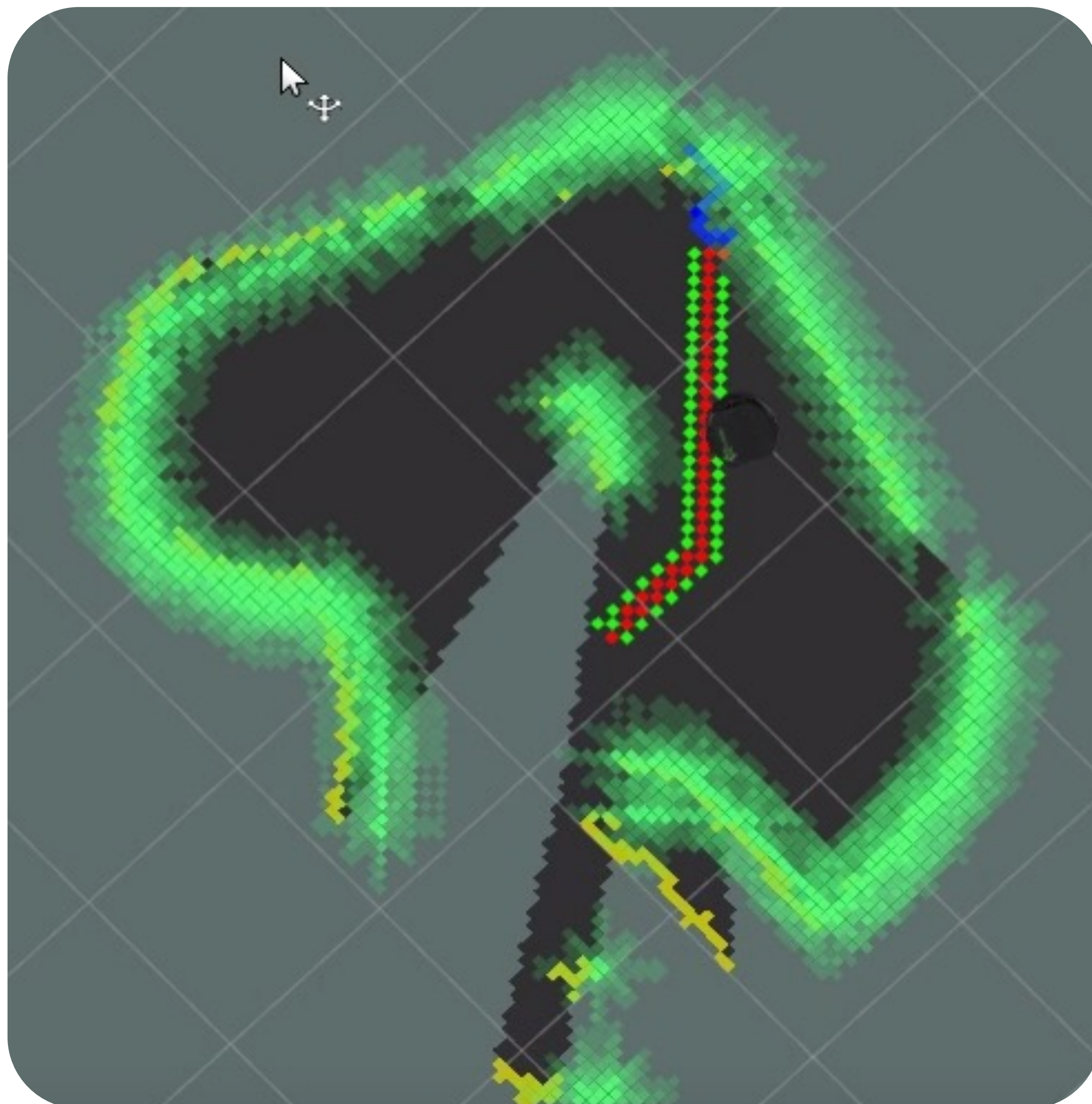


Project :

In a 3-Person team we developed exploration algorithm in Python for a Turtlebot robot running ROS. The Robot started in unknown environment and explored unknown frontiers until the entire region was mapped. [Project Writeups](#)

Contribution: I wrote the A* Path planner. To reduce path-planning run time my A* algorithm only expanded diagonally neighboring nodes. This reduced number of expanded nodes by half, required no “map resizing function” and kept the map resolution functionally identical. Run time was cut by more than 50%. Zigzags were filtered out after shortest path determined.

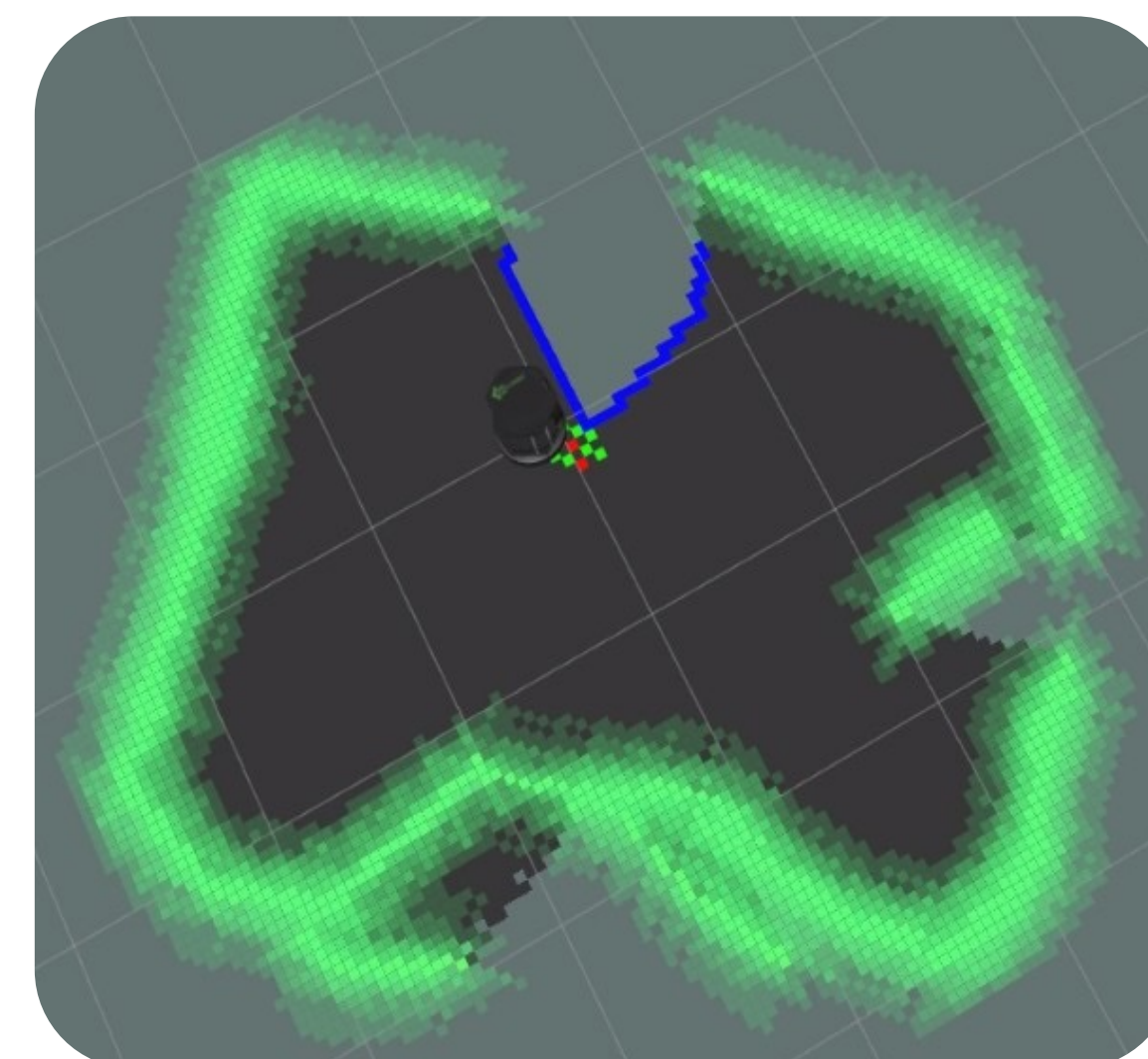
Robot Navigating to Unexplored Region,
Planned Path Displayed



