

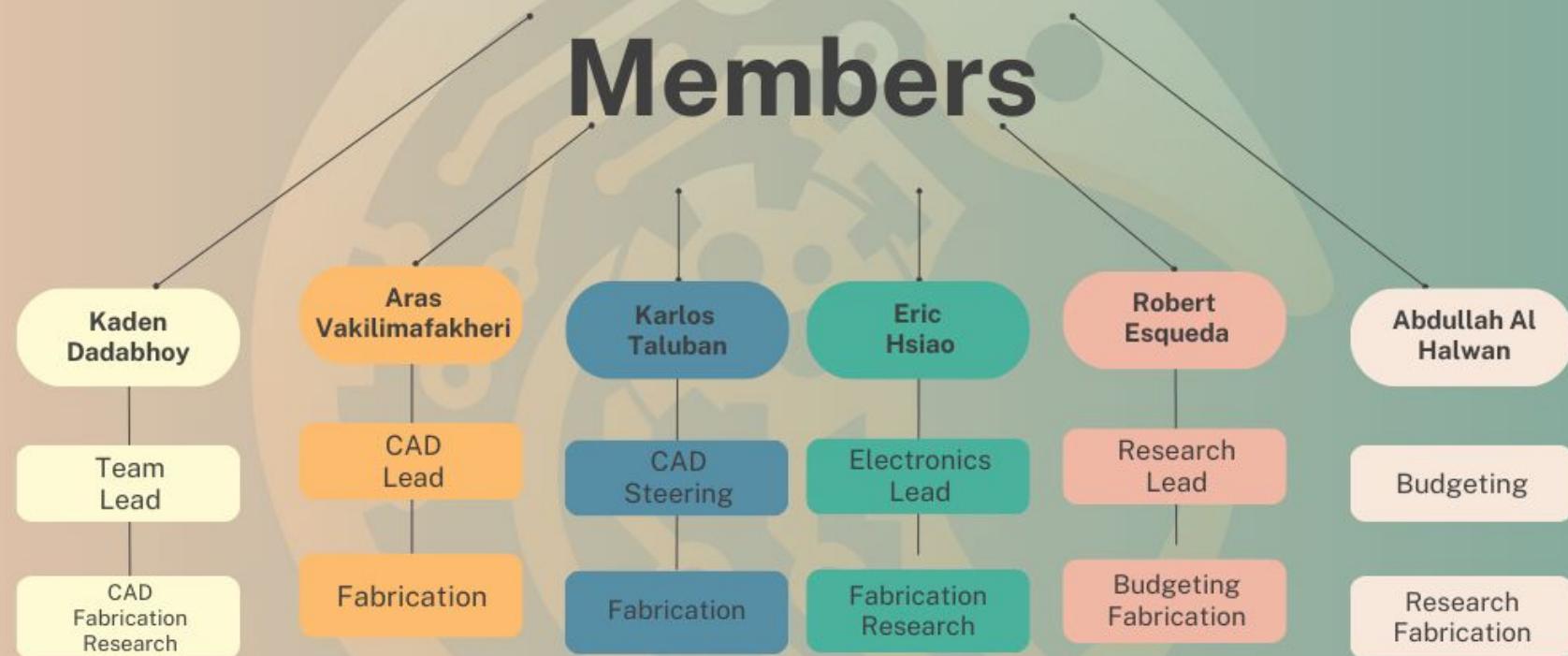
# ANTGINEERS

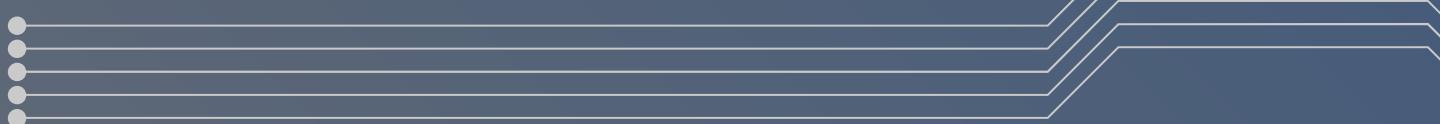
## Final Presentation

ENGR7A: Fall 2023



# Team Members





# 3-Initial Goals

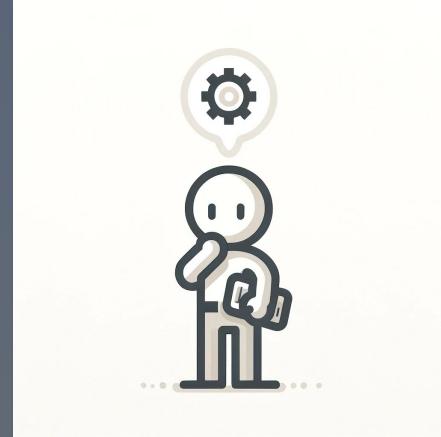
## Did we succeed?

- 
1. Stay on top of deliverables
  2. Maintain a collaborative and cohesive environment
  3. Design, build, and test a functional rover



# Design Requirements

- Max width: 10" (Act: 9.50")
- Max length: 16" (Act: 15.95")
- Must have Gear guard
- Must meet all safety requirements
- Total cost  $\leq$  \$275

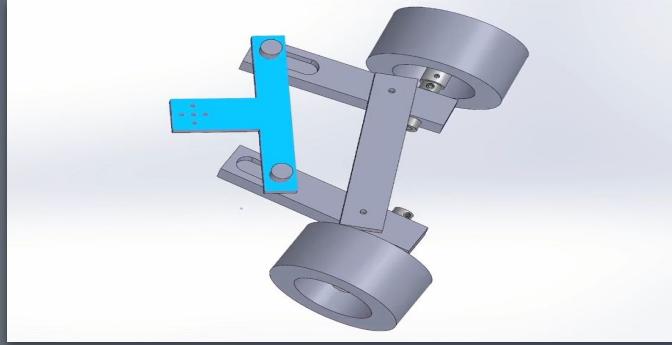


# Design Choices

- 52T Gear
- 85mm wheels
- Wooden main chassis
- 3D printed components



Gear	Output Torque	RPM (speed)
40T	0.2723783288	610
52T	0.3134920388	468
64T	0.4352758313	370





# Project Overview

## Week 3

- Rover Layout Idea

## Week 4

- PO Form

## Week 6

- SolidWorks Assembly/Drawings

## Week 7

- SolidWorks Drawings Revision
- 3D Printing Request
- Chassis & Steering Assembly

