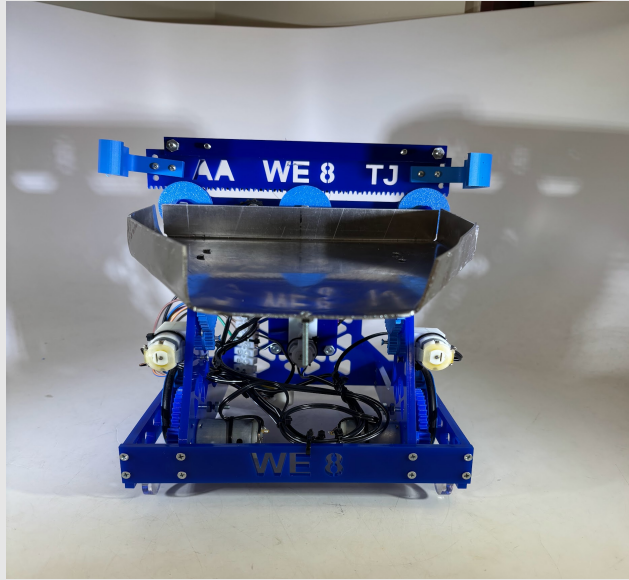
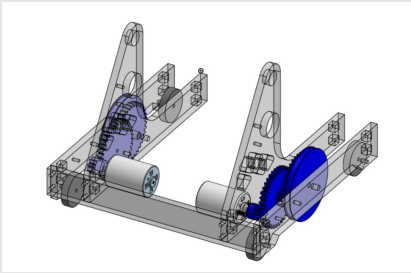




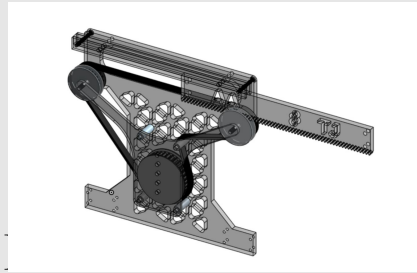
WE 8

Aaron Aviles, Alex Avalos, Thi Vo, Jocelyn Wang

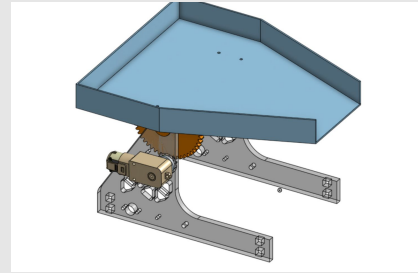
Four Main Components



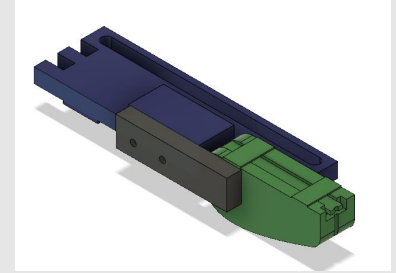
DRIVETRAIN



ARM



TRAY



PASSIVE METEOR

How does it work?

Step 1: Align robot with the edge of the field

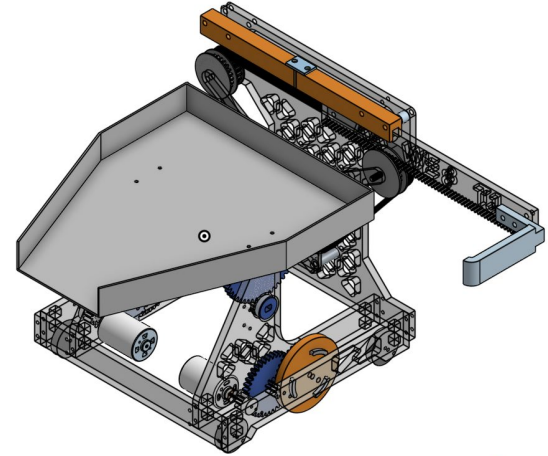
Step 2: Extend arm out

Step 3: Starting moving forward and collecting objects into tray

Step 4: Dump into event horizon

Step 5: Repeat on other side!