Robot in Operation



Robot at Final Unexplored Area

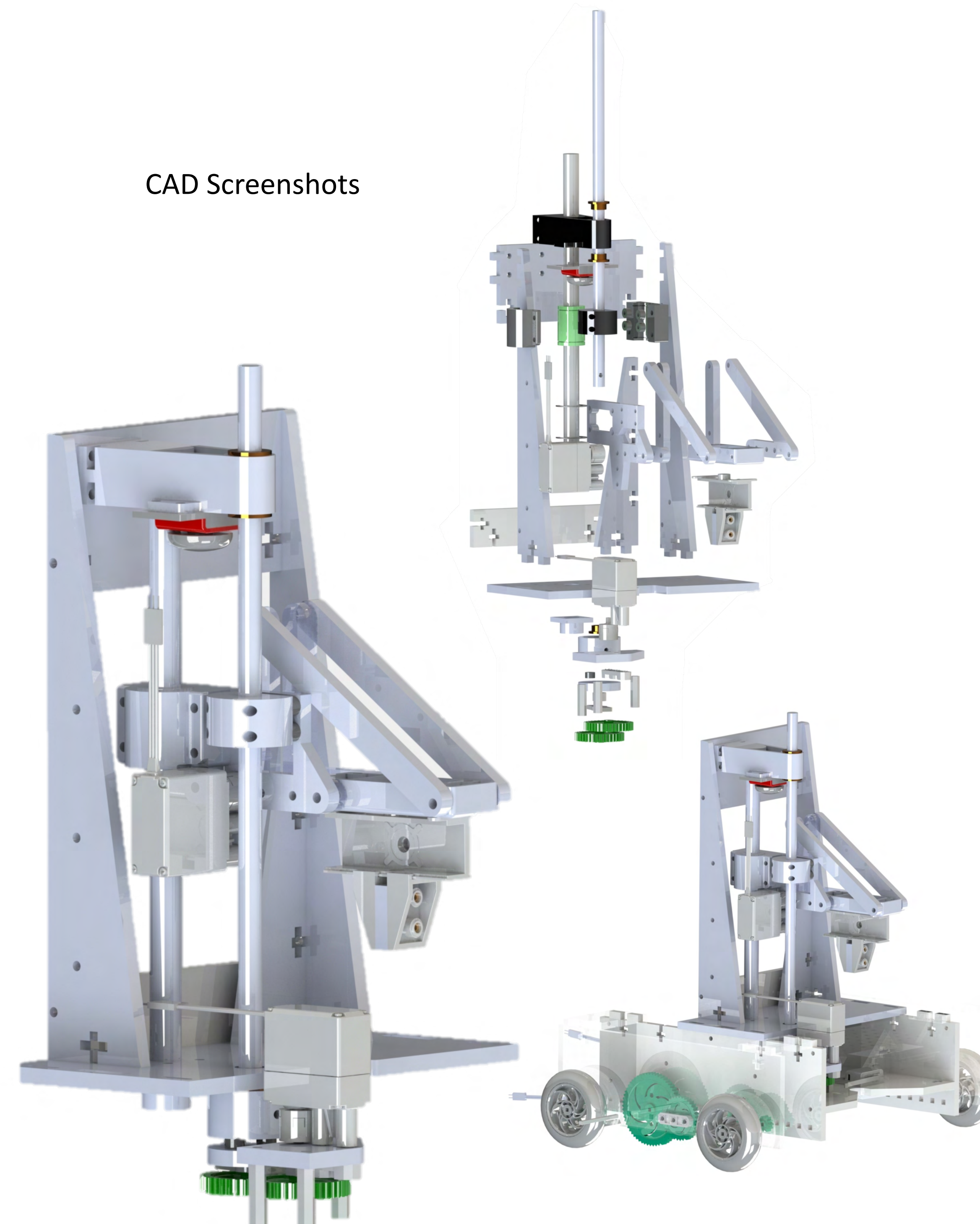


Project :

