



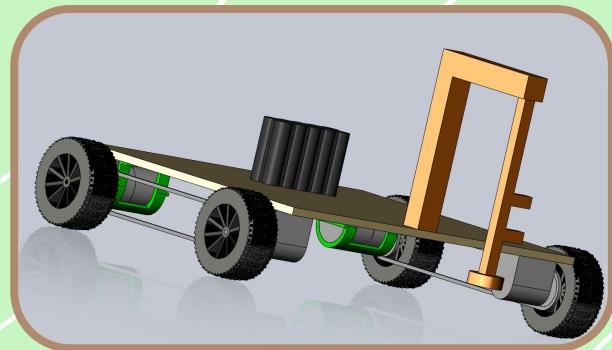
Final Design Presentation



# GOALS

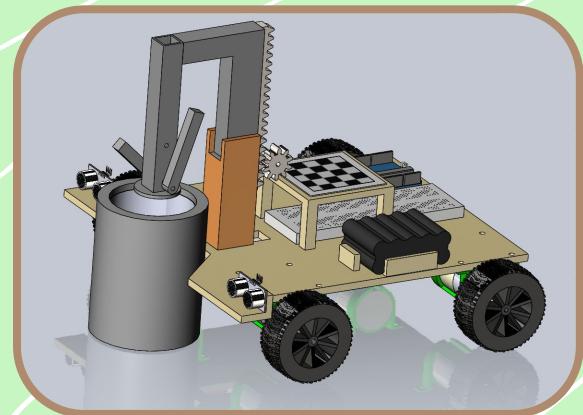
- Navigate to within 150 mm of the payload
- Physically connect to both of the payload output ports
- Extract and correctly transmit the duty cycle of the signal square wave to within 5%
- Identify and transmit the material in the base of the pylon (magnetic or non-magnetic)
- Navigate completely past the three obstacles
- Navigate completely into the destination zone

