DATA EXTRACTION

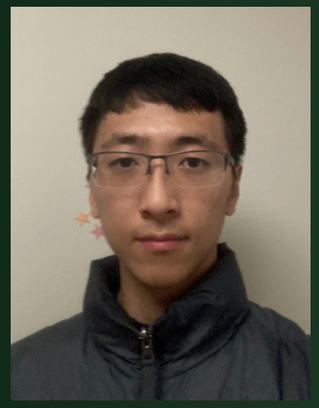
“OSCAR THE GROUCH”

Vihaan Le
Mission

Steven Vilcheck
Mission, Chassis

Ella Bierly
Locomotion

Jacquelyn Eng
Locomotion



Phillip Chen
Electrical

Ariana Butterworth
Electrical

Thomas Kimberlin
Arduino

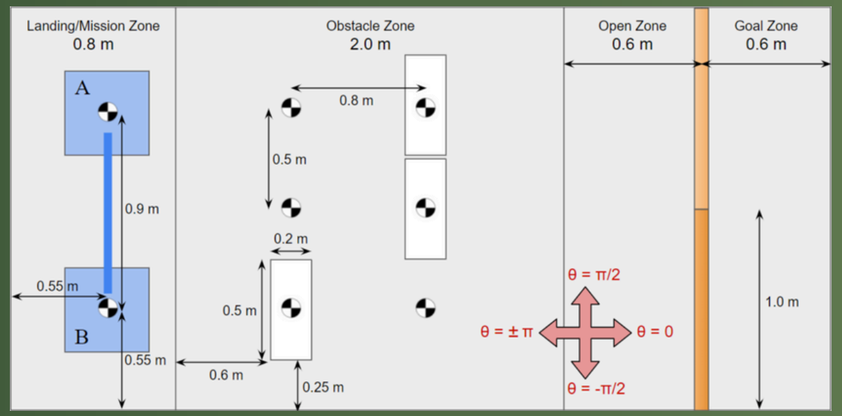
Ryan Tran
Arduino, Mission

TABLE OF CONTENTS

PROBLEM DEFINITION

OBJECTIVES OF OSCAR

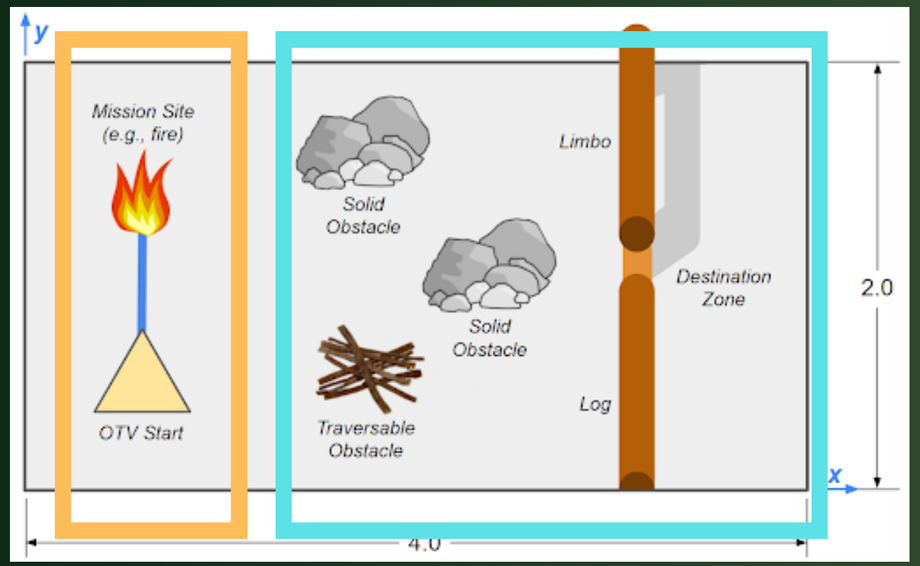
- Travel within 150mm of a Payload Site
- Accurately extract and transmit the duty cycle of Pylon
- Fully remove the puck from inside the data Pylon
- Determine and transmit the magnetic property of the Puck
- Successfully navigate through all three obstacles
- Traverse over LOG to arrive at destination zone.



OSCAR'S APPROACH

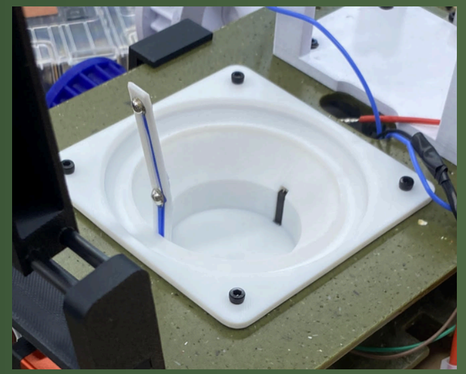
NAVIGATE COURSE

- Use 2x Bump Switches to determine position of OTV and obstacles to navigate through Arena