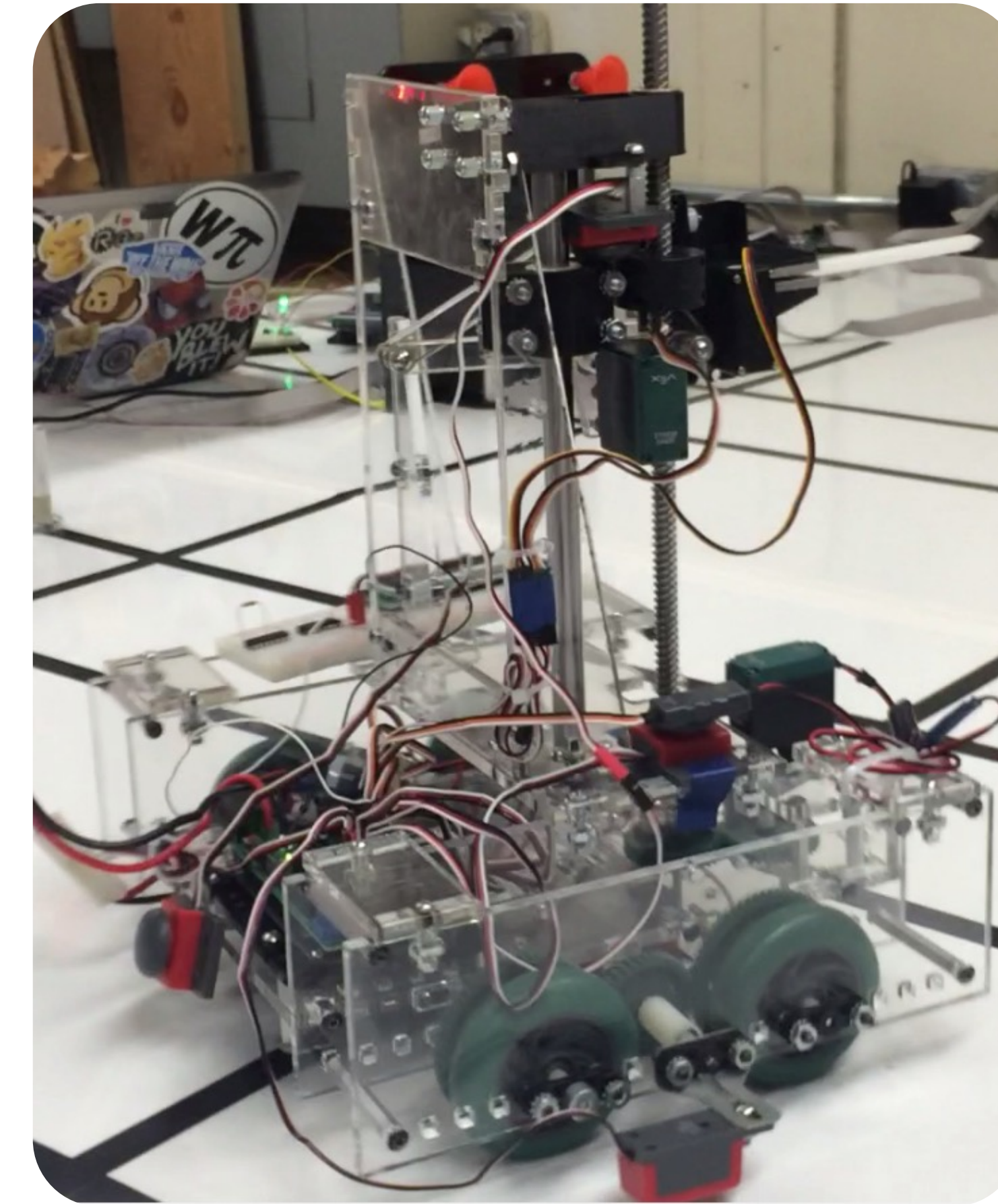
4 person team had to design and implement a robot that could operate in simulated nuclear facility, picking up “spent fuel rods,” placing the rods in horizontal holder, and retrieving and replacing a new fuel rod in “reactor”.

Contribution: I designed the rod extraction mechanism.