# DESIGN EVOLUTION

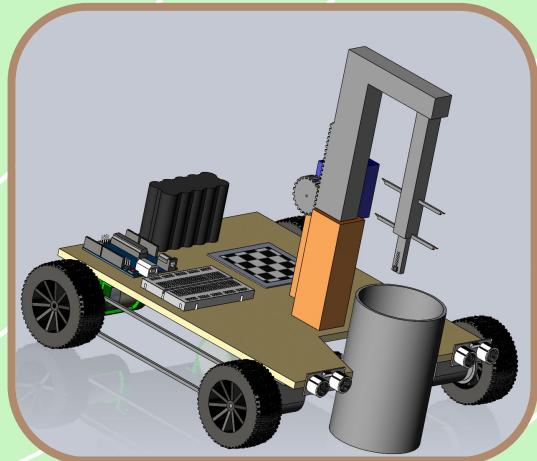


1st design

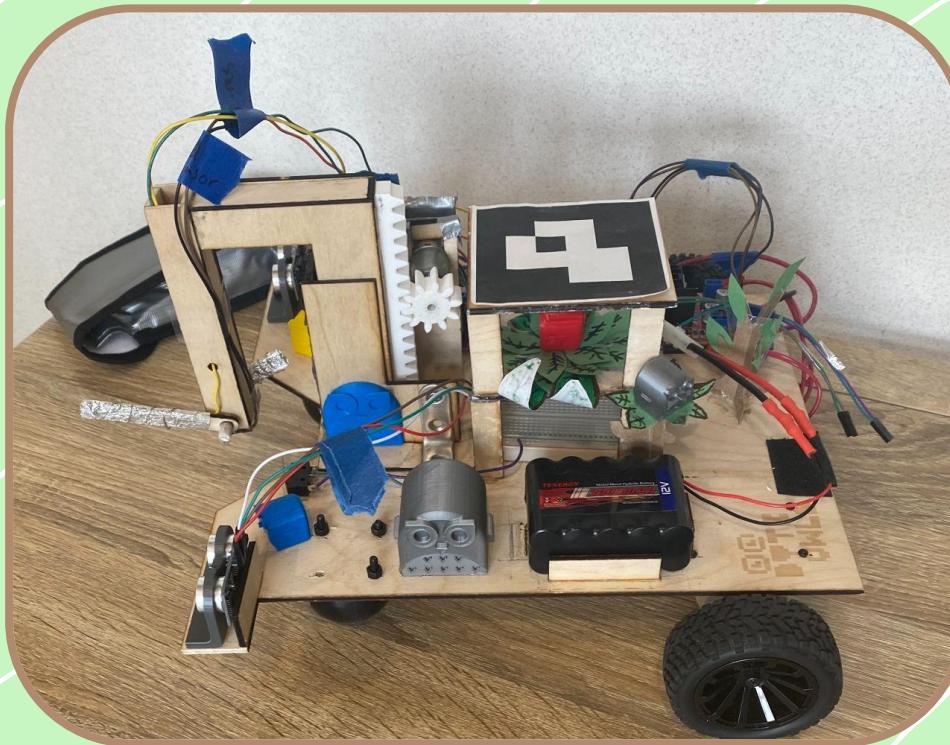
2nd design



3rd design



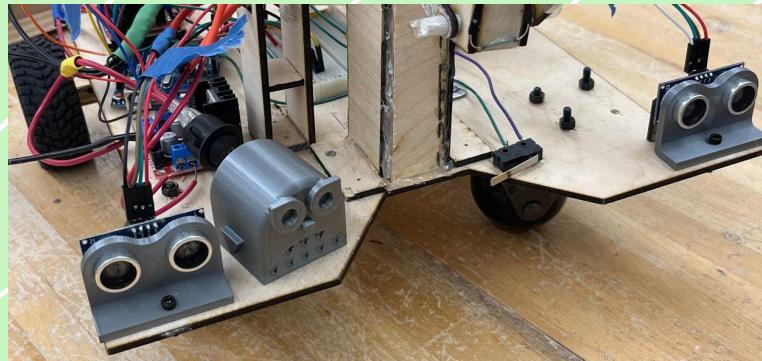
# FINAL DESIGN OVERVIEW



# KEY DESIGN FEATURE #1

## “THE V”

- One key issue was centering onto Pylon.
- The “V” acts as a bumper used for centering,
- This “V” allowed for a margin on error.



# KEY DESIGN FEATURE #2

## “CASTOR WHEELS”

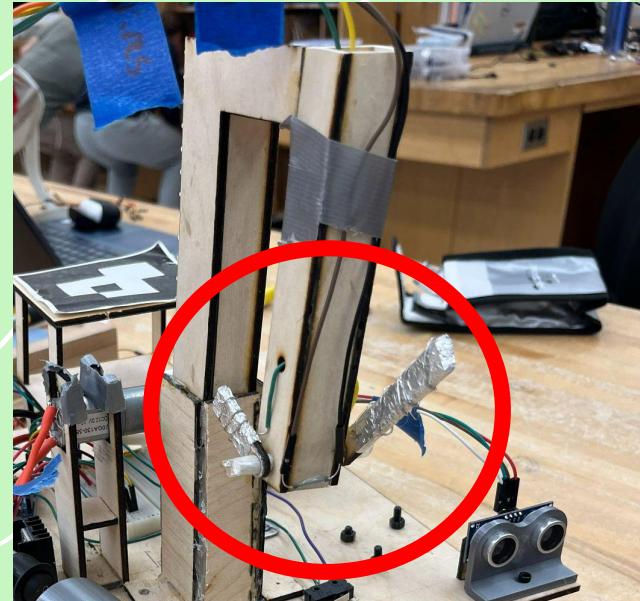
- Allows for easier, more consistent turning
- Prevents us from attempting to traverse rough terrain since our motor housing gets stuck on it