## Week 8

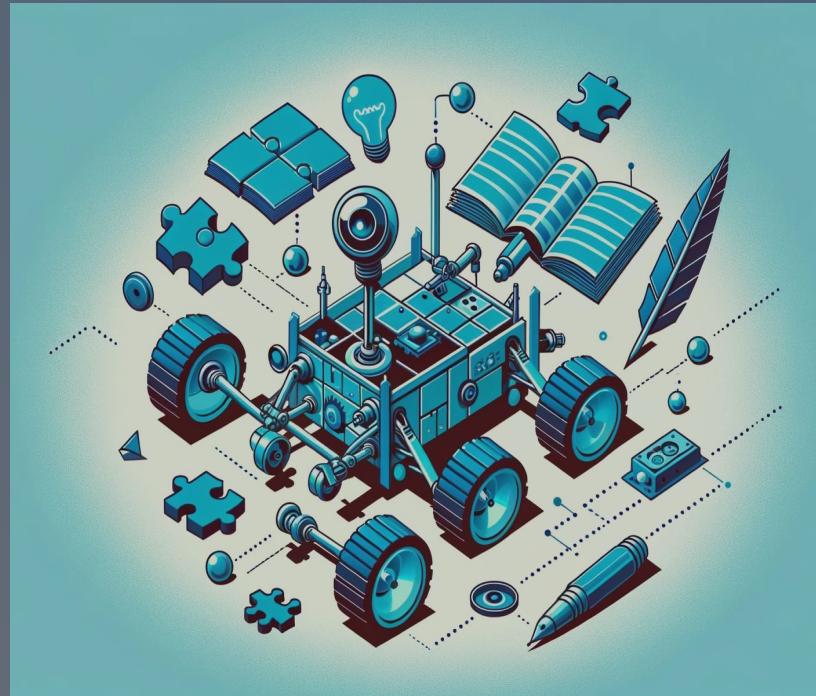
- Continued Assembly

## Week 9

- Electronics
- Gear Guard & Clearance Pieces

## Week 10

- Testing/Tuning
- Set Track Time



# Full Gantt Chart

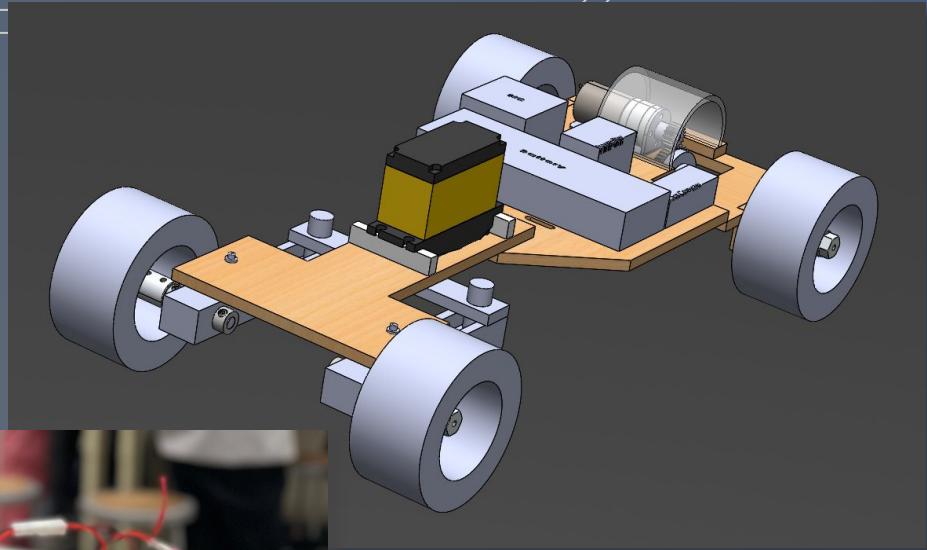
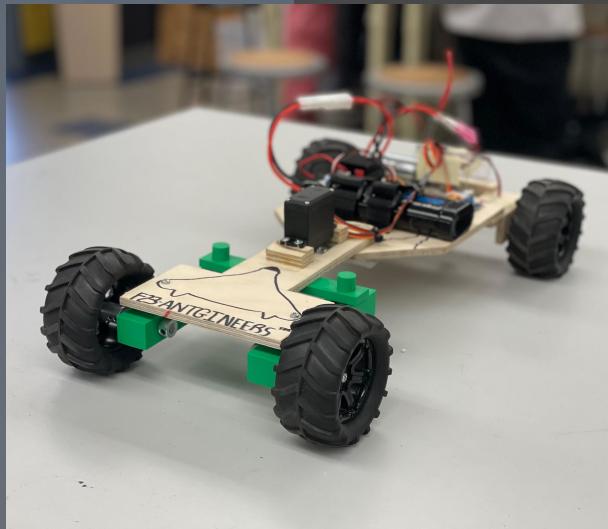
Antgineers				Planned		Actual		Due Date																							
Thursday 1-2:50pm		Planned		Actual		Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Week 8		Week 9		Week 10		Finals Week					
Activity		Start	End	Start	End	M	Tu	W	Th	F	M	Tu	W	Th	F	M	Tu	W	Th	F	M	Tu	W	Th	F	M	Tu	W	Th	F	
Team Formation		W = Week																													
Team Name & Captain Chosen		W1	W2																												
Rover Design		W2	W4	W3	W4																										
Determine Rover Layout		W2	W4	W3	W3																										
Select Gear Ratio		W3	W4	W4	W4																										
Purchase Order Form		W3	W5	W4	W4																										
SolidWorks Part Designs		W3	W4	W4	W4																										
SolidWorks Assembly		W3	W6	W4	W6																										
SolidWorks Detailed Drawings		W3	W6	W6	W6																										
Structure Fabrication		W7	W8	W7	W8																										
Wheels System		W7	W8	W7	W8																										
Motor Mount		W7	W8	W7	W8																										
Gear Guard		W7	W8	W8	W9																										
Battery holder		W7	W8	W7	W8																										
Steering System		W7	W8	W7	W8																										
Structure Assembly		W7	W7	W7	W8																										
Electrical System		W7	W8	W8	W10																										
Mount & Connect Electronics		W7	W8	W8	W9																										
Remote Control Tuning for Motor		W8	W9	W10	W10																										
Remote Control Tuning for Servo		W8	W9	W10	W10																										
Steering System Testing		W8	W9	W8	W10																										
Test and Evaluation		W8	W9	W9	W10																										
FINAL COMPETITION		W10	W10	W10	W10																										
Action Item Reports																															
Preliminary Presentation																															
Final Presentation																															