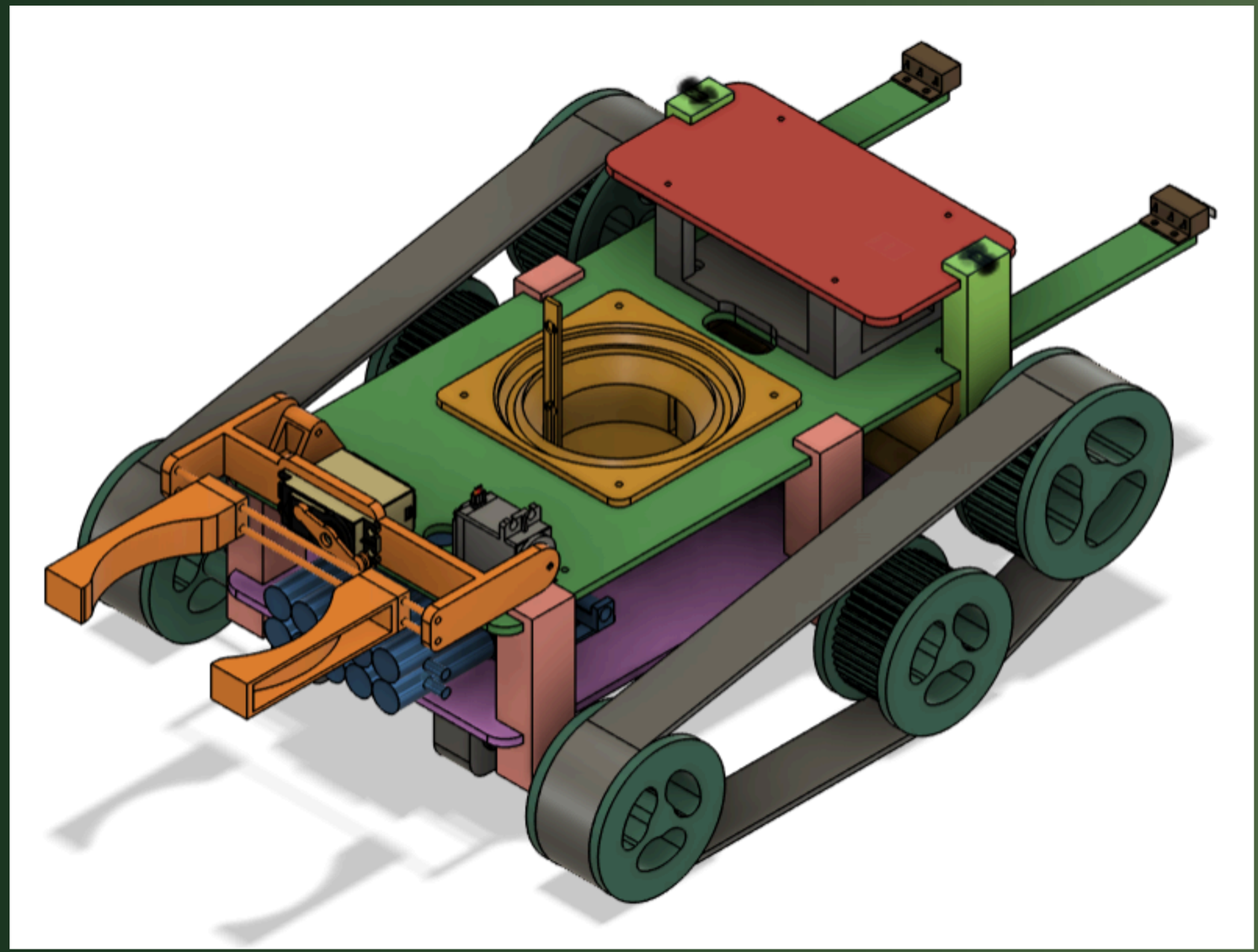


DATA EXTRACTION

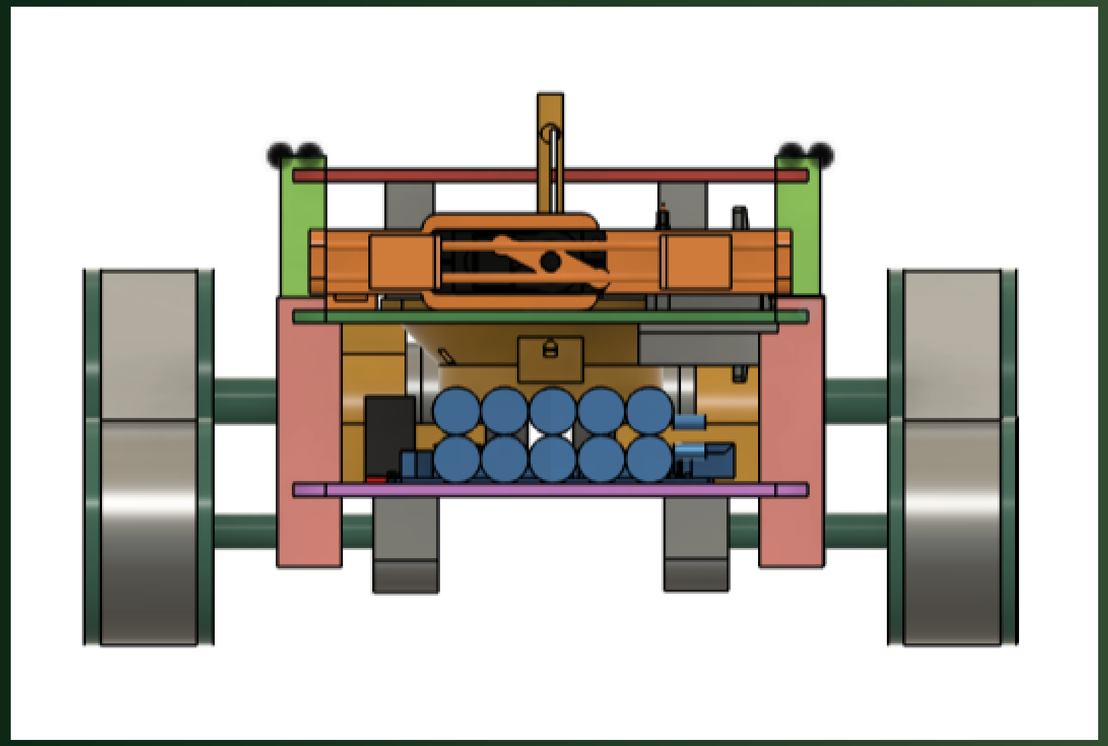
- Claw controlled by Servo1 grabs Pylon
- Servo2 flips Pylon into Interface plate
- Elecrode reads & transmits Duty Cycle
- Reed Switches sense pucks magentism