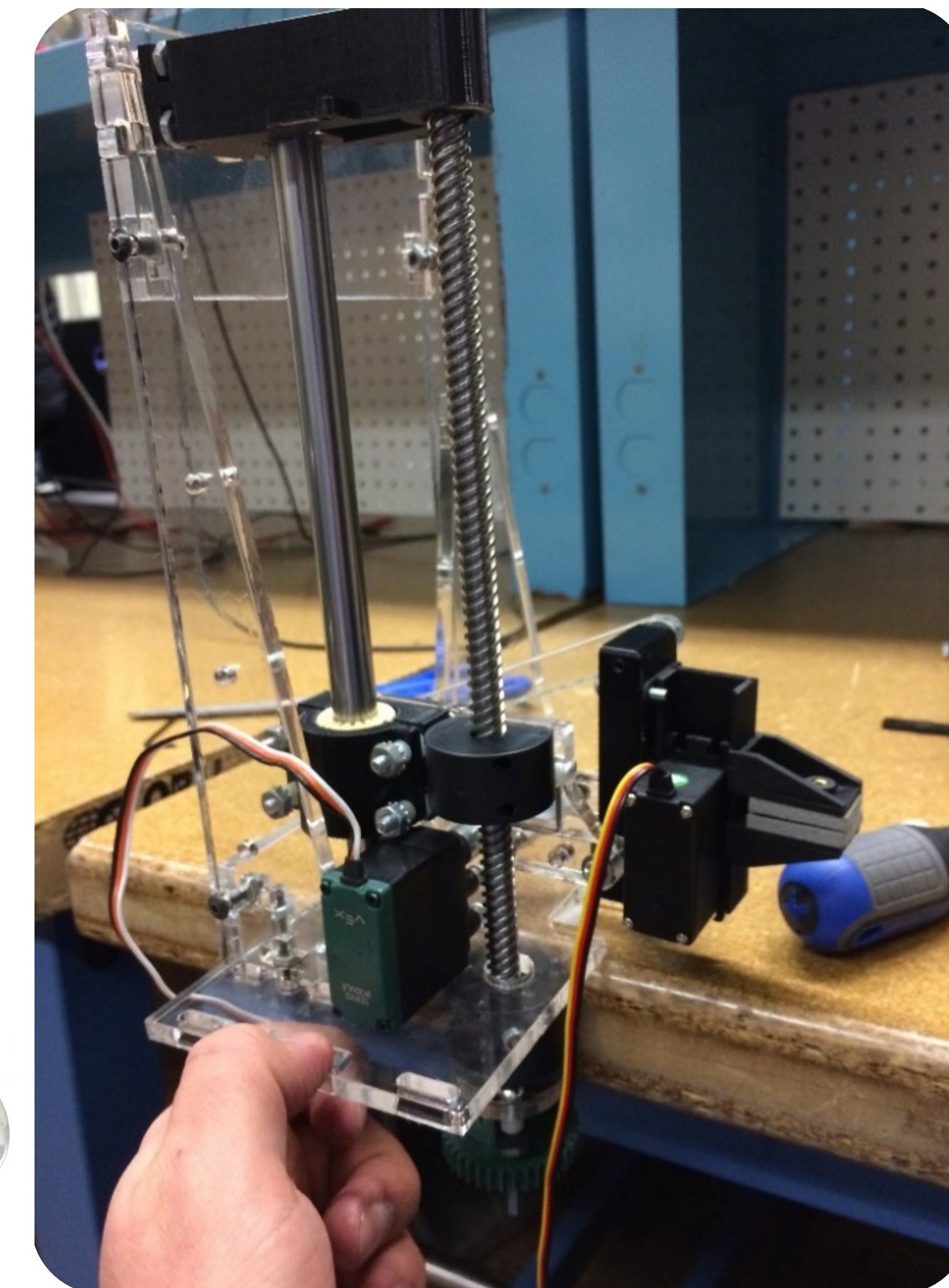
CAD Screenshots



Full Robot



Rod Extraction Mechanism