# KEY DESIGN FEATURE #3

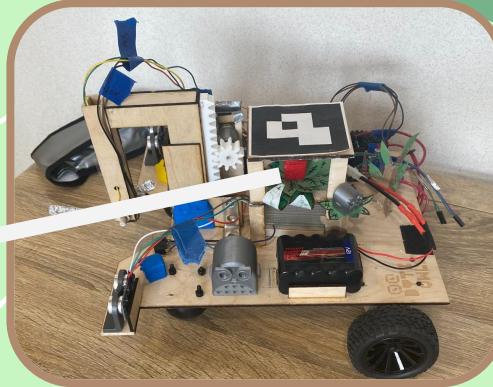
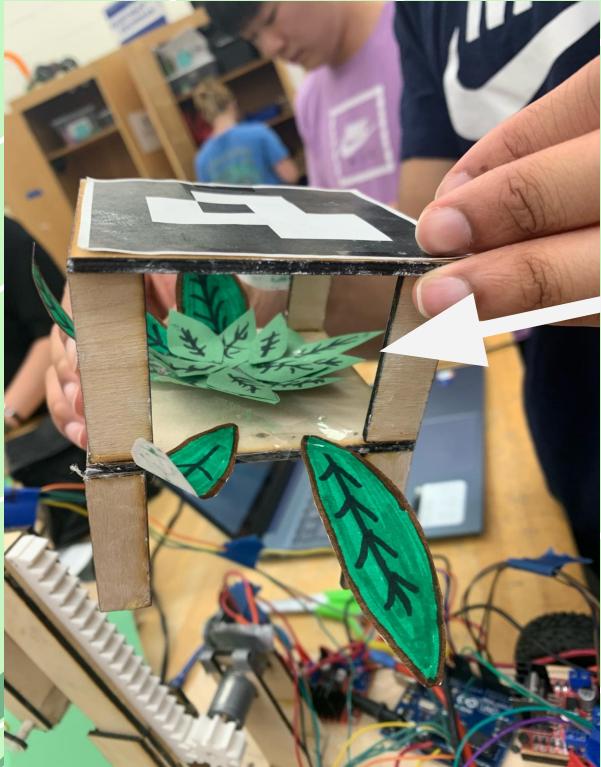
## “STIFF FINGERS”

- The “fingers” on the arm must be stiff enough to touch the sides of the pylon.
- Plywood, coiled in wire allowed for strong and durable “fingers” as well as accurate duty cycle readings.
- The “fingers” are stiff enough to consistently remain in contact with the pylon without collapsing.



# KEY DESIGN FEATURE #4

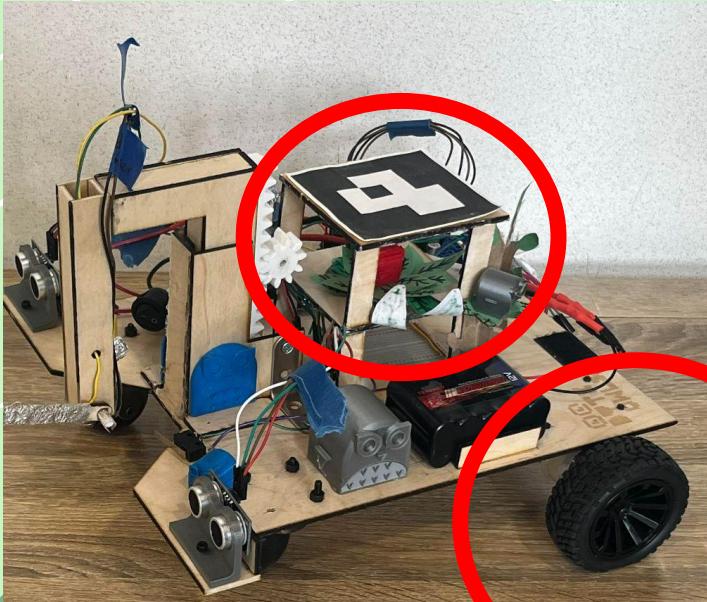
## “ARUCO TREE”



- Aruco marker was originally too low to be detected by Vision System
- Made the Aruco marker higher and implemented a tree where small owls are placed.

# KEY DESIGN FEATURE #5

## “ 4X2 DRIVE TRAIN”



- Motors in the back 2 wheels provide movement to the entire OSV.
- Limited the weight of the OSV, while still providing torque to the front 2-wheels.

# OTHER KEY DESIGN FEATURES

- Hall Effect Sensor -> Reed Sensor
  - Hall Effect sensor could only sense magnetism at very precise positions
  - Reed sensor was more reliable
- Bumper for Wheels
  - Prevents wheels from getting caught on obstacles
- Rack and Pinion
  - Powered by smaller motor
  - Mechanism for raising/lowering arm
- Limit Switch Position
  - Designed to be triggered by contact with pylon
  - Tells OSV to stop moving when pushed

# EVALUATION OF TEAM PERFORMANCE

- The team attendance for the project was very consistent.
- People attended the lab days whenever they could.
- During the off days, especially during Fridays around 11 am -12:30 pm the team members gathered and worked on the project.
- During the weekends near the competition everyone gathered at the lab and worked on optimizing the OSV performance, especially the mission aspect of it.
- There was heavy communication between subteam prior to a modification to the OSV.