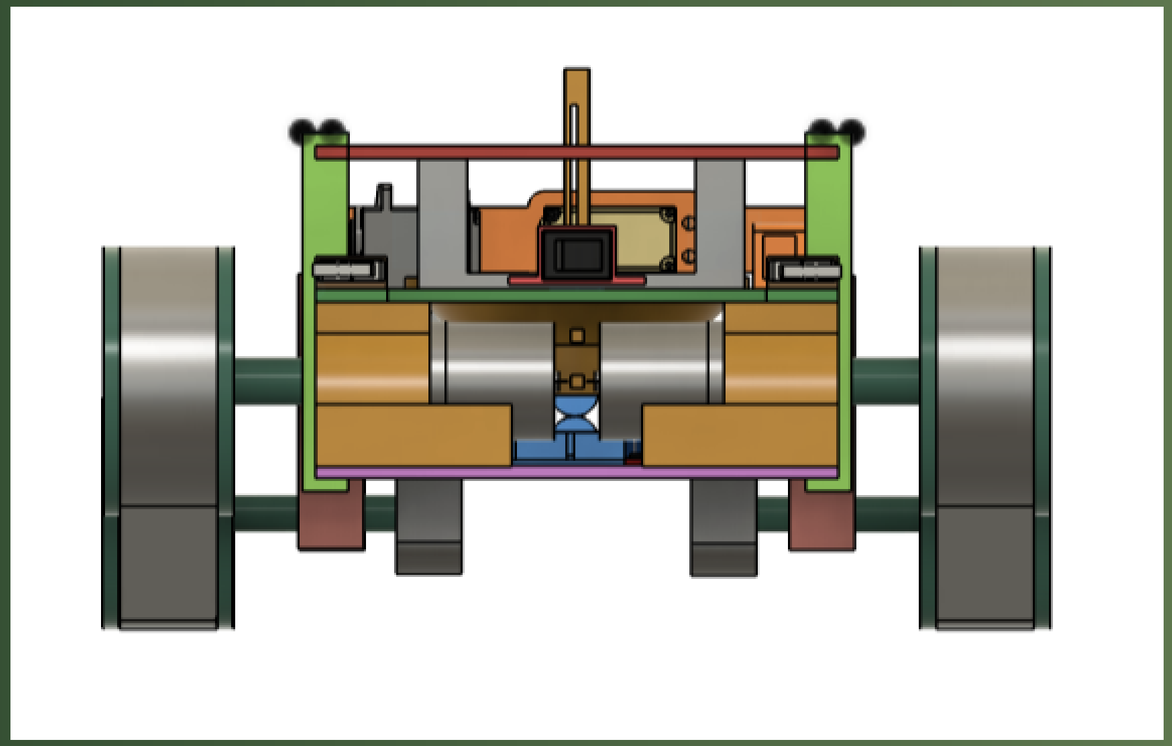
OTV CAD



OTV CAD



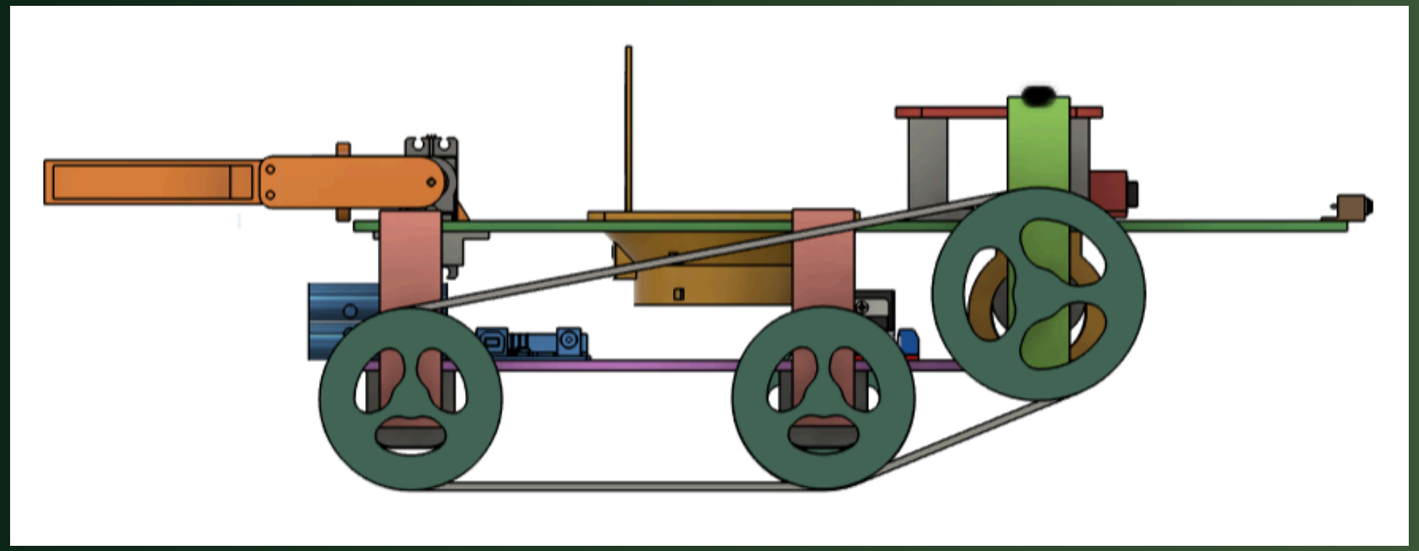
Front view



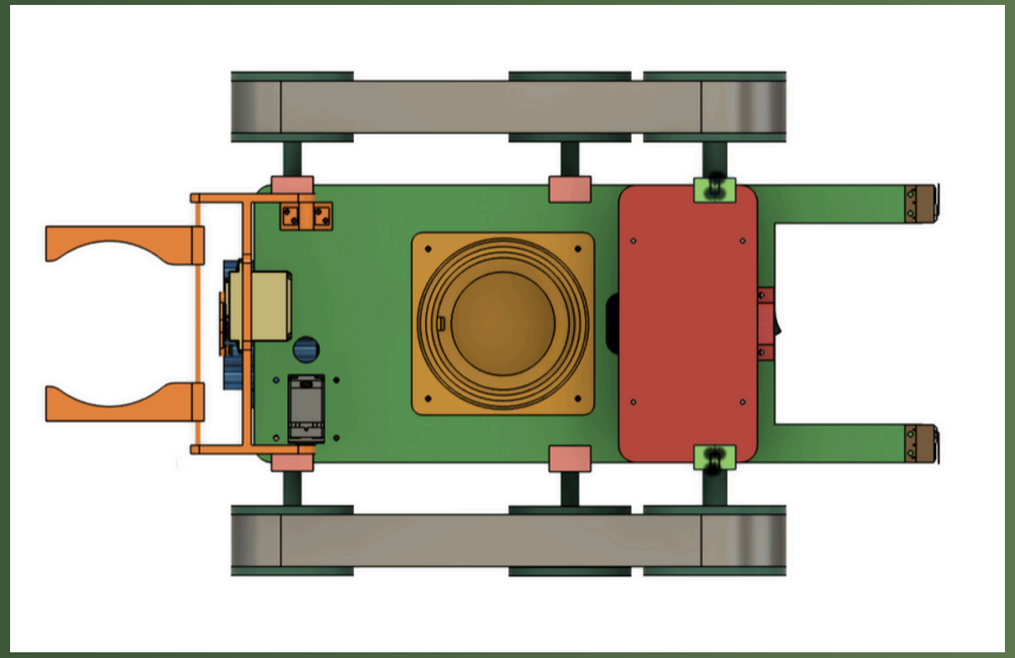
Back View

Center of Mass [mm]:
(19.172, 41.293, 7.794)