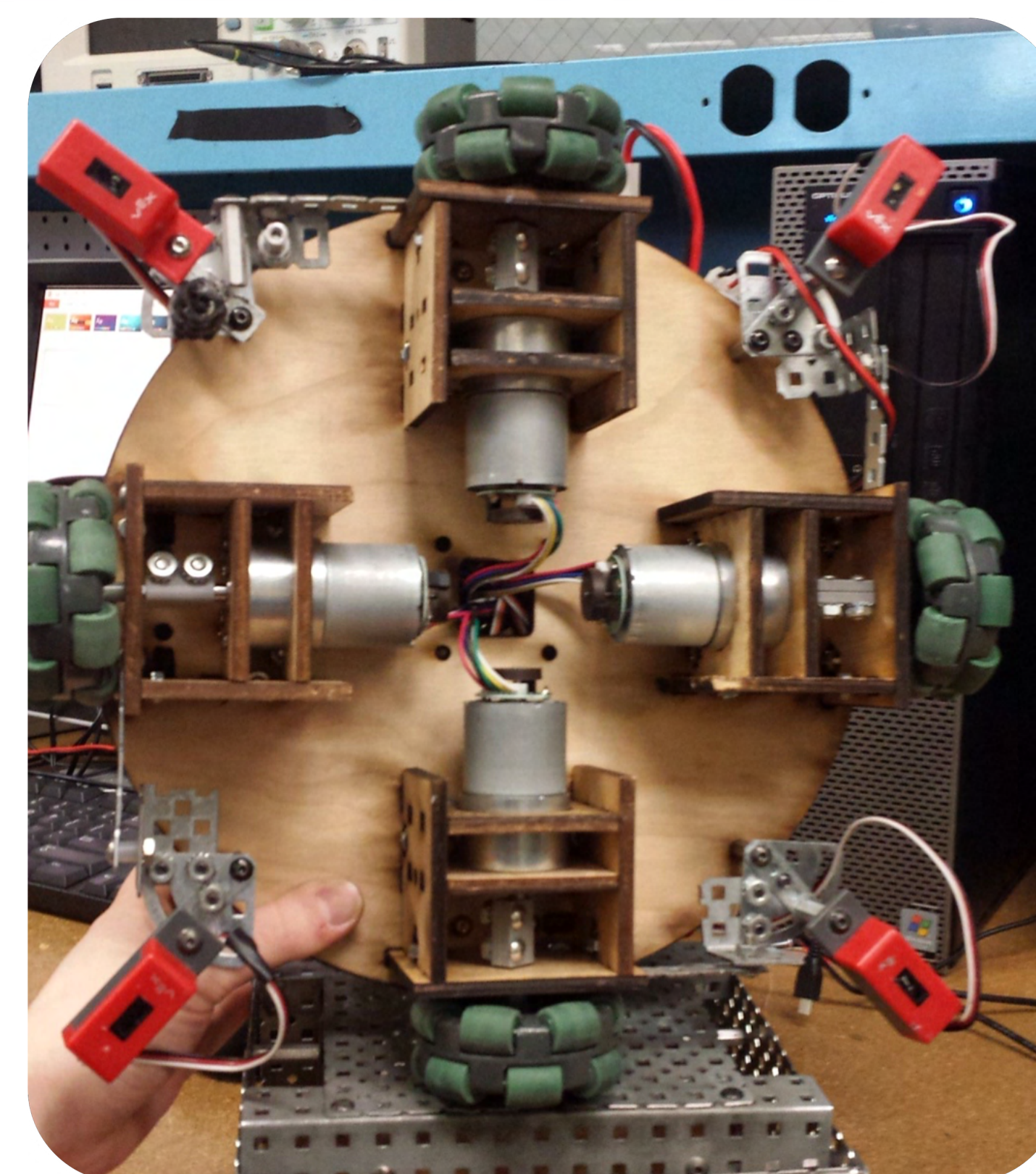
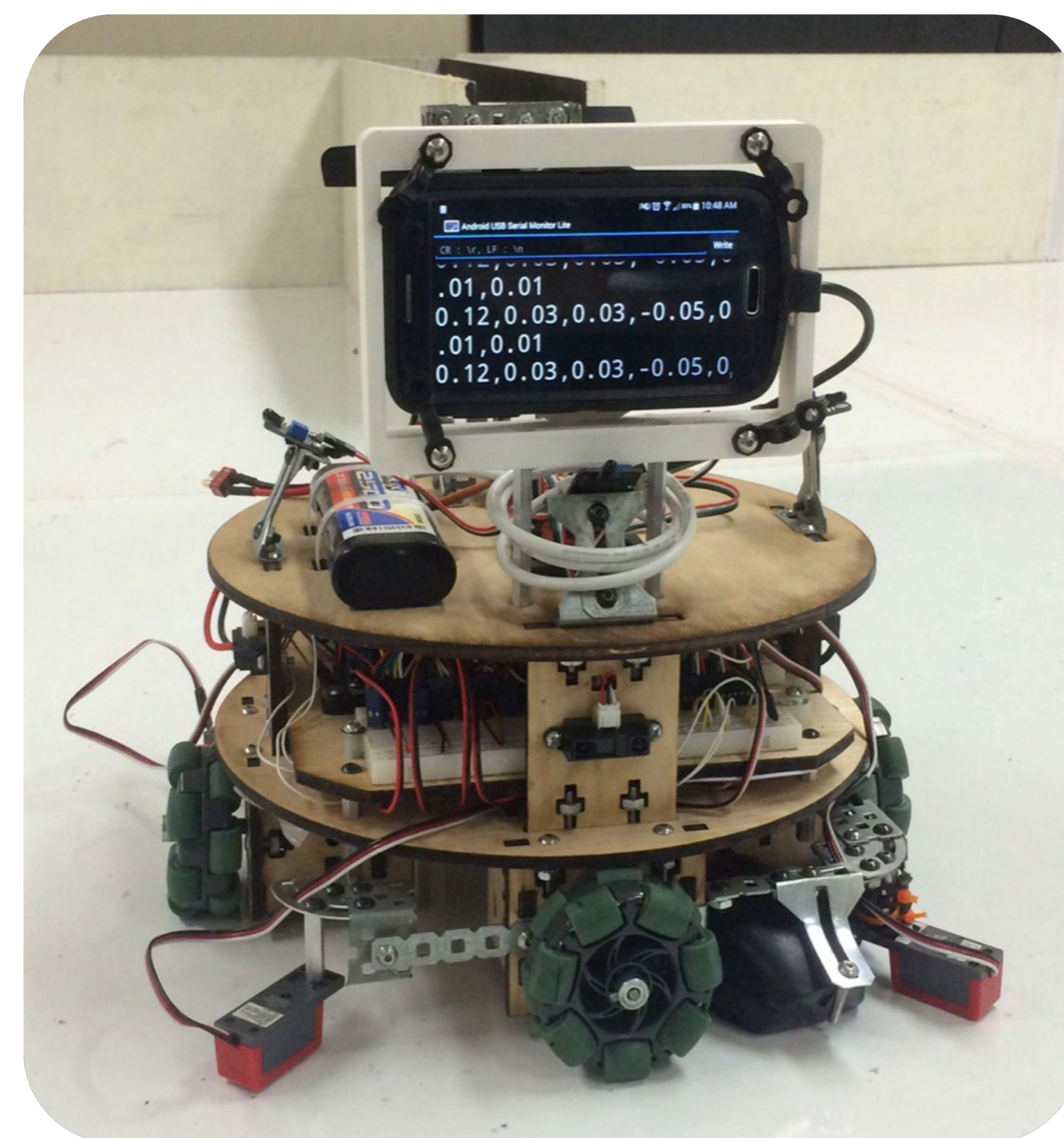
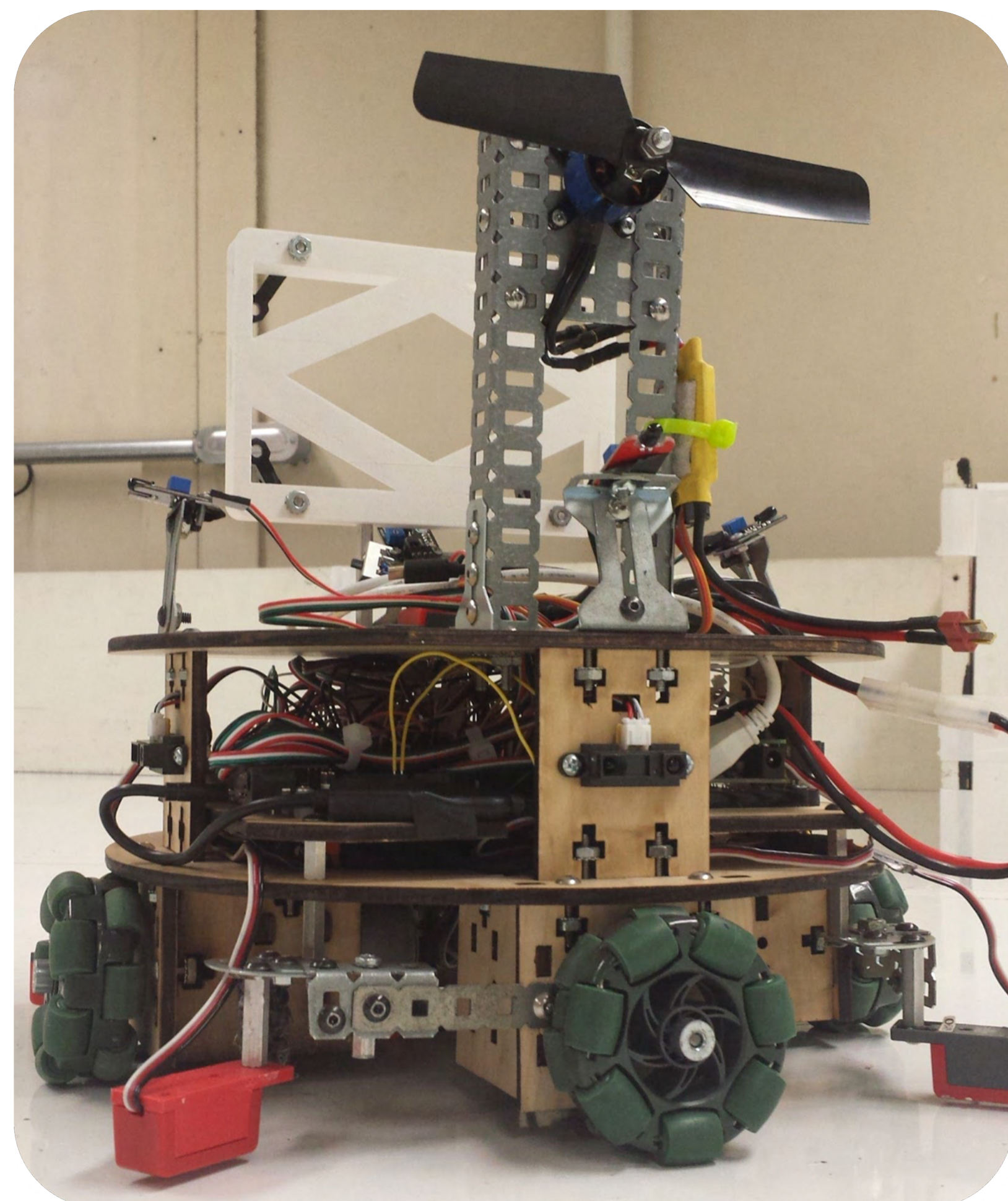