(Step 6: Time permitting, tip over balls into tray and repeat)



Scoring Graph

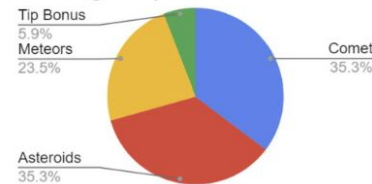


Figure 1: Scoring Graph

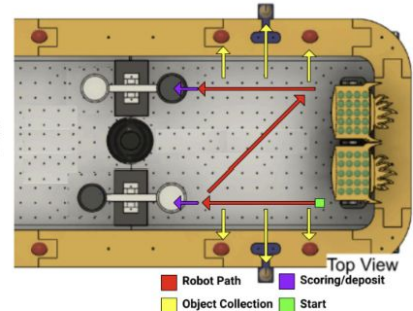
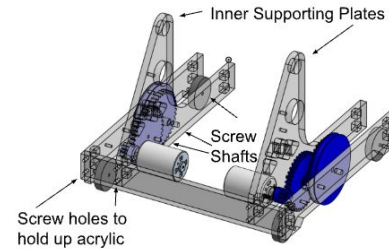
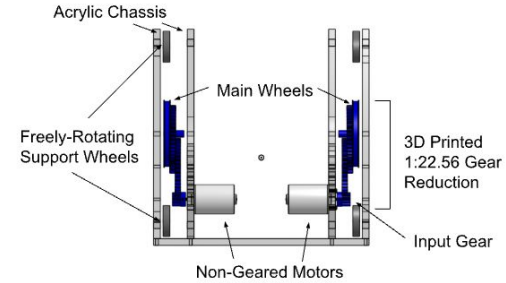
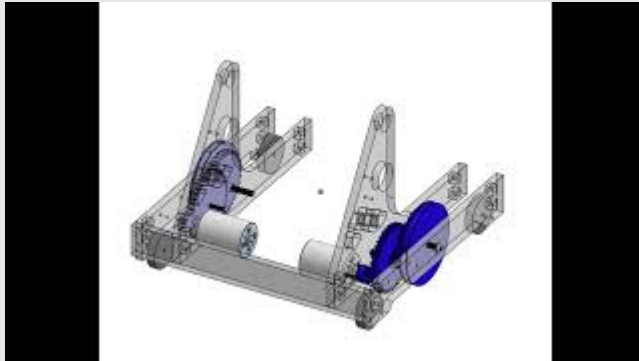


Figure 2: Path Plan



DRIVETRAIN

- Allows for linear & rotational motion of the robot
- Center-wheel drive powered by two non-geared motors
- Assists other components by providing motion necessary for collection of objects



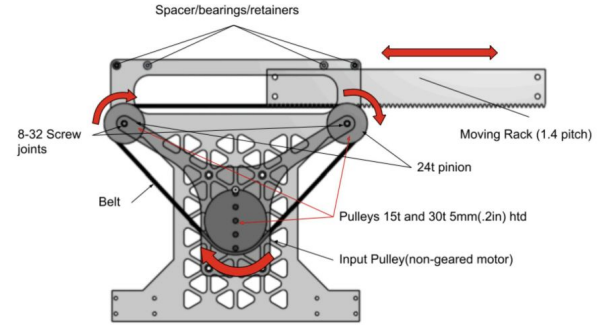


EXTENDING ARM

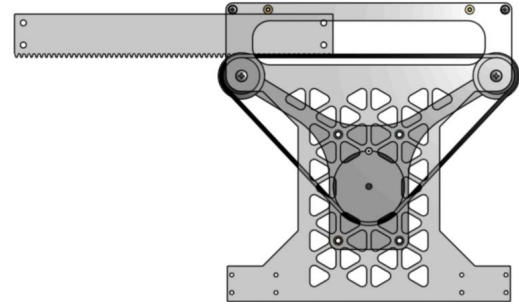
- Arm extends out past objects to drag them into tray
- Extends in both directions
- End effector have curved edge to help grab object