During Each Lab

# SolidWorks - CAD

Our Rover was finalized into three subassemblies:

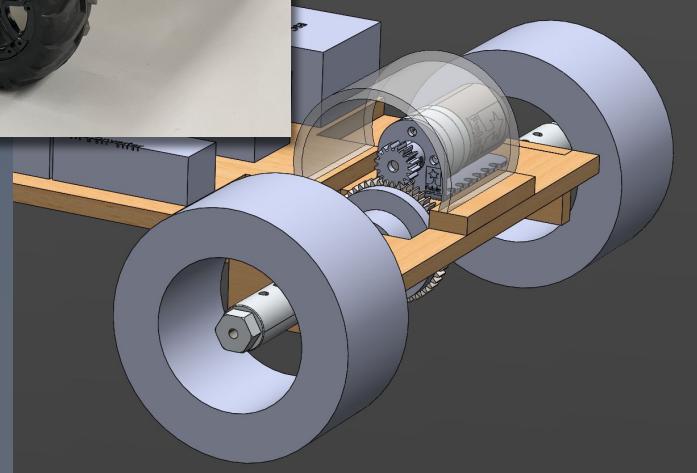
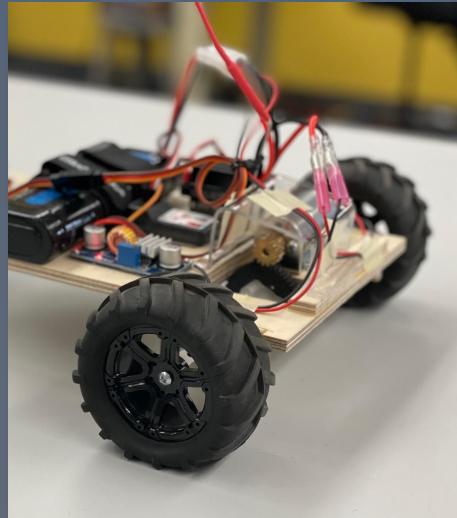
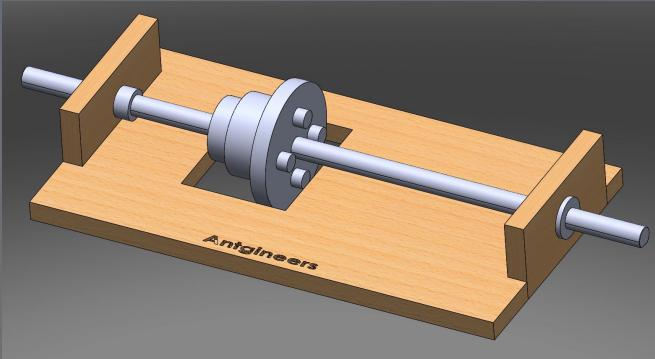
- Rear Drive Train
- Main Chassis
- Steering and Servo