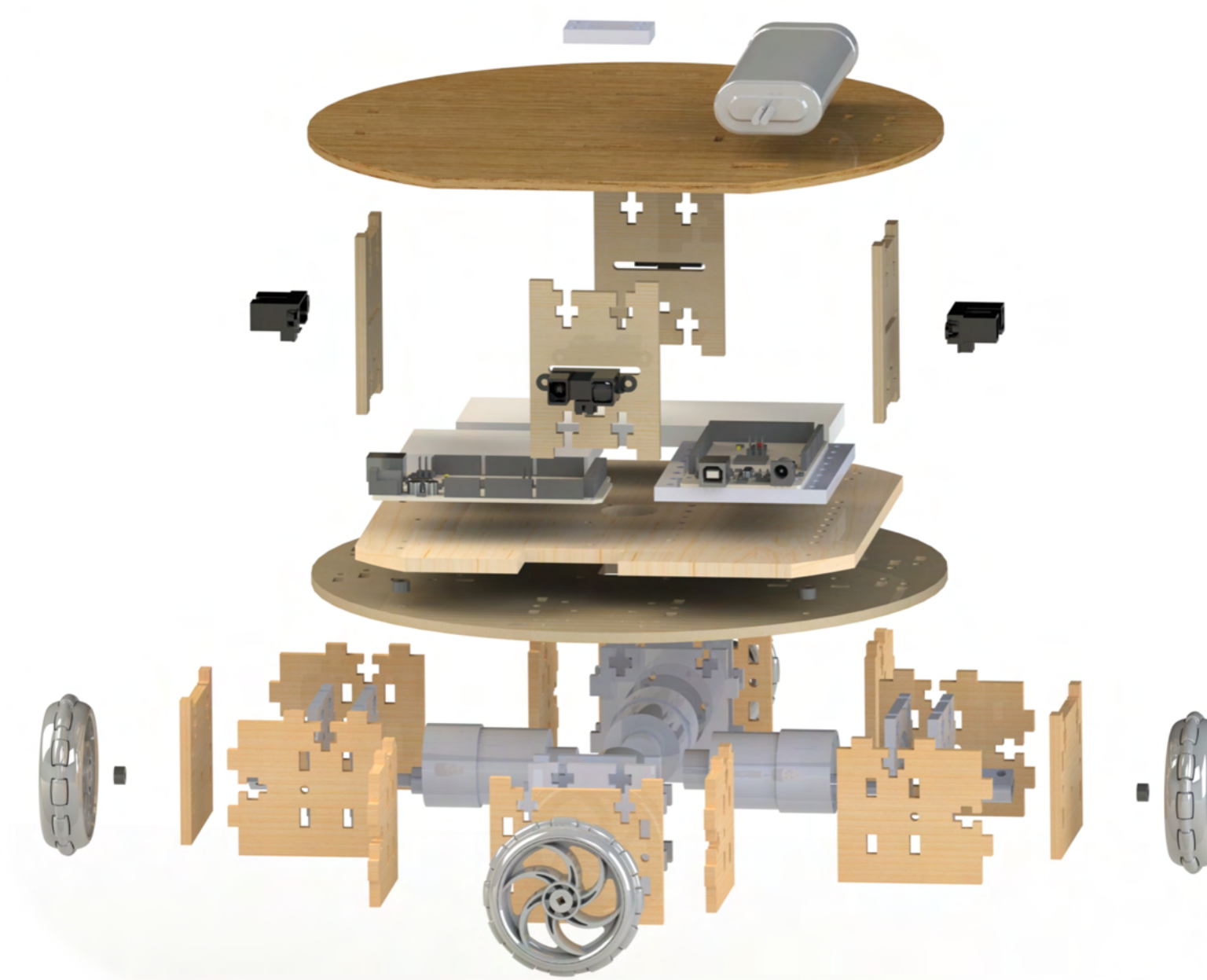
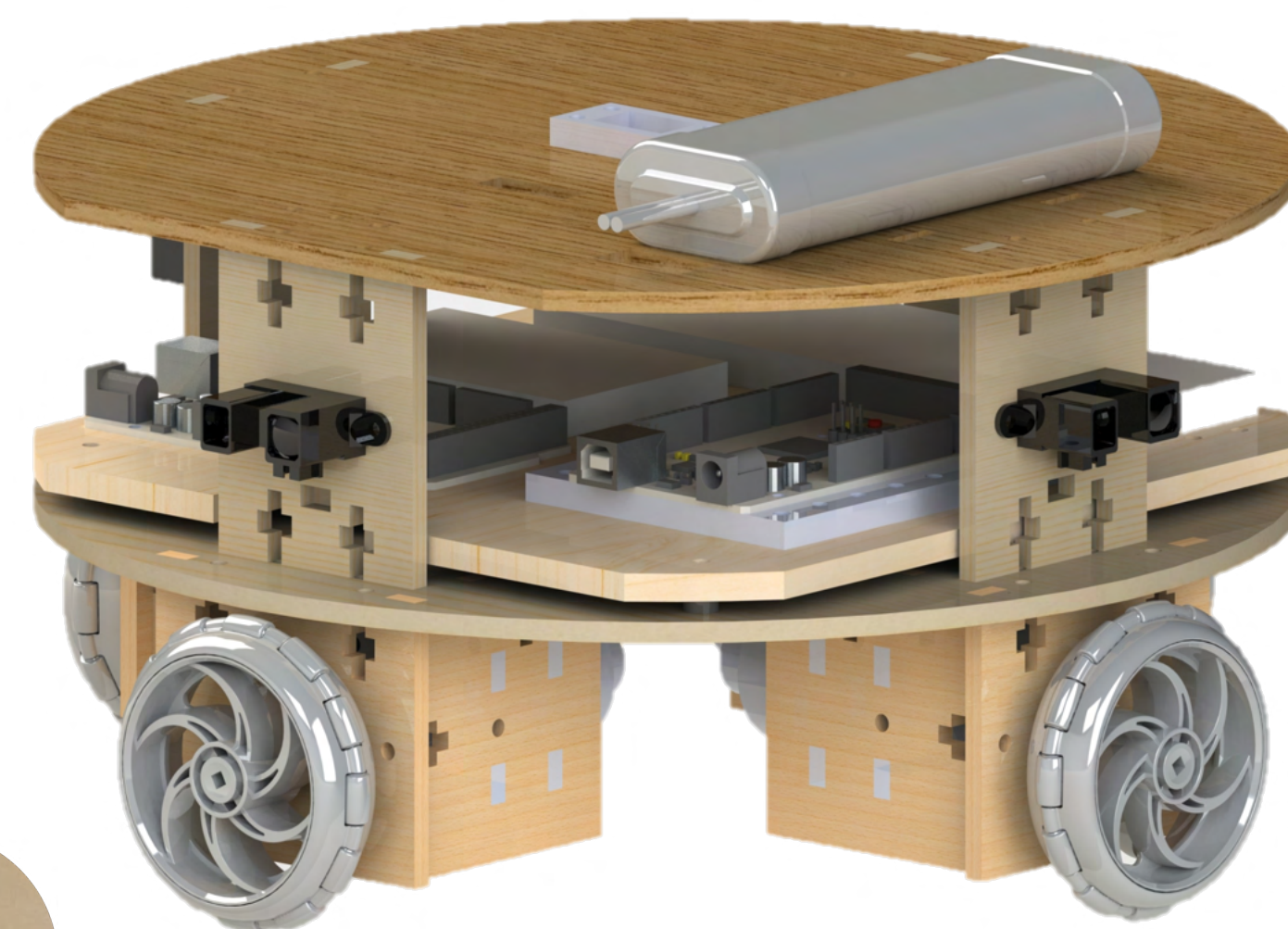
WPI RBE Course 2002 – 2015