OTV CAD



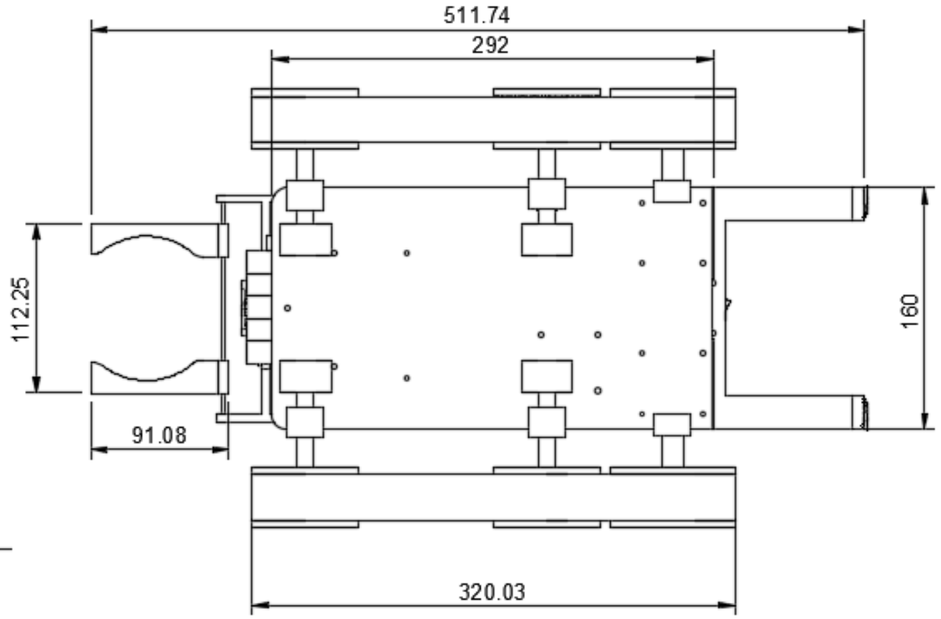
Side view

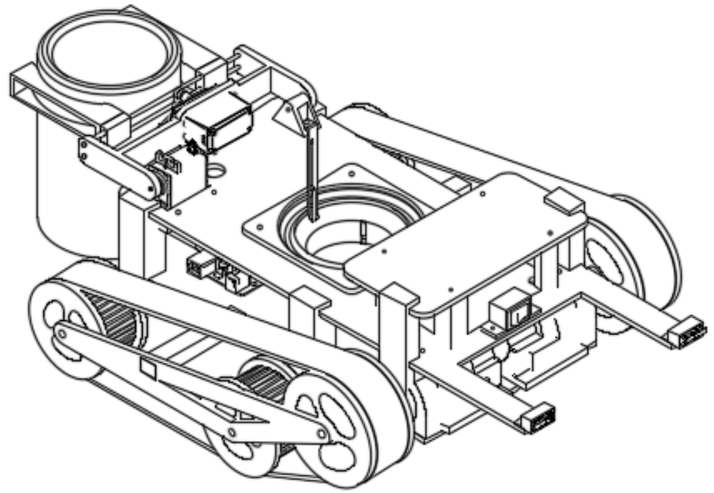


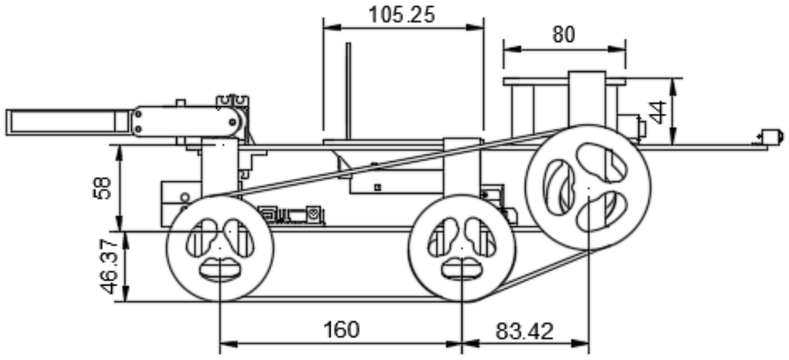
Top View

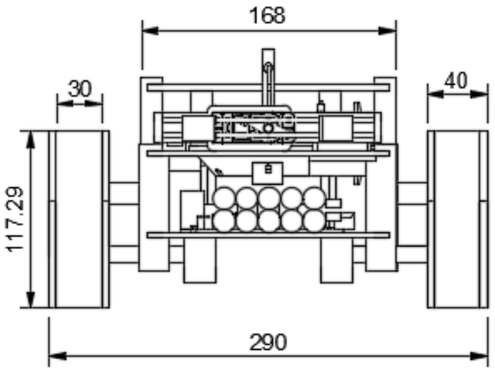
Center of Mass [mm]:
(19.172, 41.293, 7.794)