Front Face:



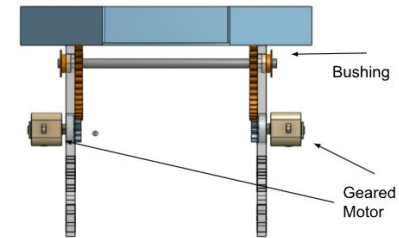
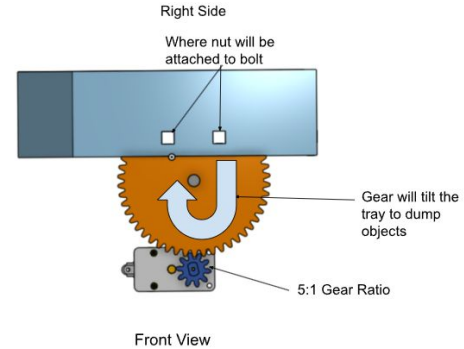
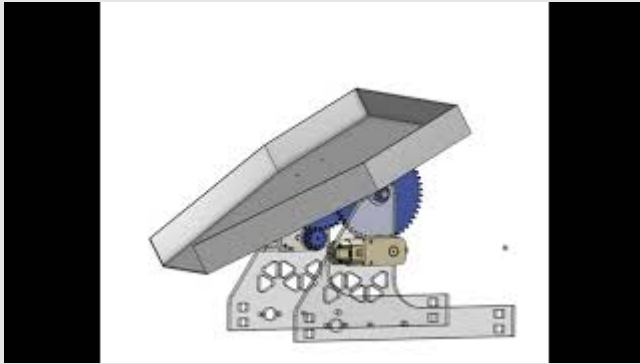
Back Face:





TRAY MECHANISM

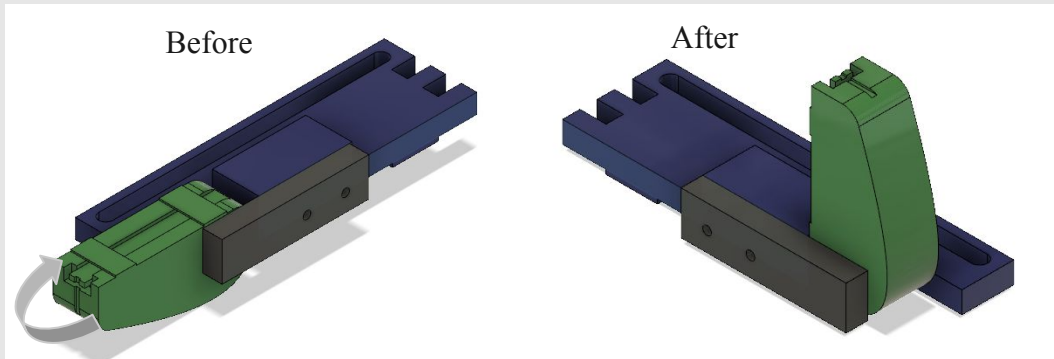
- Allows robot to hold more than one object at a time
- Dumps objects directly into scoring zone
- Can tilt event horizon down to our side



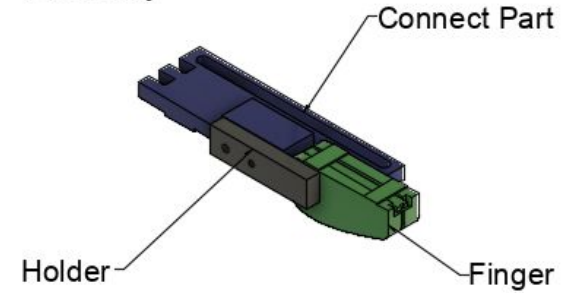


PASSIVE METEOR

- The passive mechanism was held in place by friction, and when the friction is release the finger of Passive will rotate.
- It will touch the Meteor tray and collect them for our robot.