Project :

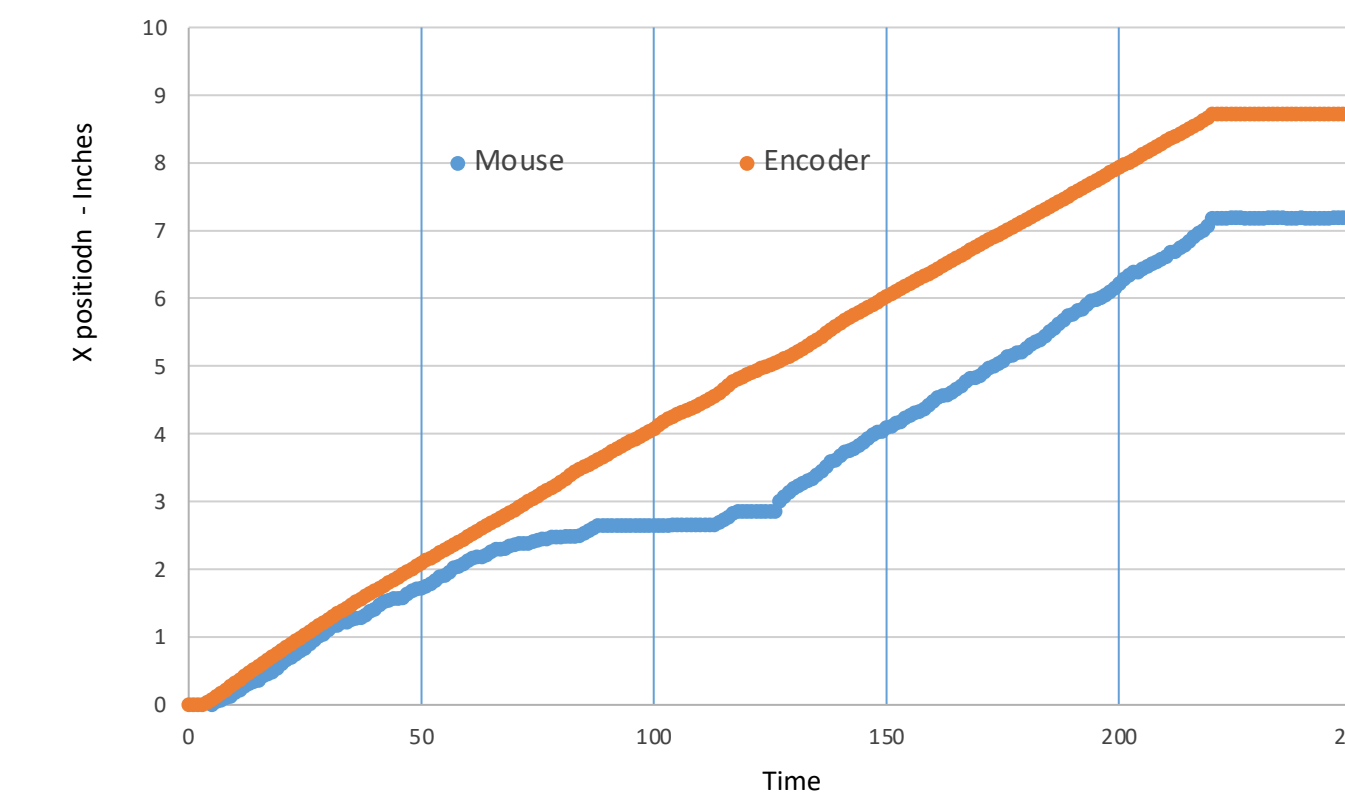
3-person team was tasked with making a robot to drive around a maze, find a candle, extinguish the flame, and report the location the flame.

Contributions: I designed the full Robot assembly and took advantage of the rapid prototyping resources available to us. The robot was manufactured from laser-cut parts and assorted vex components.

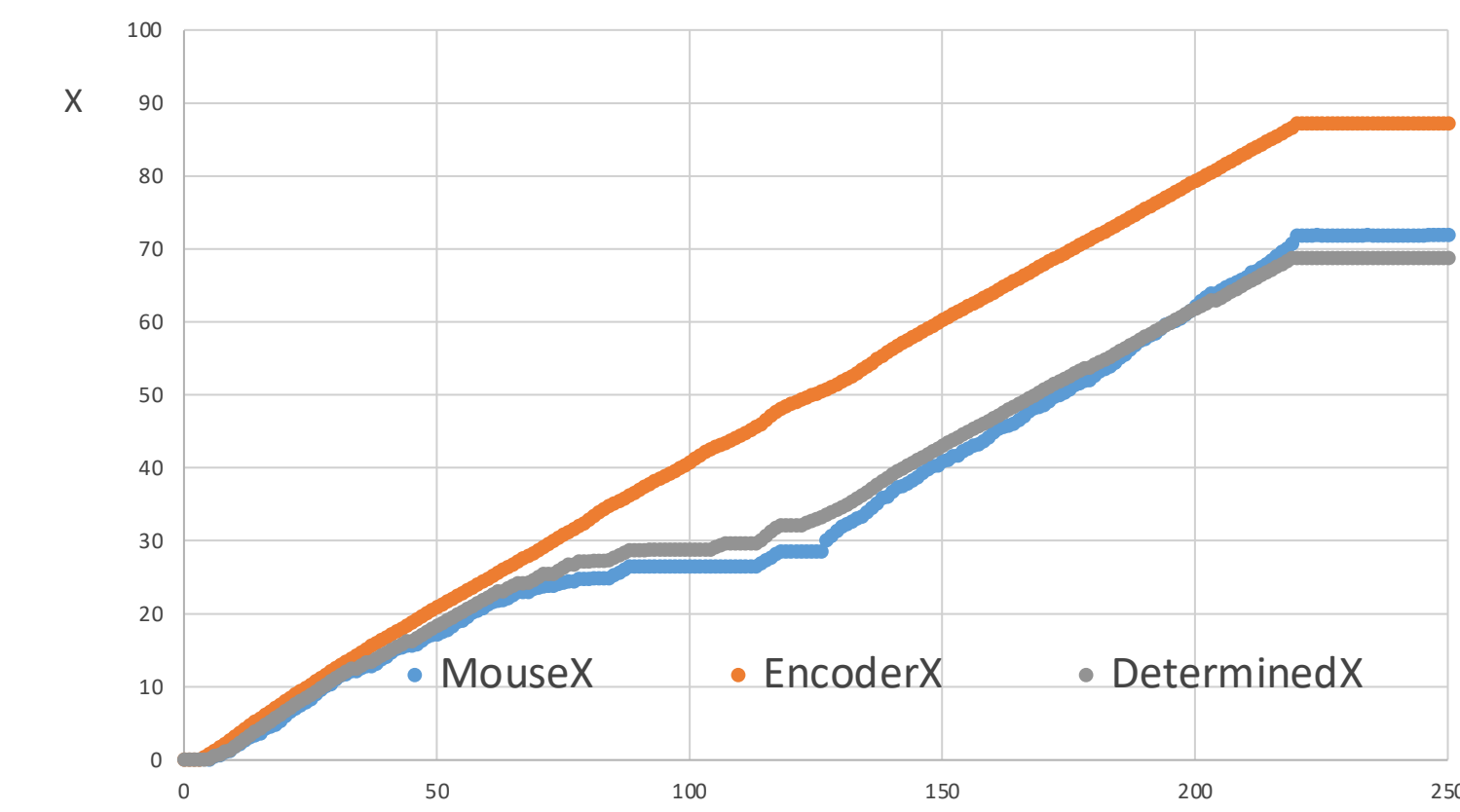
One issue our robot faced was wheels that kept slipping on the whiteboard-surface used as the maze floor. I used a computer mouse to detect when the robot was slipping and compensate for the encoder error. I found that over larger distances the encoder was more reliable than the mouse.