OTV CAD



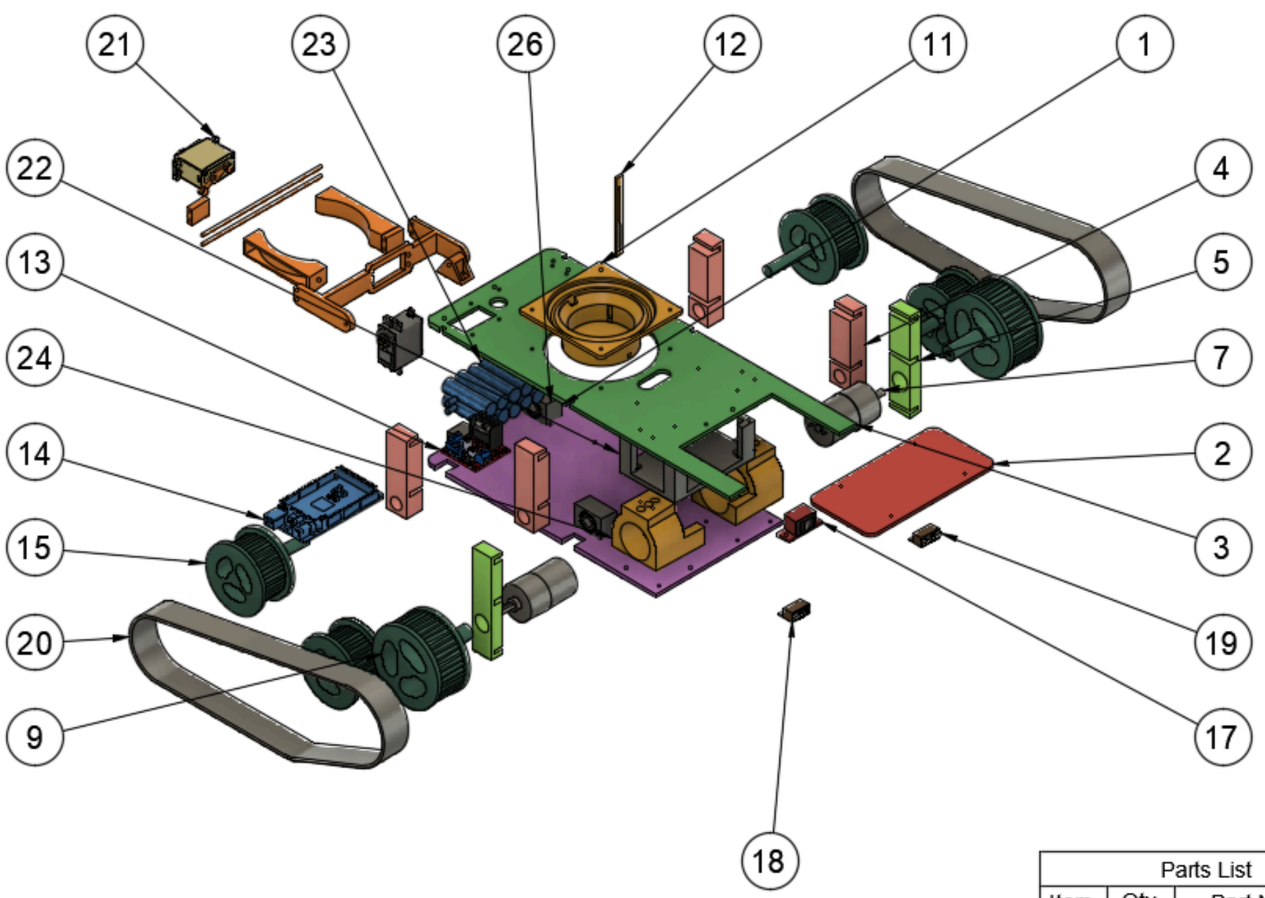






All Dimensions in mm

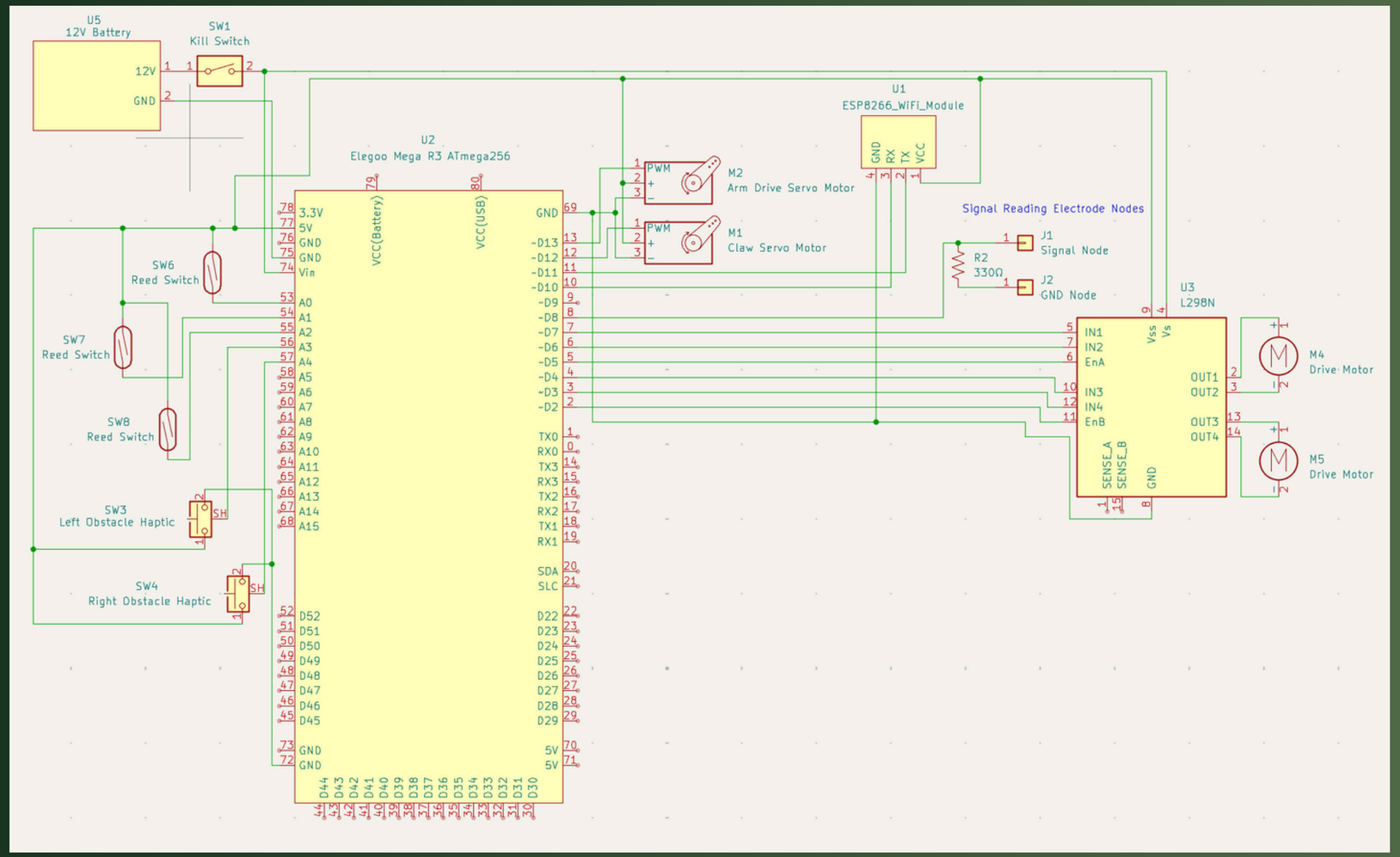
OTV CAD EXPLODED VIEW



Parts List		
Item	Qty	Part Number
1	1	BottomDeck
2	1	TopDeck
3	1	MiddleDeck
4	4	MS2Spacer
5	2	DoubleHeightSpacer
6	1	Motor_mount v2
7	2	Finalized motor
8	1	Motor_mount v2 (1)
9	2	Drive Wheel
10	1	SiloMockup
11	1	CargoInterfacingPlate_Plate
12	1	CargoInterfacingPlate_Antenna
13	1	L298N Driver DC Motor, Stepper Motor
14	1	ArduinoMega_STEP_AP203
15	4	Support Wheel
16	1	TCRT5000L Module
17	1	RA1113112R
18	1	P:\E-Switch Secure\3D_MODELS_STP_FORMAT\MS085xx02FxxxP1A.stp
19	1	P:\E-Switch Secure\3D_MODELS_STP_FORMAT\MS085xx02FxxxP1A.stp
20	2	Belt
21	1	2ServoClaw
22	1	Battery Cage

Parts List		
Item	Qty	Part Number
23	1	Battery
24	2	Motor_mount
25	1	Wheel Outer Support
26	4	Bottom Chassi Support

Circuit Schematic



BUDGET SHEET

Total	
Cost	$158.57
Mass [kg]	2.515

Product	Amount	Cost	Total Mass of Parts (kg)
Carbon Fiber	2	$4.19	0.006
Aruco Marker	1	$0.00	0.000
Wood and Cardboard	2	$0.00	0.020
Elegoo MEGA R3 ATmega 2560	1	$22.99	0.064
BOJACK L298N Motor DC Dual H-Bridge Motor Driver	1	$6.99	0.040
Tenergy NiMH Battery Pack 12V 2000mAh High Capacity Rechargeable Battery	1	$21.99	0.255
Battery Tamiya Connector	1	$2.89	$0.05
GT2 Timing Belt Closed Loop Rubber Belt	2.5	$9.50	0.071
3D Printed Parts	18	$18.96	0.936
Reed Switch	1	$0.40	0.001
MS0850502F0 30P1A Snap Action Switch	2	$2.70	0.001
RA1113112R Rocker Switch	1	$0.71	0.003
PLA	2	$2.00	0.560
MG996R Servo Motor	1	$4.50	0.055
FS5115M Servo Motor	1	$19.95	0.091
Greartisan DC 12V 15RPM Motors	2	$30.00	0.222
Other (glue, nuts, screws, etc)	N/A	$0.81	0.091
Other Electrical Components (Wires, Resistors, WiFi, etc)	N/A	$10.00	0.05