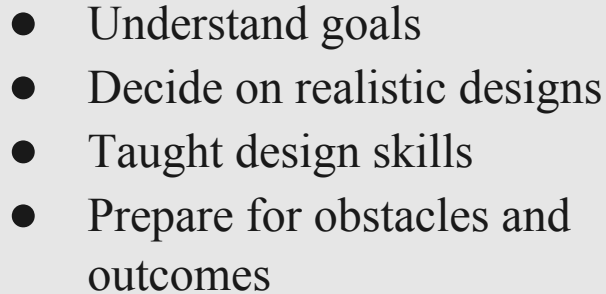


Passive
Assembly





TEAM SCHEDULING



Integration CAD

Features

Features (151)   

▼ Default geometry

○ Origin

 Top

 Front

 Right

➤  Planes (7)

➤  Size Constraints (4)

➤  Elements (4)

➤  Chassis (32)

 Mirror 1

 Mirror 2

➤  System Sub I (16)

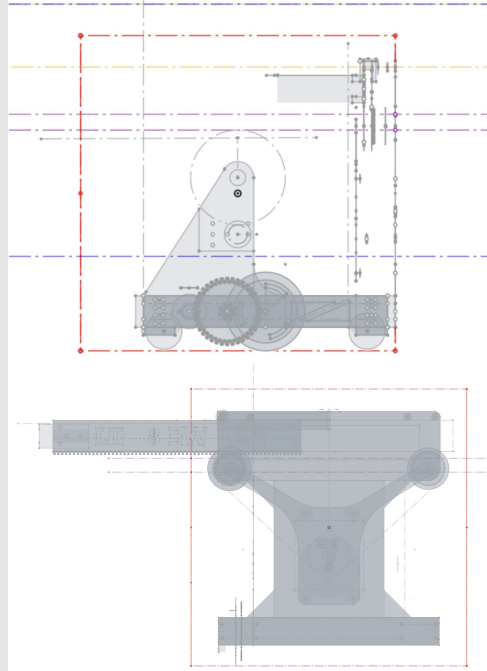
➤  Subsystem II (40)

○ Belt (22.321 in) 

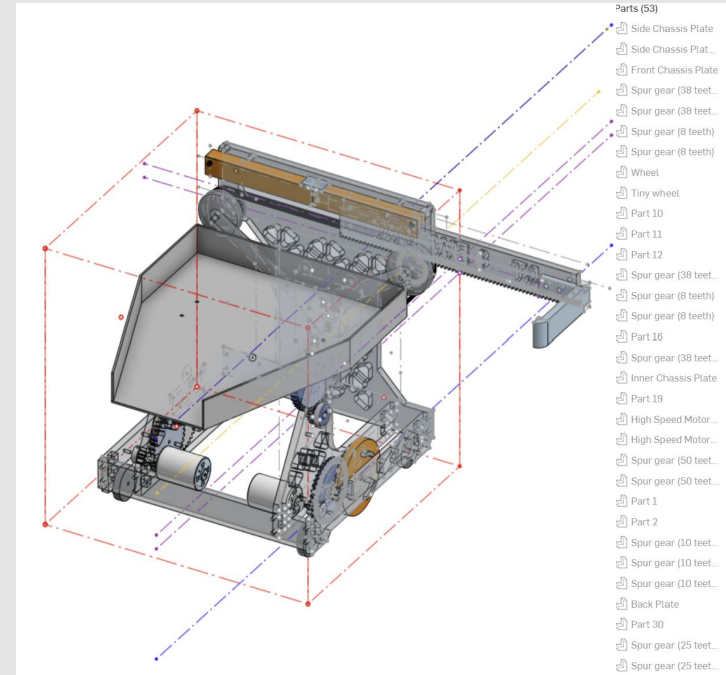
➤  Slide (20)

