



MAE 106 Mechanical Systems Laboratory

Robot Project: CAD Model

Team Members:

Vi Duong - *Steering Mechanism Design*

Kelsey Lawson - *Propulsion Mechanism Design*

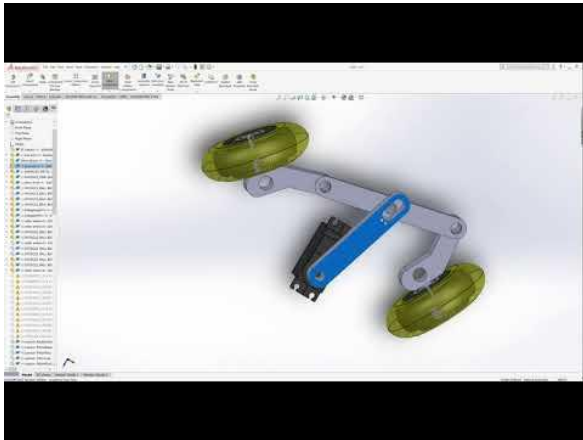
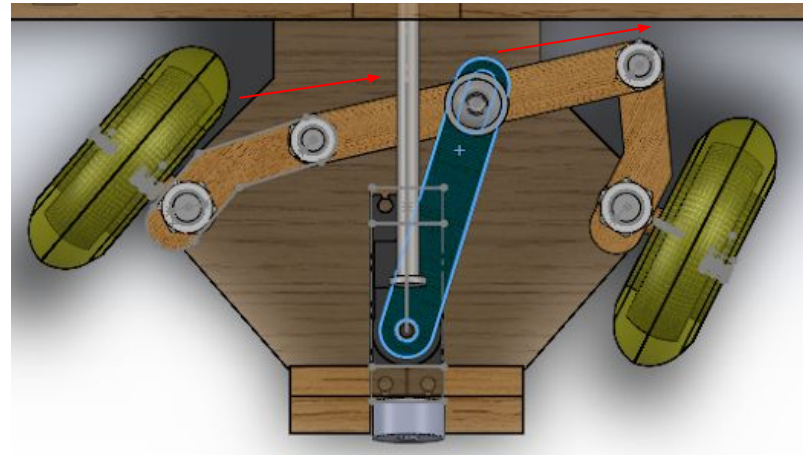
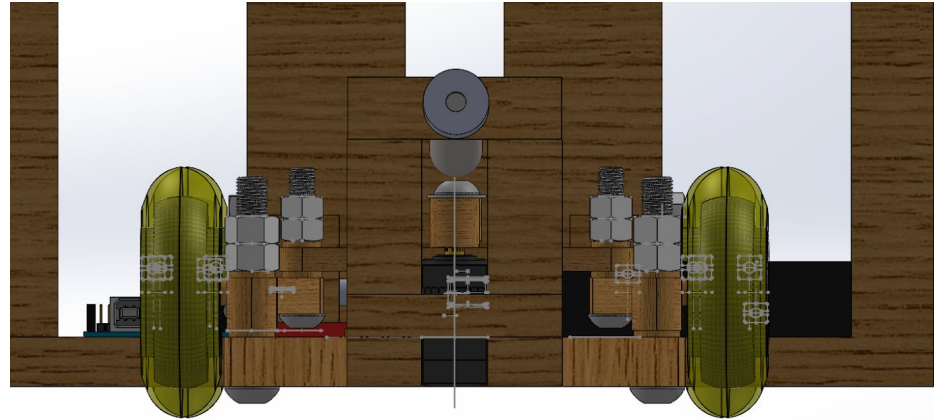
Zion Lee - *Chassis Design & Overall Integration*



Components & Dimensions:

- Middle linkage (108x13.74mm)
- Nuts, bolts, and washers
- 70mm wheel
- Ball bearing (21.26 mm diameter)
- Servo linkage (87mm x 15mm)
- Wheel linkage
- Servo Motor with Pot

Steering Design is Bell & Crank and the linkage is used and connected to the servomotor.