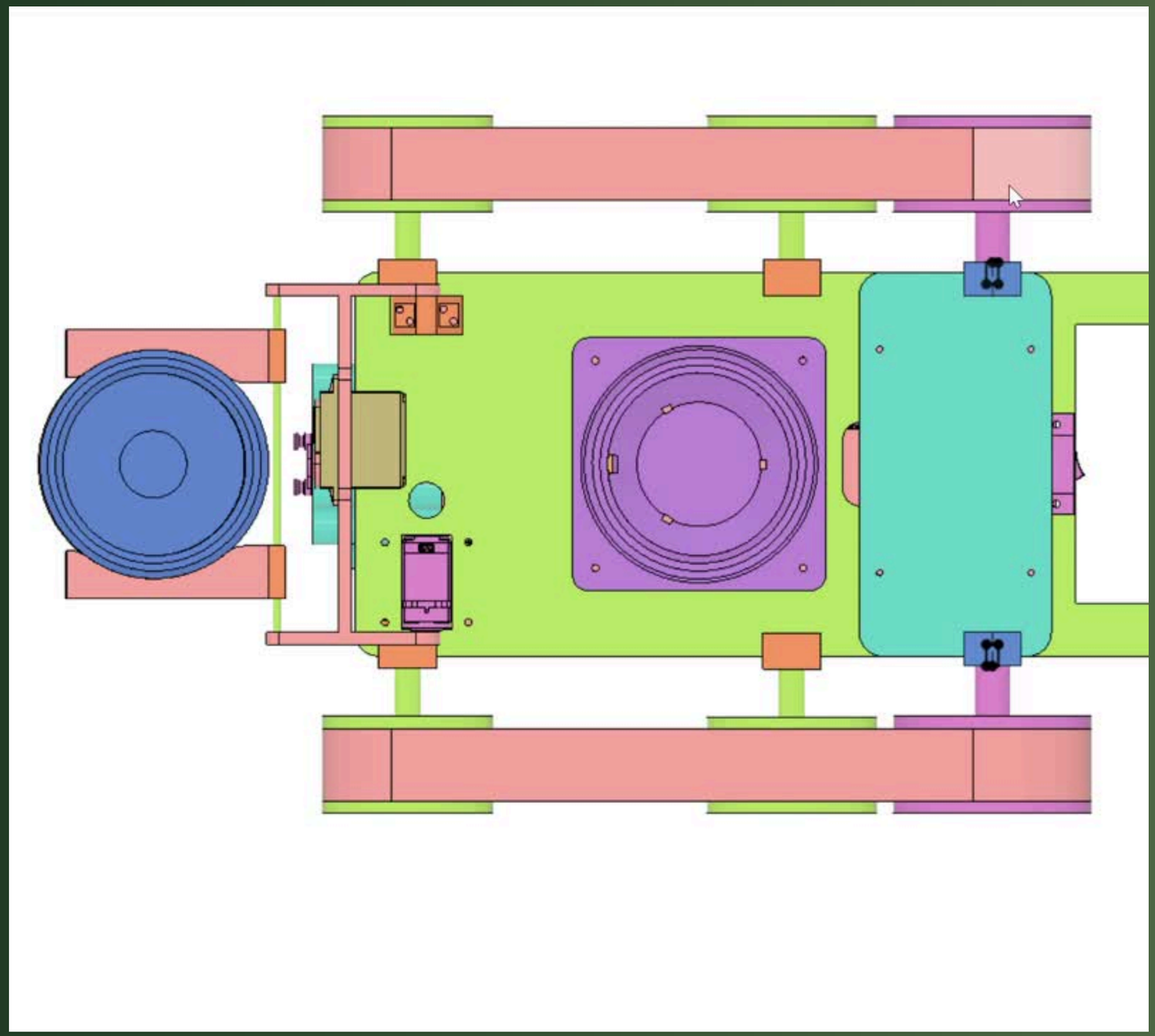
OTV key features

Oscar has a dual section haul that divides the locomotion and mission portions, allowing us to do more testing and troubleshooting separately.

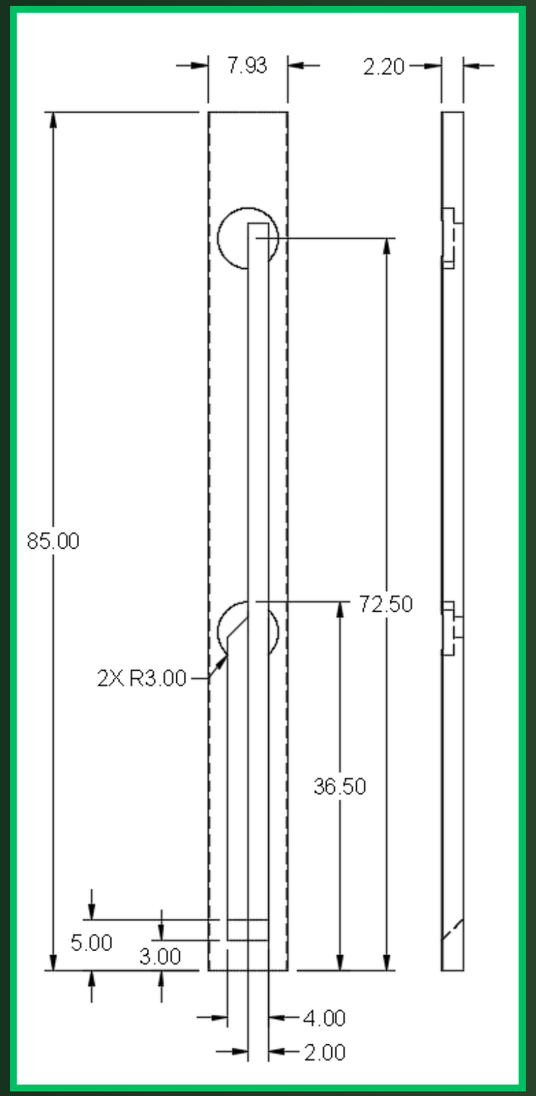
- Top Layer
  - Claw & Flip
  - Interface Plate
- Bottom Layer
  - Locomotion
  - Electronics