# Rear Drivetrain-CAD

## Modified Homework #1 Assembly

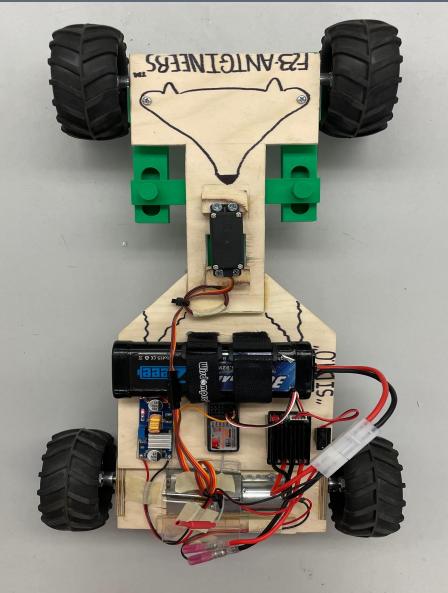
- Larger Cutout for Gear & Mount
- Dimension Changes to Axle Mount



# Main Chassis-CAD

Originally one longboard shaped piece

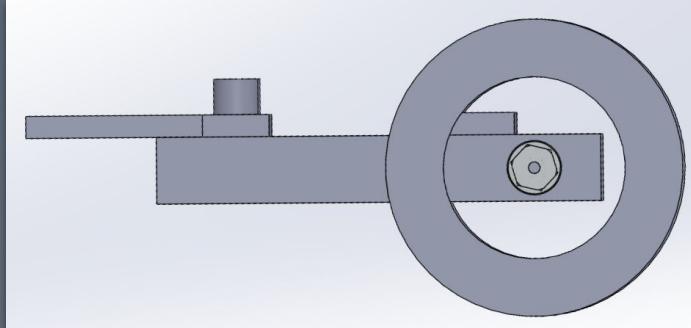
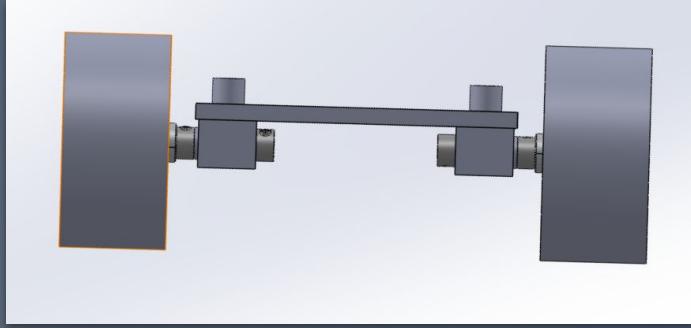
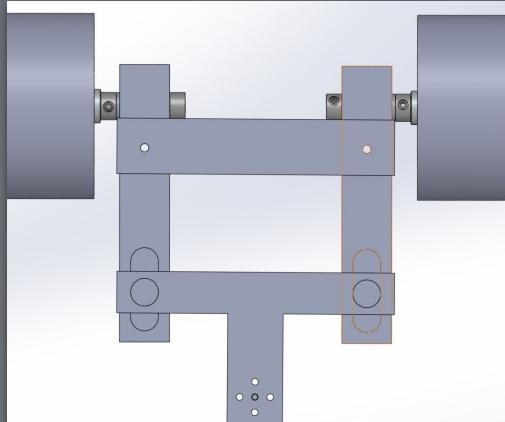
- Altered for wheel leveling and electronic spacing



# Steering Design

## Ackerman Steering:

- Four bar linkage system
  - Two slots to allow rotation
  - T-shaped servo bar
  - ABS plastic