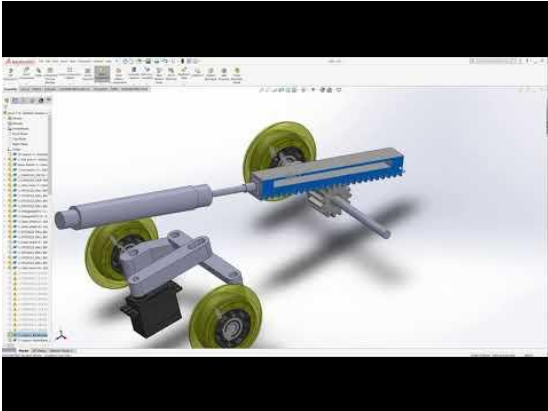
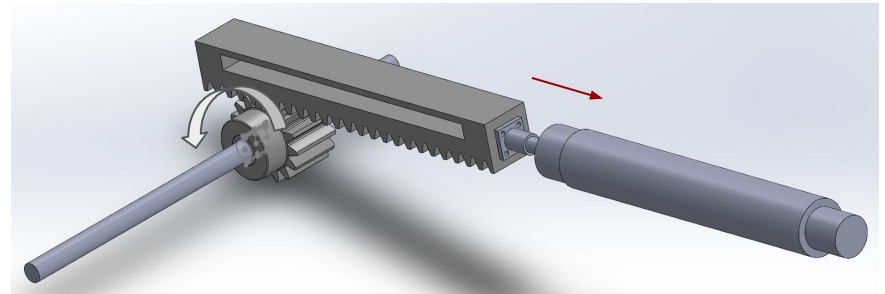
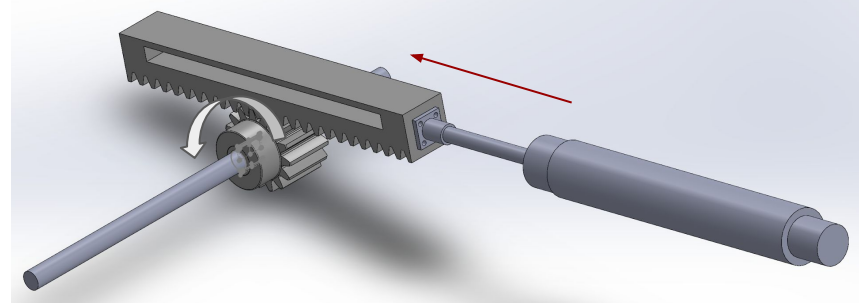




Components & Dimensions:

- Pneumatic piston
- Spur Gear (30mm Pitch & 12mm Inner Dia)
- One-Way Locking Bearing (12mm (0.001 tolerance) & 8mm Inner Dia)
- Gear Rack (2.24in length)

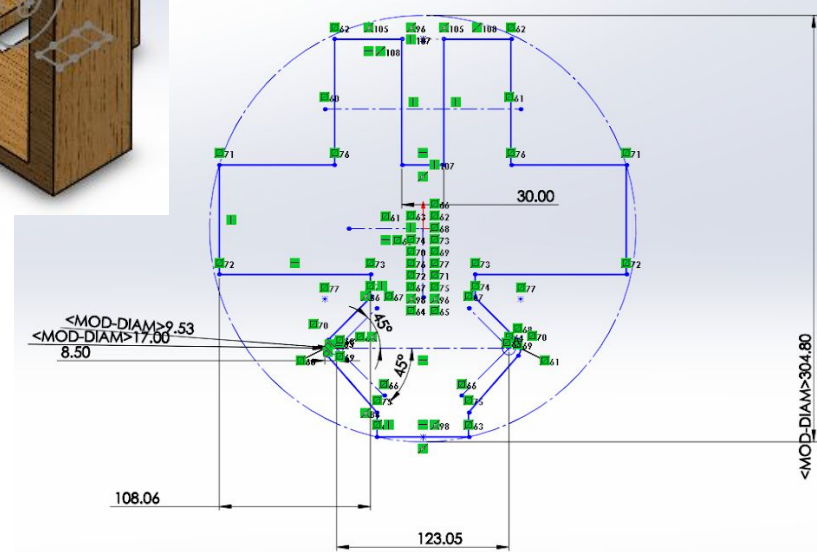
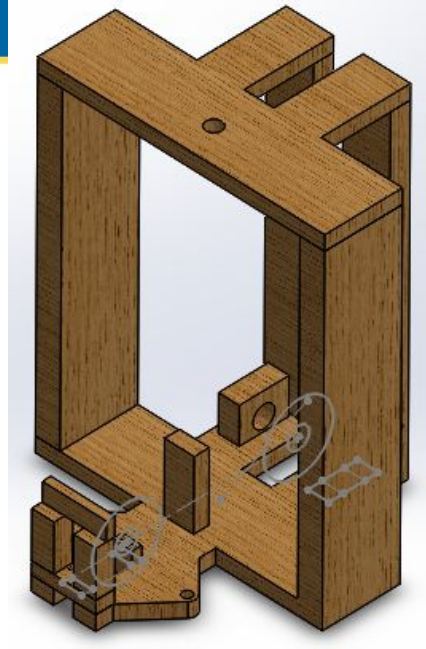
The propulsion mechanism is a one way bearing and spur gear. The bearing is on the axle that is then inserted into a gear connected to a rack.