MISSION SYSTEMS

Claw Subassembly

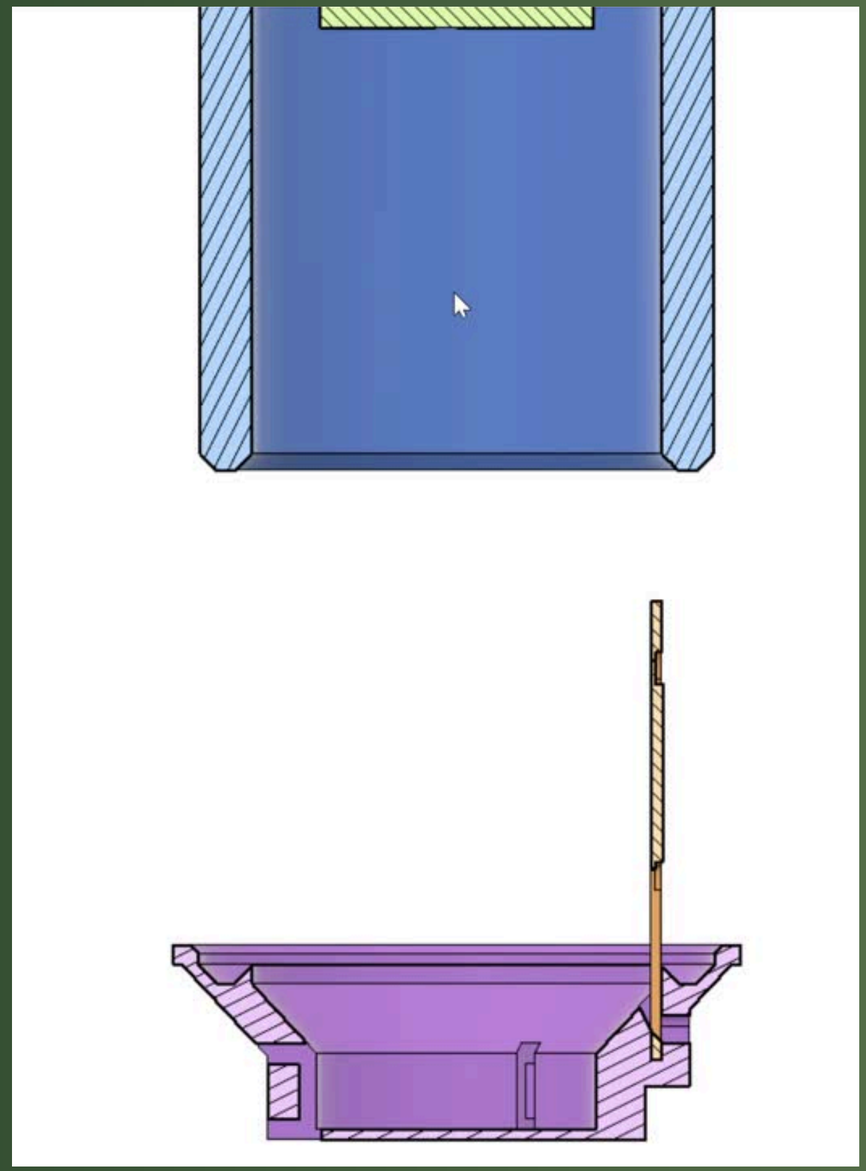


MISSION SYSTEMS

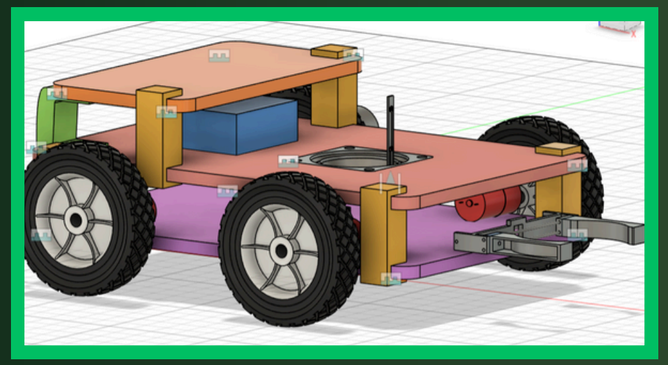


Antenna

Silo and Interface Plate

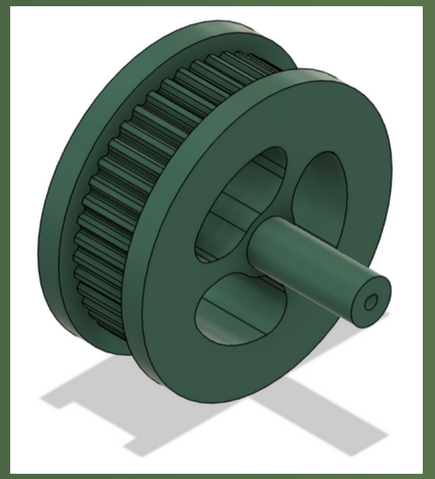


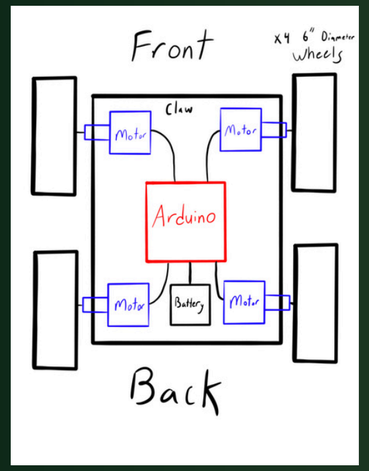
FROM CONCEPT TO FINAL BUILD



MS2 CONCEPT

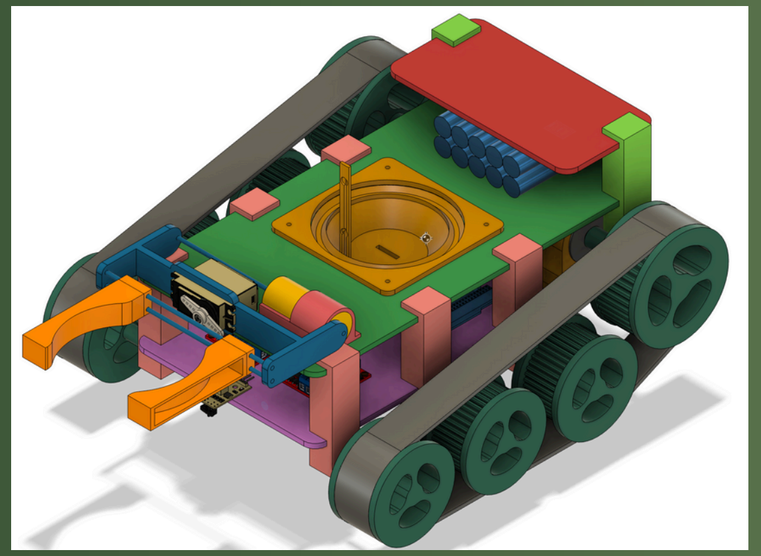
- *Tank Drive with two motors*

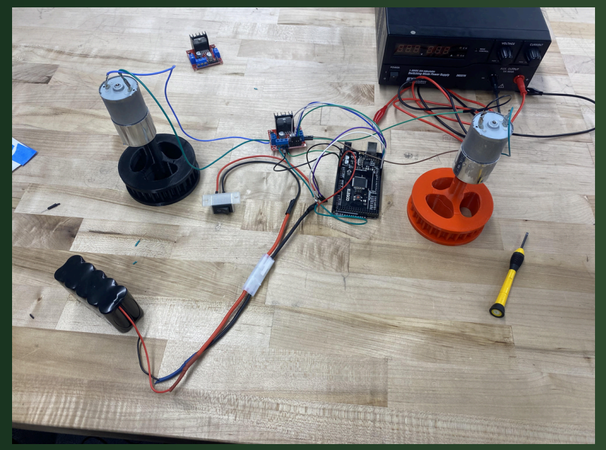




INITIAL CONCEPT

- *4 Wheel Drive*
- *Battery in the back*
- *Arduino in the middle of the bottom level*

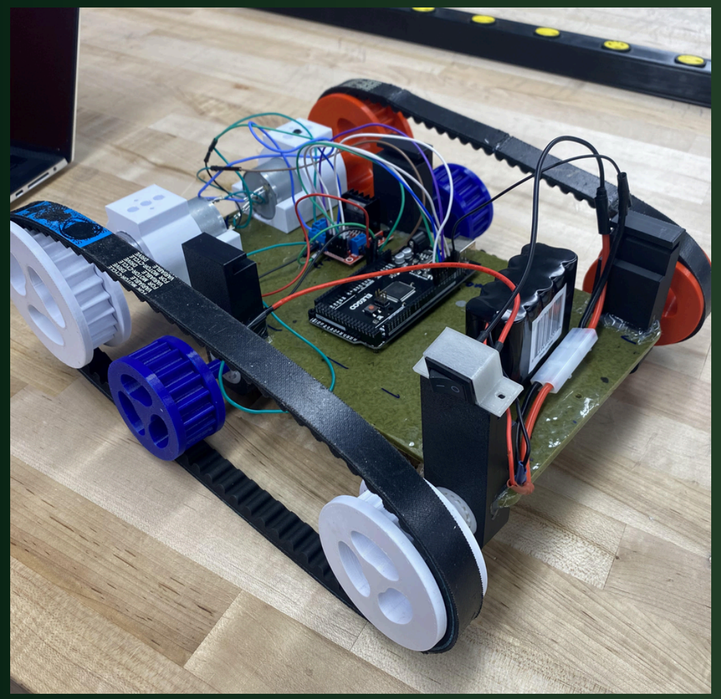




Testing the motors after a setback when the Arduino started sparking. We spent time testing individual pieces to guarantee they were not burnt out. Thankfully, they were not!

Attaching the second level of the OTV.

The first level of our OTV.



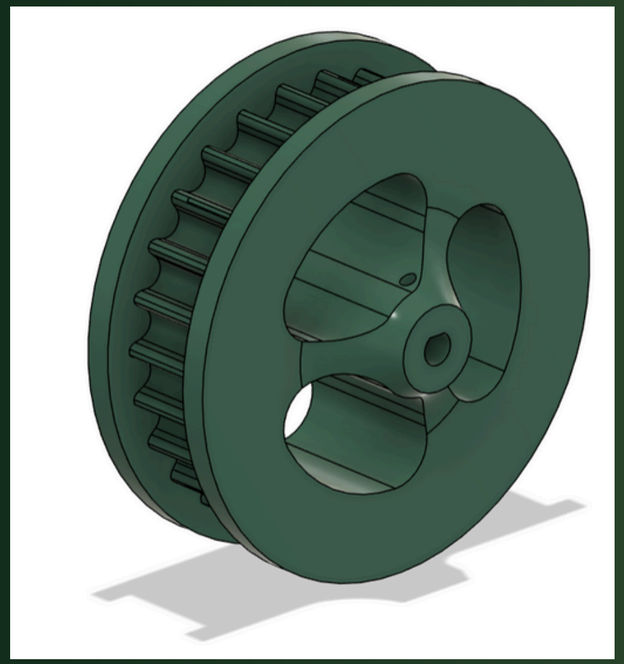
ASSEMBLY

- Moved the arduino towards the claw
- Only used one layer of tread for each tank belt