➤  End Effector (21)

2D Geometry



Part Studio



EXTENDING ARM ANALYSIS

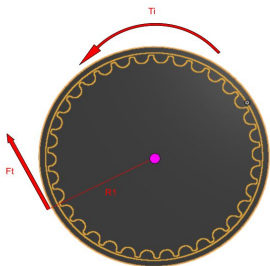
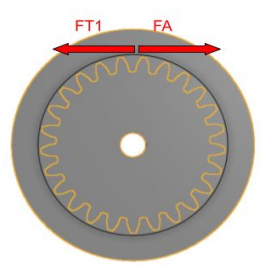
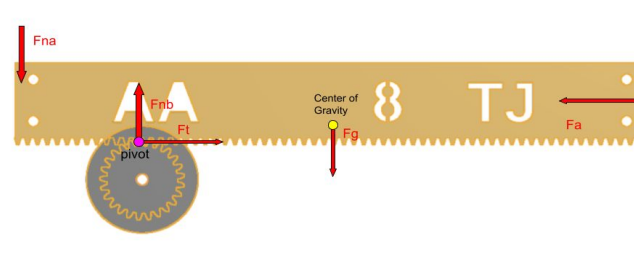
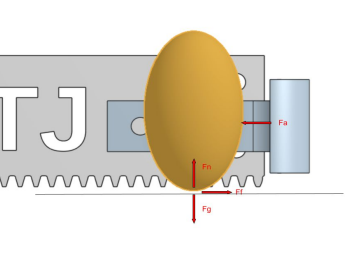
Assumptions:

- Quasi-Static Analysis
- Internal friction is negligible
- Motor torque is the stall torque
- Sprockets are massless

Objectives:

- Find how much force the arm can pull
- Find how fast the arm moves

Free Body Diagrams

			
$\sum F = 0$ $T_i - F_t \cdot R_1 = 0 \Rightarrow F_t = \frac{T_i}{R_1}$	$\sum F = 0$ $F_t - F_A = 0 \Rightarrow F_t = F_A$	$\sum F_y = 0$ $F_n \cdot R_2 - F_g \cdot R_3 = 0$ $\sum F_x = 0$ $F_t - F_A = 0$	$\sum F_y = 0$ $F_n - F_g = 0$ $\sum F_x = 0$ $F_a - F_t = 0$

Driving Sprocket
Aaron

Driven Sprocket &
Pinion

Linear Arm Slider

Game Object



EXTENDING ARM ANALYSIS

Theoretical

$$F_A = \frac{T_i}{R_1}$$

- T_i : Stall torque (0.25 Nm)
- R_1 : Radius in meters (convert 1.25 inches to meters)

$$F_A = \frac{0.25}{0.03175}$$

$$F_A \approx 7.87 \text{ N}$$

$$F_n = 0.184 \cdot 9.81 = 1.804 \text{ N}$$

$$F_f = 0.45 \cdot 1.804$$

$$F_f \approx 0.812 \text{ N}$$

$$F_f = 0.812 \text{ N} \cdot 3$$

$$F_f \approx 2.436 \text{ N}$$

$$\omega = \frac{\text{RPM} \cdot 2\pi}{60} = \frac{37.5 \cdot 2\pi}{60} \approx 3.93 \text{ rad/s}$$

$$v = 3.93 \cdot 1.25 \approx 4.91 \text{ in/s}$$

Findings

Calculated Force: 7.87 N

Experimental Force: 4.7 N

Force Factor of Safety: 1.93

Calculated Velocity: 4.91 in/sec

Experimental Velocity: 2.99 in/sec

OUR PERFORMANCE

Within 60 Seconds:

200 points

No Time Limit:

316 points



THANK YOU!



Love,
Aaron, WE 8, Thi, Jocelyn, and Alex (Left to Right)