Chassis Design

- The wooden blocks in the chassis can be cut to precise size and shape using Band Saw
- Screw can be used to make connection hole for different part
- Parts can be ordered online
 - Wheel
 - Nut, bolt, washer, screw
 - Ball bearing for wheel
 - Steel Shaft
 - Vehicle Components
- Linkage for steering can be 3D printed to get the desired shape. (Also can be made with wooden blocks)

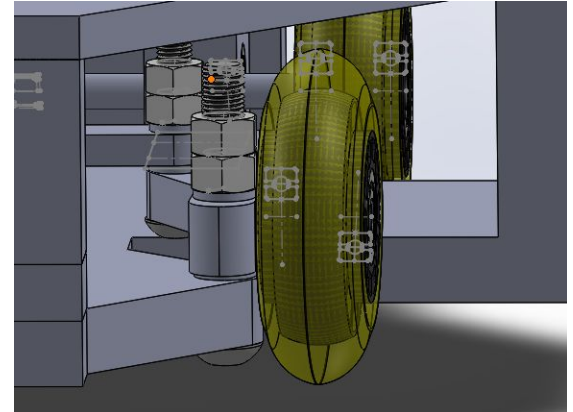
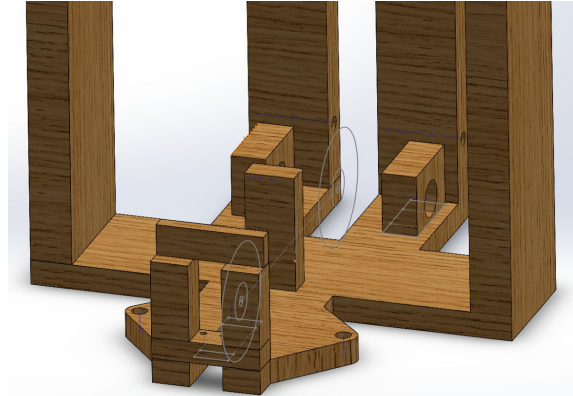




Components:

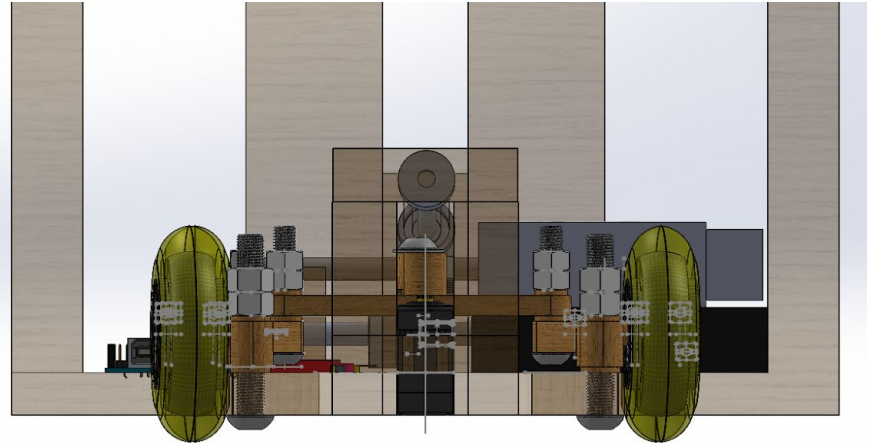
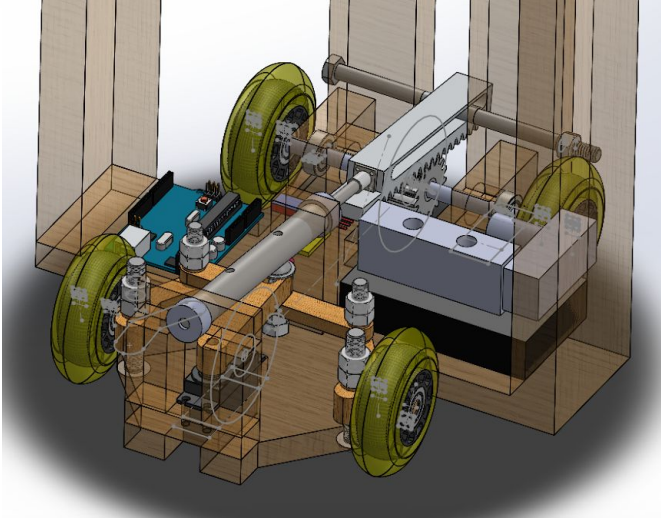
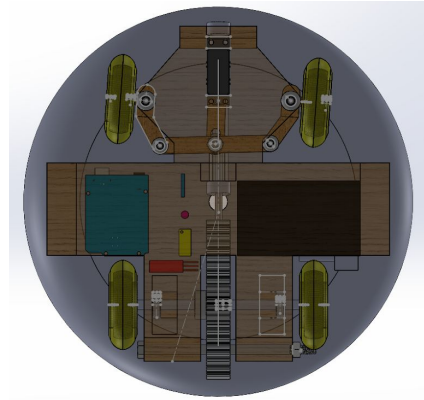
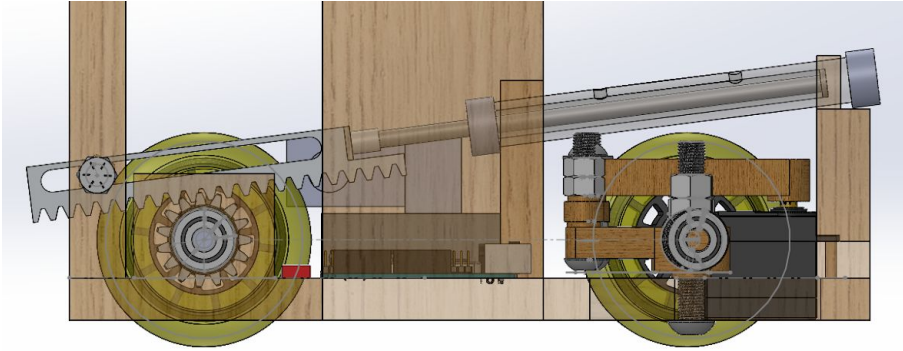
- 13 in heavy duty pneumatic tire
- Wheel Magnet(s)
- Magnetic Reed Switch
- Battery Pack
- MOSFET
- Arduino
- 3D Compass & Accelerometer Carrier w/ Voltage Regulator
- 3/2 Solenoid Valve
- Pneumatic Piston
- Gear
- Rack
- One Way Bearing