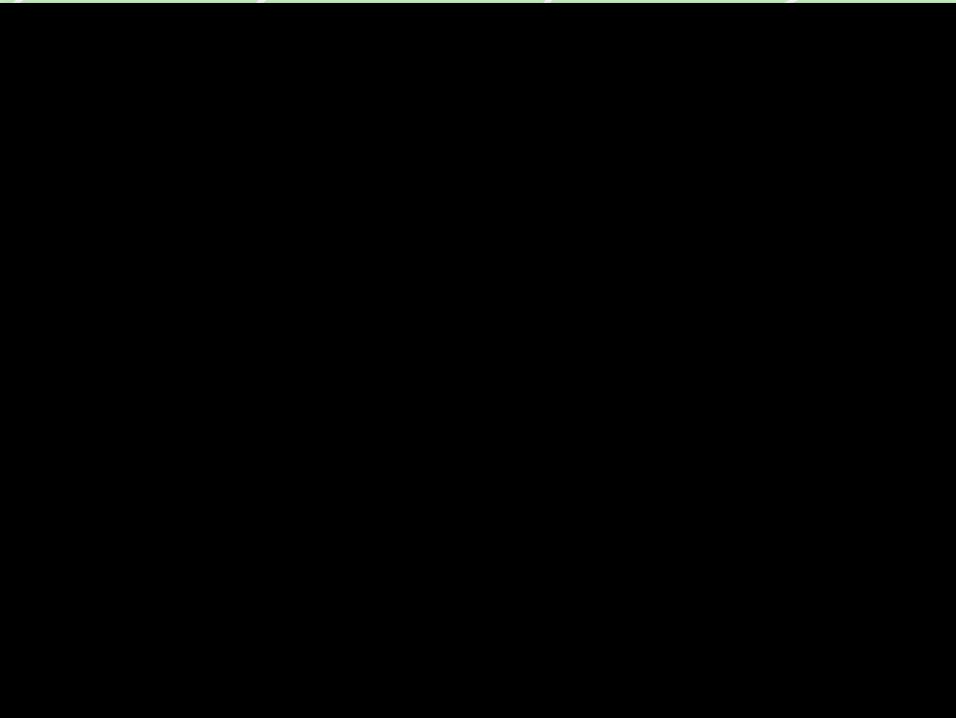
# OVERALL PRODUCT PERFORMANCE

- Achieved 120/240 points placing us 2nd place in data mission OSV performance out of all the ENES100 sections
- Awarded honorable mention for Sustainability Award for low impact to the environment
- Successfully navigated to the mission site, extracted duty signal, and identified material at the bottom of the pylon. However, it could not traverse through the arena.

# PREDICTED PERFORMANCE VS ACTUAL PERFORMANCE

Predicted	Actual
<ul style="list-style-type: none"><li>• Would Complete the Entire 120 point mission</li><li>• <i>Would win Sustainable Design Award</i></li><li>• Would use Ultrasonics to Navigate</li><li>• Would use gear and belt to power front wheels<ul style="list-style-type: none"><li>• Would use more mechanically- advanced finger design.</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Completed 60 points of the Mission<ul style="list-style-type: none"><li>• <i>Was the only team mentioned for the Sustainable Design Award</i></li></ul></li><li>• Did not get to navigating with Ultrasonic Sensors</li><li>• Used Simple 2x4 drivetrain<ul style="list-style-type: none"><li>• Found Success Using a Simple Finger Design.</li></ul></li></ul>

# **MS7 RUN VIDEO**



# LESSONS LEARNED

- Don't be scared to voice your opinion
  - More ideas -----> More possibilities for success!
- Keep design ideas **simple**
  - The best design aspects of our OSV came from a clear understanding of the mission goal.
  - Always ask for advice especially when changing design.
- Team spirit leads to success
  - Owl outfits and glasses: The **KEY** to accomplishing the mission.

# TEAM PHOTOS

