

ENG252 Dynamics: Project

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1 Introduction and Scope

2 Design

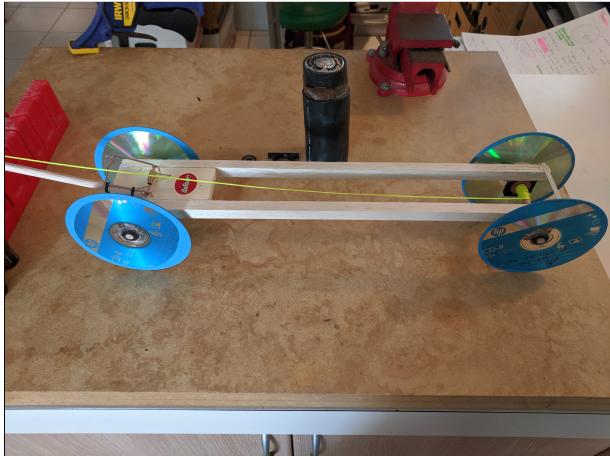


Figure 1: Vehicle material selection predominately focused on limiting the vehicle mass. Where possible existing structures, such as Compact discs, were used to reduce manufacturing effort.

Table 1: Key vehicle characteristics.

Measurement	Value	Unit
Chassis Length		
Chassis Width		
Chassis Height		
Mass	0.180	kg

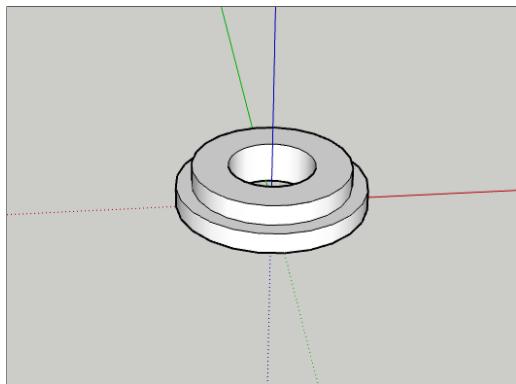


Figure 2: Small plastic mounts designed to securely fix the shaft to the Compact Disc wheel at the centre of mass.

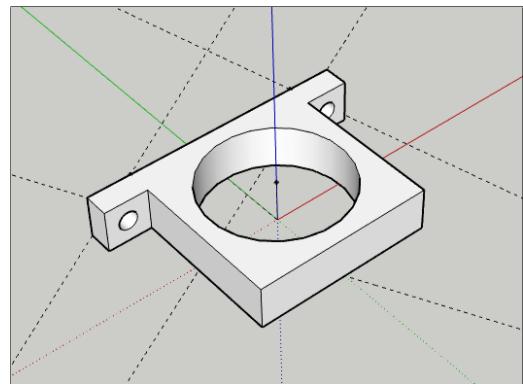


Figure 3: Small plastic mounts designed to house the bearings and attach them securely to the vehicle chassis.

Measurement	Value	Unit
Length	0.450	m
Width	0.010	m
Mass	0.006	kg



Figure 4: Balsa wood section used for the frame. Two lengths were used.

Measurement	Value	Unit
Diameter	0.022	m
Mass	0.009	kg



Figure 5: Bearings used to reduce friction between shafts and frame.

Measurement	Value	Unit
Length	0.028	m
Width	0.028	m
Mass	0.002	kg



Figure 6: Plastic bearing mounts designed with Sketch up and constructed using additive manufacturing. Four of these were used.

Measurement	Value	Unit
Diameter	0.120	m
Mass	0.013	kg



Figure 7: Compact disc used for wheels. Four of these were used.

Measurement	Value	Unit
Length (Lever Arm)	0.400	m
Length (Shaft)	0.100	m
Mass (Lever Arm)	0.011	kg
Mass (Lever Arm)	0.003	kg



Figure 8: Dowel lengths used for both the lever arm (one used), and for the shafts (two used) to which wheels were attached.

Measurement	Value	Unit
Length	0.100	m
Width	0.045	m
Mass	0.023	kg



Figure 9: Mouse trap used to power vehicle.

3 Machine Dynamics

- 3.1 Theoretical Rolling Friction**
- 3.2 Theoretical Static Friction**
- 3.3 Theoretical Rotational Inertia of Wheels and Shaft**
- 3.4 Spring Coefficient and Potential Energy**
- 3.5 title**

4 Distance Estimation

5 Experimental Performance and Possible Improvements

6 Conclusion