- Reduced number of wheels to 6
- Used a ziptie to keep the spacers from slipping off

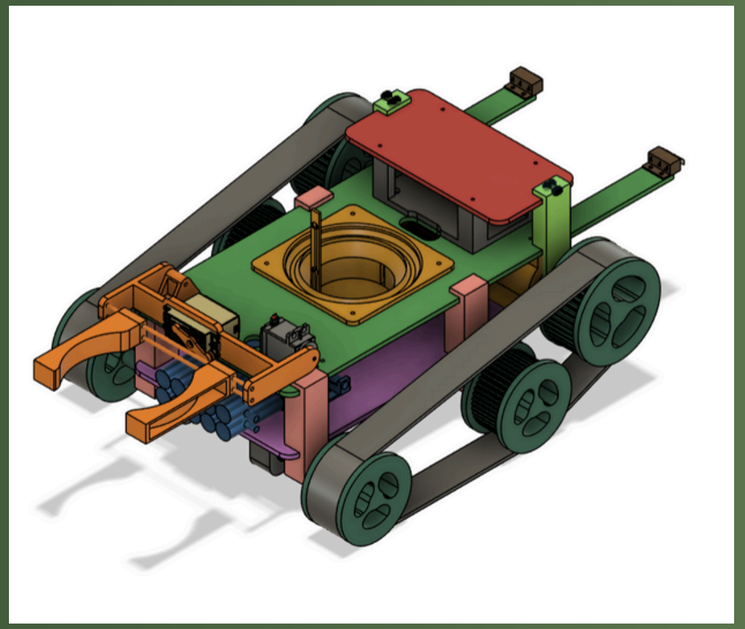
TESTING

- *Made the drive wheel axles shorter*
- filed down areas of the chassis which blocked the claw
- created a wall behind the interfacing plate
- expanded the chassis to place the limit switches farther away from the OTV

FINAL OTV!



After too much usage of the claw, the wires would snap. We had to repair them frequently.



OTV Performance Evaluation/Reflection

We were successful in completing a full run of the mission and navigation. Minor issues to improve for the future include the OTV drifting when driving straight, the claw occasionally dropping the silo, and the unintentional repetition of sequences of coding.

Oscars garbage truck was overall extremely successful! At the ENES Showcase, we tied for first in our mission and won the Innovation Design Award!