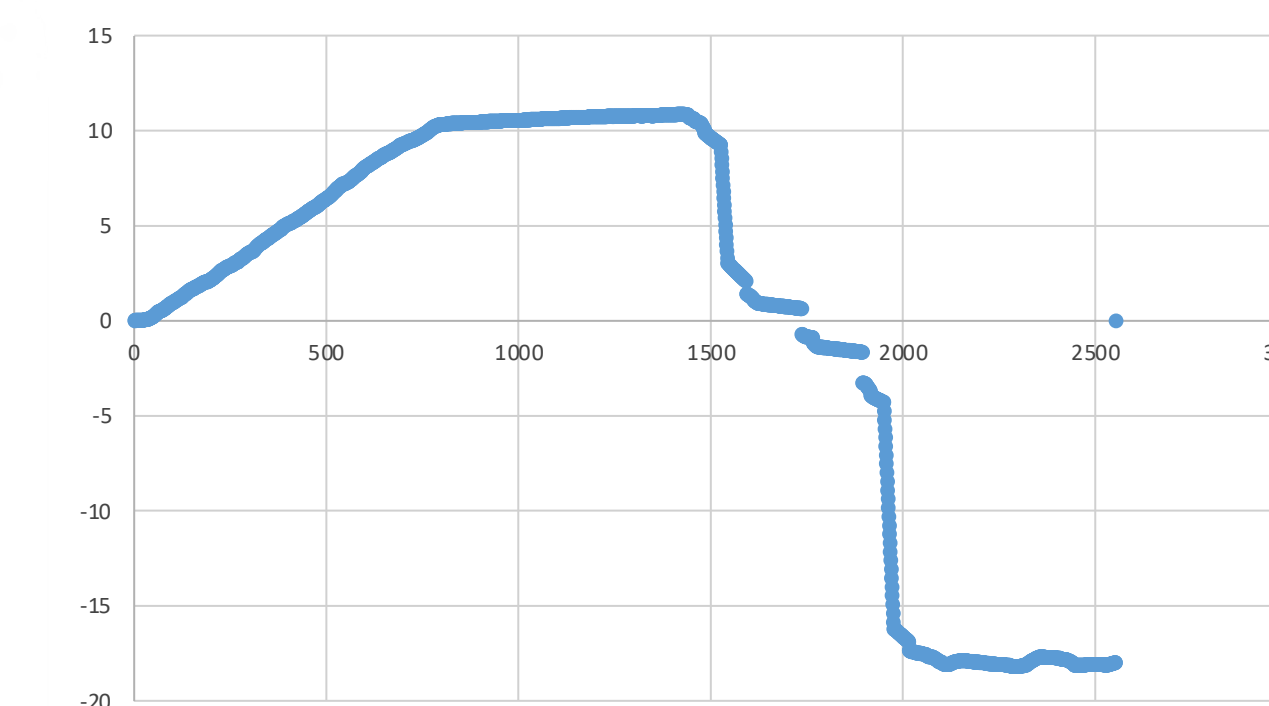
Robot Horizontal Position
Wheel Slip
Encoder v Mouse



Robot's Horizontal Position
With Software Correction

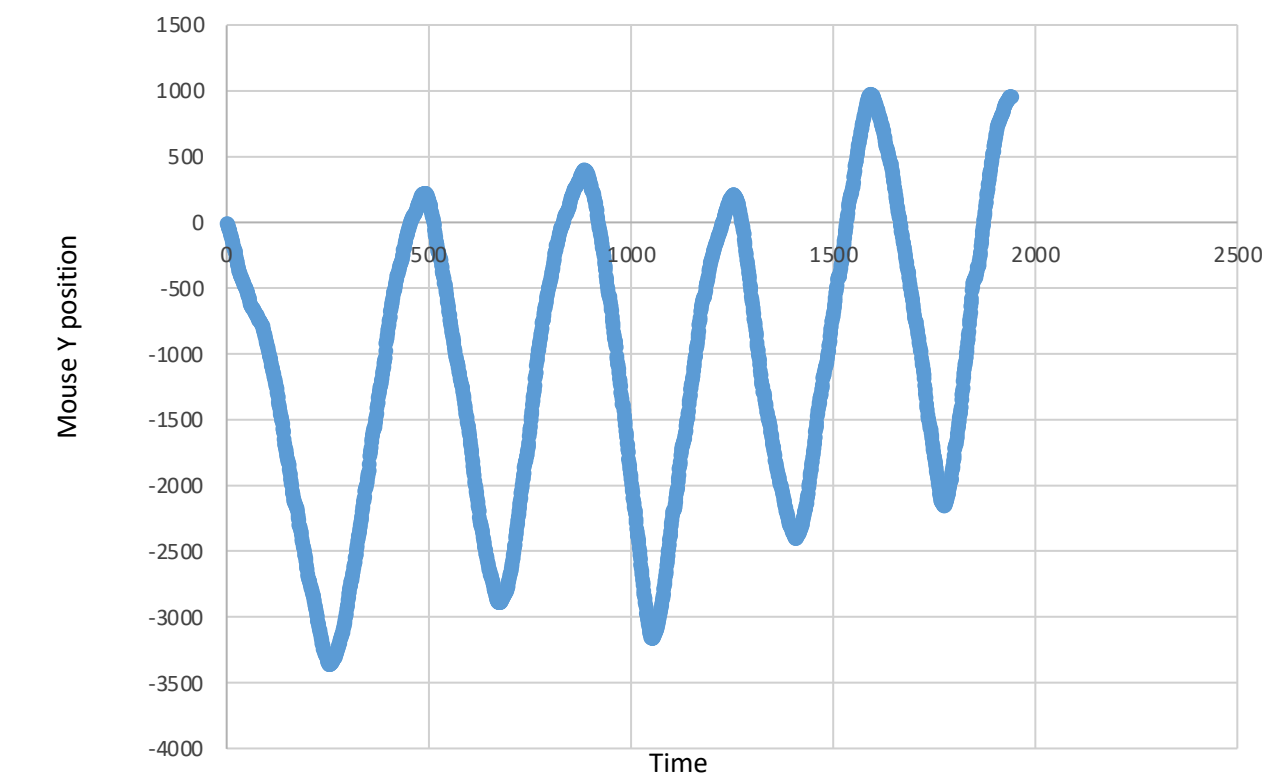


Mouse Y position / time
Mouse is broken



In the testing process I even discovered that my own mouse was broken and needed to be replaced.

Mouse Vertical
8" Of travel
Back and Forth



Parts

- 4x Pololu motors for driving
- 4x 3200 count/revolution encoders (1 per wheel)
- 4x SHARP IR sensors, in each cardinal direction
- 4x Flame Sensors
- Brushless DC motor (for fan)
- IR mouse
- Android Smartphone (for Serial Output)

- CAD Design Accounted for Unknown Features:
 - Fan Assembly
 - Function and Characteristics of Flame sensor
 - Size and Mounting Options of Mouse
 - LCD Holder
 - Light Sensors