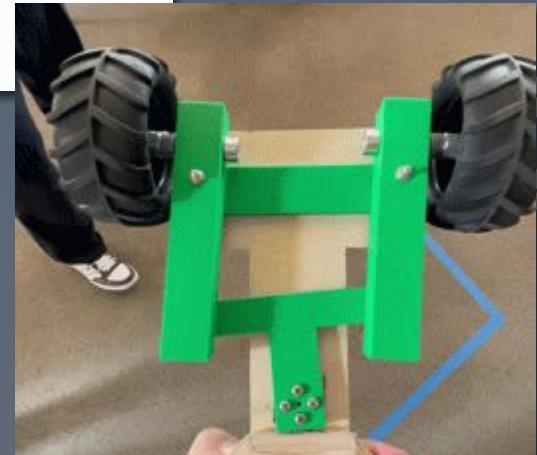
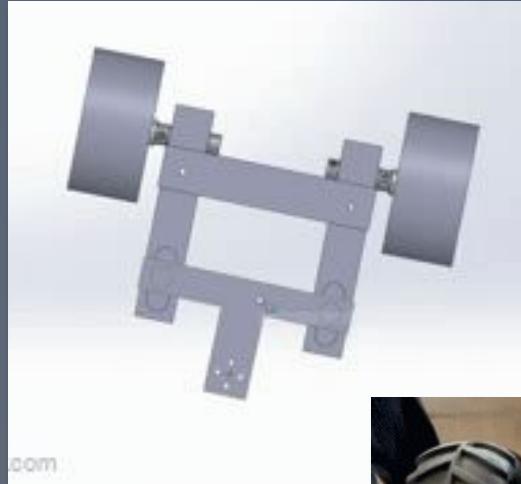
# Steering Design

## Turning Performance

- 100.55 ft

## Setbacks

- Slots too short
- Wheel-links too long
- Turn radius exceeded track turns



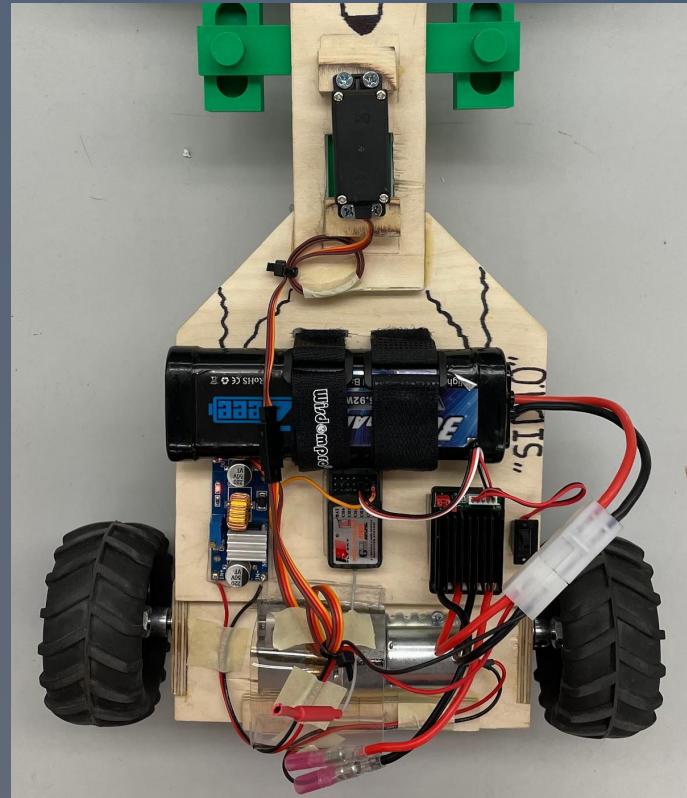
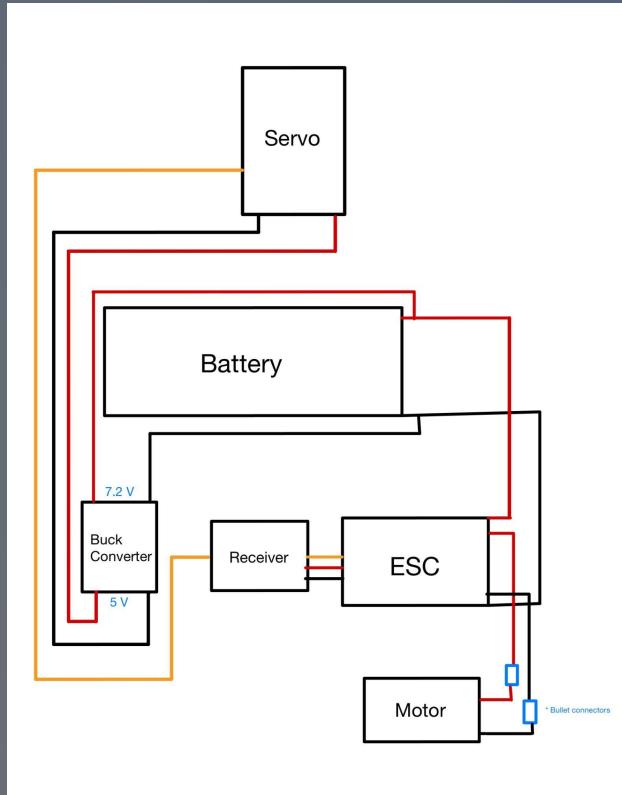
# Electrical Diagram