The wooden piece is connected together using super glue - like gorilla glue as well as screwed together. Double stacked nuts, washers, and bolts are used in order to connect mechanical and electrical components to the chassis. The shaft is held in place by the linkage and the ball bearing.





Overall Integration

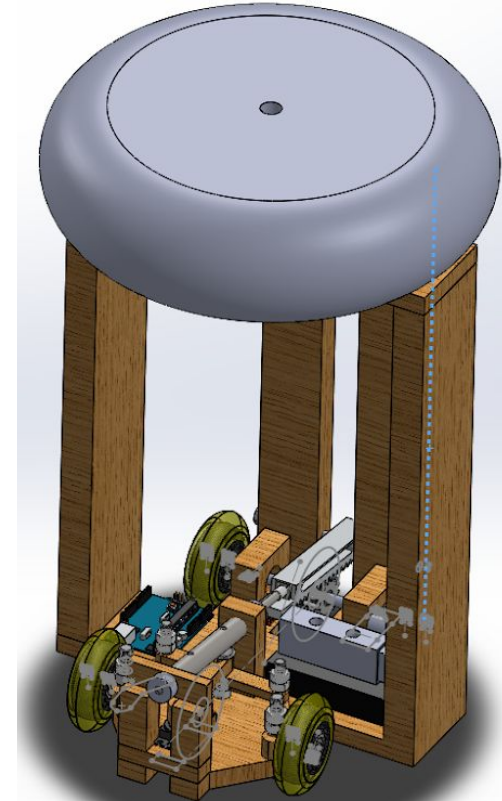




Regulation: *The overall size is compliant within the 12" diameter and 16" height cylinder.*

Components & Dimensions:

- Model is within 12 in Dia. Circle
 - Wheelbase is 6.81 in (173mm)
 - Track width is 6.54 in (166.04mm)
 - Height of the total robot is 16 in (406.4mm)
 - The ground clearance is 0.253 in (6.42mm)
- Wheels diameter is 70mm
- Connectivity of Electrical & Electromechanical components is inside 12 in chassis diameter before firing piston.





Obtained from McMaster-Carr:

- Sealed, Trade No. 608-2RS, for 8mm Shaft Diameter (5972K222)
- 3/8"-24 Thread Size, 2-1/2" Long (92949A875) - Bolts
- 5/16"-24 Thread Size, 1-3/8" Long (92949A861) - Bolts
- One-Way Locking Needle-Roller Bearing Clutch Single Row, for 8mm Shaft Diameter (6392K42)
- Metal Gear - 20 Degree Pressure Angle Round Bore, 2 Module, 15 Teeth (2664N22)
- Metal Gear Rack - 20 Degree Pressure Angle, Rectangular, 2 Module, 500 mm Length (2485N205)
- Grade 8 Steel, 5/16"-18 Thread Size, 5-3/4" Long (91257A120) - Bolts
- Grade 5, 3/8"-24 Thread Size (95505A613) - Nuts
- Grade 5, 5/16"-24 Thread Size (95505A614) - Nuts