Red: Positive

Black: Negative

White: Signal

Blue: Bullet  
Connectors



# Budget & P.O. Form

P.O. Form Chart:

Structure (\$6.39)

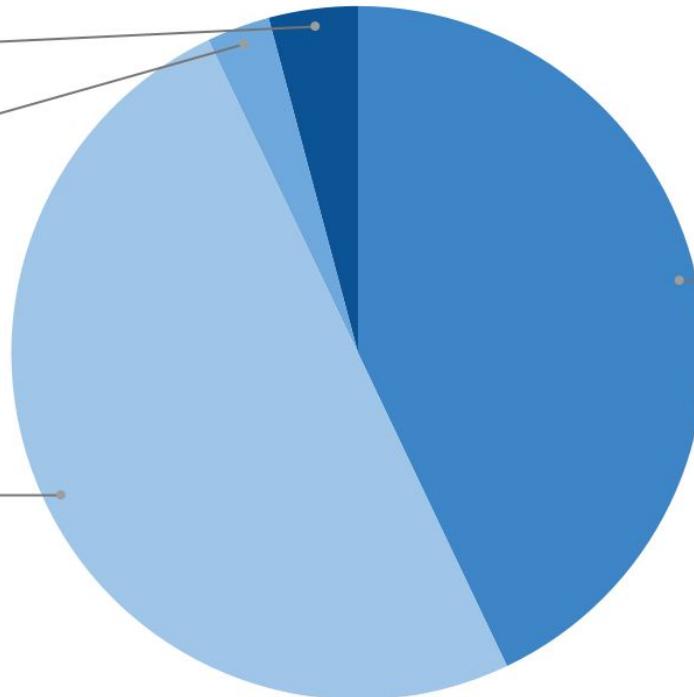
4.2%

3D Printing (\$9)

3.0%

Mechanics (\$108.23)

50.0%



Total: \$275.00

Used: \$233.29

~84.5%

Difference: \$41.71

Electronics (\$92.98)

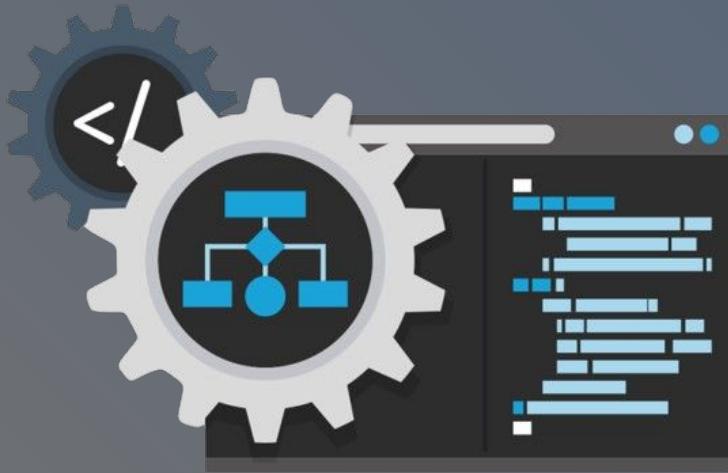
42.9%



# Budget & P.O. Form

Electronics:	Structure:	Mechanics:	Mechanics (Cont.):	3D printing:
Buck Converter	Birch Baltic Plywood	52T Gear	1/4" Wheel Adapter	Steering Assembly (4.5 Hours)
Gear Motor	1/16" Polycarbonate	85mm Wheels	4.4:1 Gearmotor	
Servo		2" Drive Shaft	1/4" Shaft Collar	
Transmitter + Receiver		8" Drive Shaft	Motor Mount Bracket	
Battery		1/4th" Sleeve Bearing		
Brushed ESC		16T Pinion Gear		
		1/4" D-Bore Gear Hub		

# Testing & Final Results:



Final time: 2:36.04

## Testing:

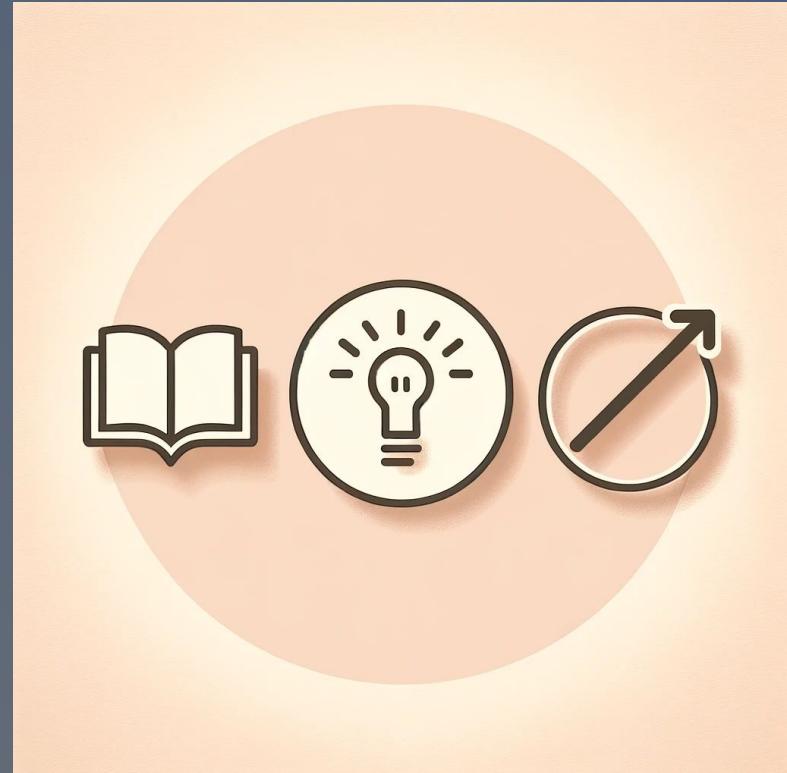
- Steering, servo mechanics, and course testing.
- Added a ramp clearance guard

## Final Results:

- All major milestones met.
- Satisfactory performance and integration checks.
- Mass: 2.059 lbs
- Drive Time: 27 mins

# Lessons Learned

- More Prototyping (Esp. Steering)
- Heavy Emphasis on Research
- Prioritize key rover components
- Understand tools before fabrication.



# THANK YOU

