Wayward Navigation Rover

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Background Information

- Tasked to create a mobile robot platform to navigate through a garden
- Navigate remotely via cloud and mobile device
- Easy assembly requested (can be built with a kit/at home supplies)
- Design will be open source when completed

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Milestones Achieved

- Created a platform that supports expansion
- Coded an I/O interface to allow users easy access to the robots mobility
- Constructed robot frame from 3D printed parts and PVC piping purchased locally
- Project will be placed on GitHub for open source release after completion

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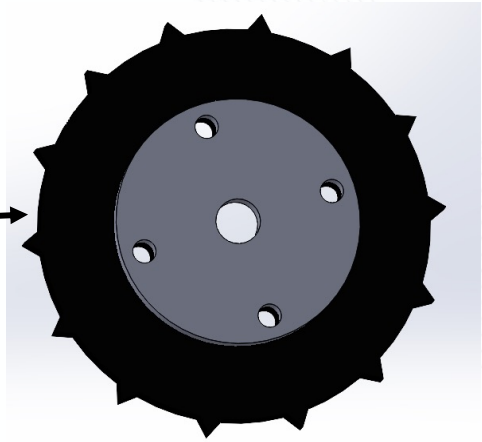
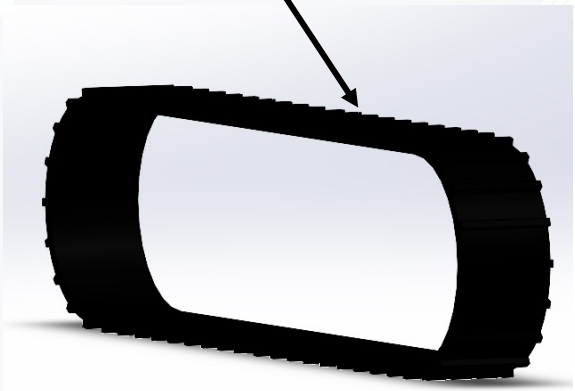
Traction and Drive Gear:

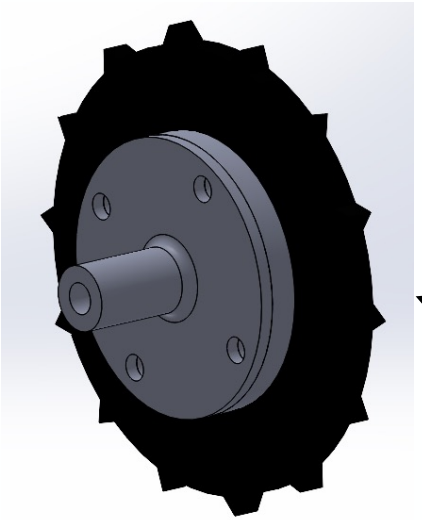
Driven wheel on tensioner



Meshed reinforcement for longevity



SuperDroids Robots Tread



Driving/Driven Sprockets:

Drive Flange attaches to sprocket across 4 bolts

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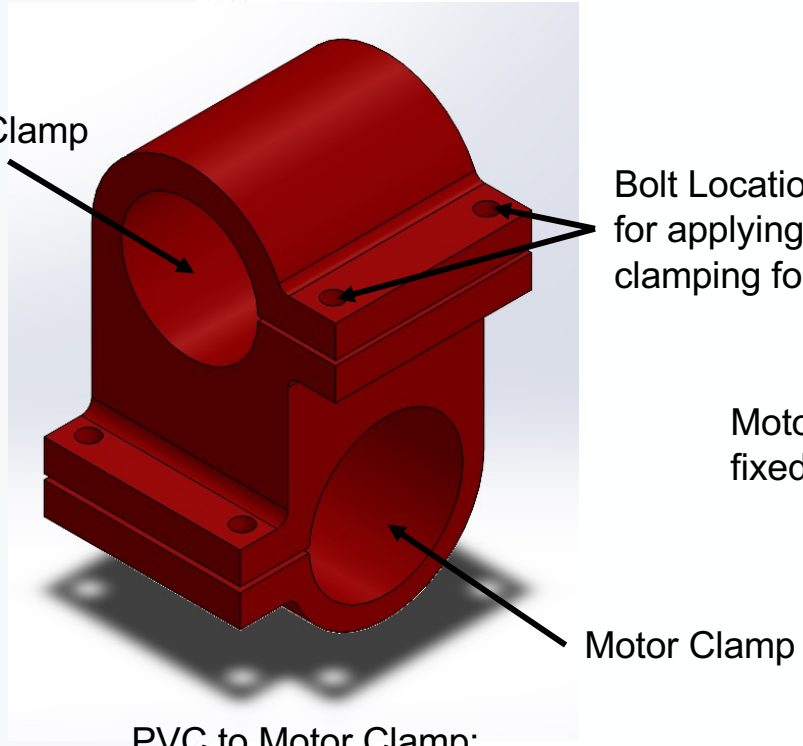
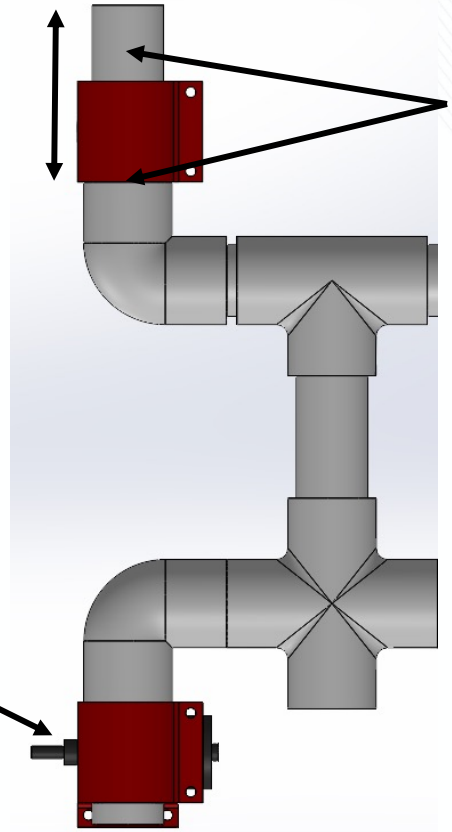
Tensioning System:



PVC to Motor Clamp:



Tensioning System:

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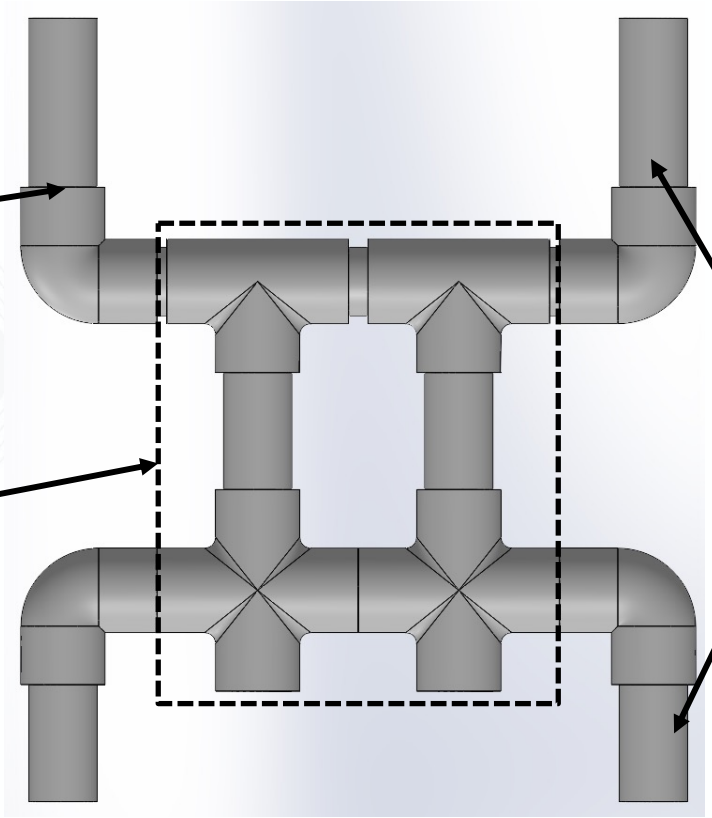
Chassis Design and Structure:

All components held in place by PVC adhesive

Boxed Center section for Rigidity



Outer structure attachment points for suspension system

Main Frame Structure:

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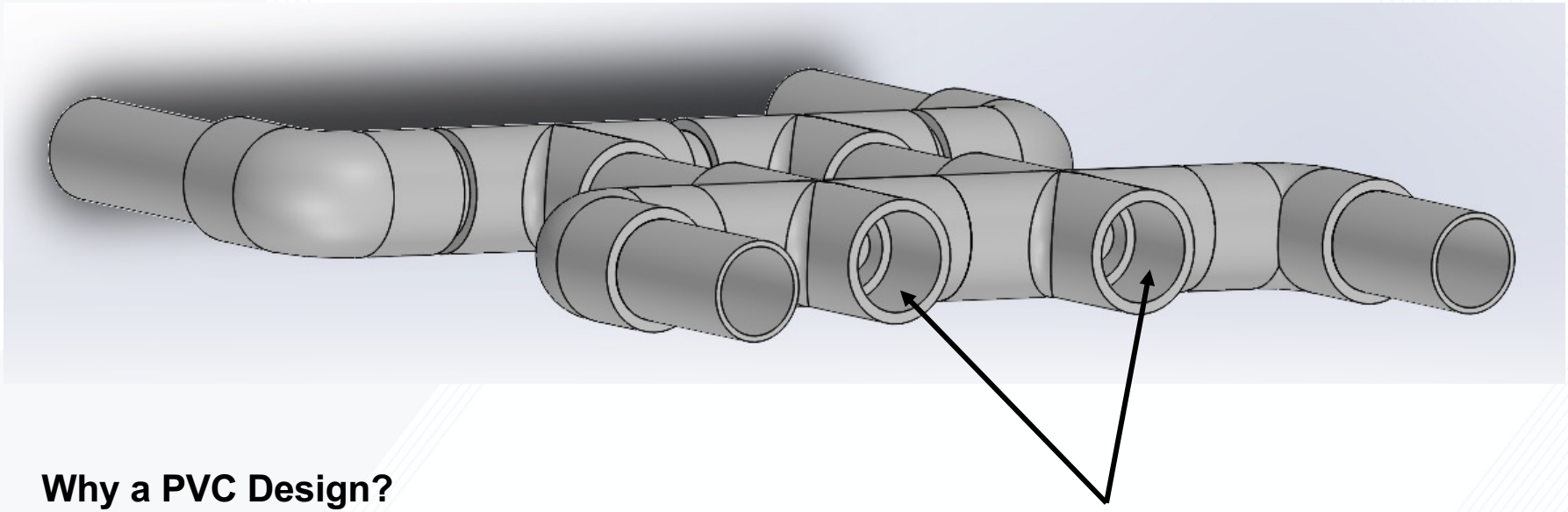
Chassis Expansion:



Open Joints for easy addition of components

Why a PVC Design?

- Modular
- Interchangeable Parts
- Expandable
- Cheap and easily accessible

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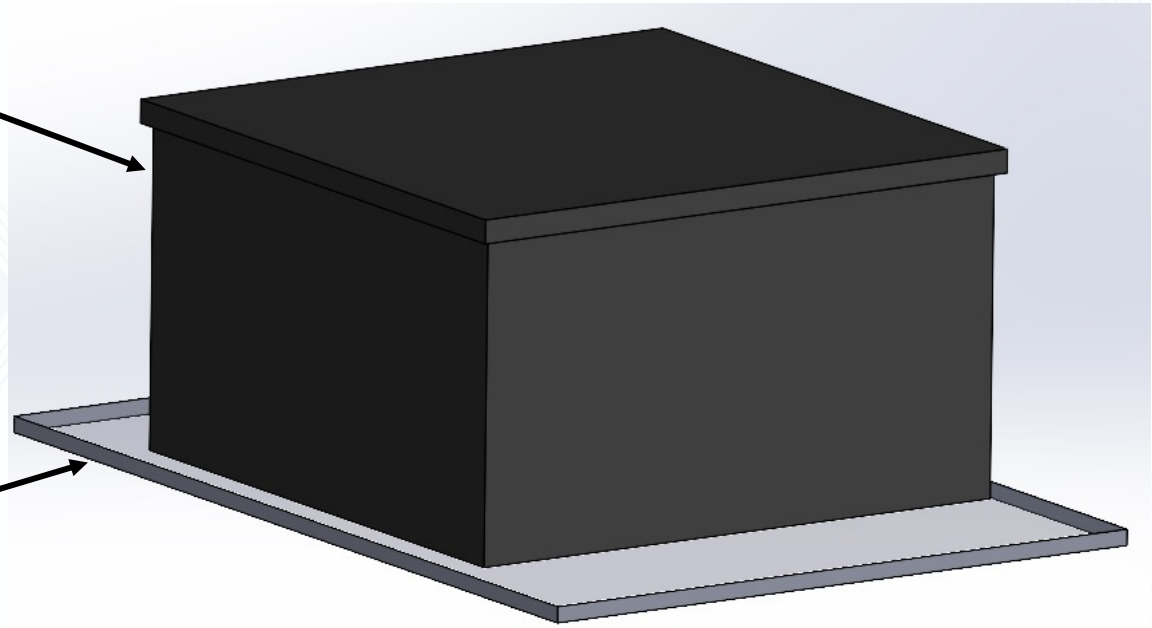
Electronics Housing:

Weatherproof Conduit Box for housing all support electronics

Clear Acryllic base plate for added rigidity and mounting surface for electronics housing



Base Plate and Electronics Housing:

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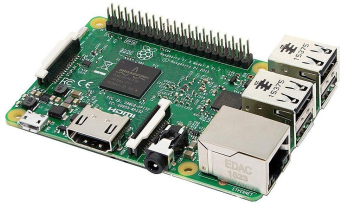
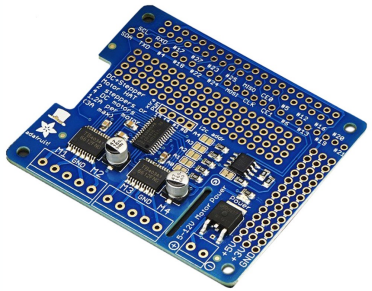
Electrical Components

- Raspberry Pi
  - 5V input power from buck converter
- Adafruit Motor Hat
  - Controls up to 4 brushed motors
  - Stackable for future expansion
- DC Motors
  - Brushed
  - 12V, 0.5A
- Regulated Buck Converter
  - Set at 5V to power Raspberry Pi
- 12V LiPo Battery
  - Powers motors and Pi in parallel
- Power Switch





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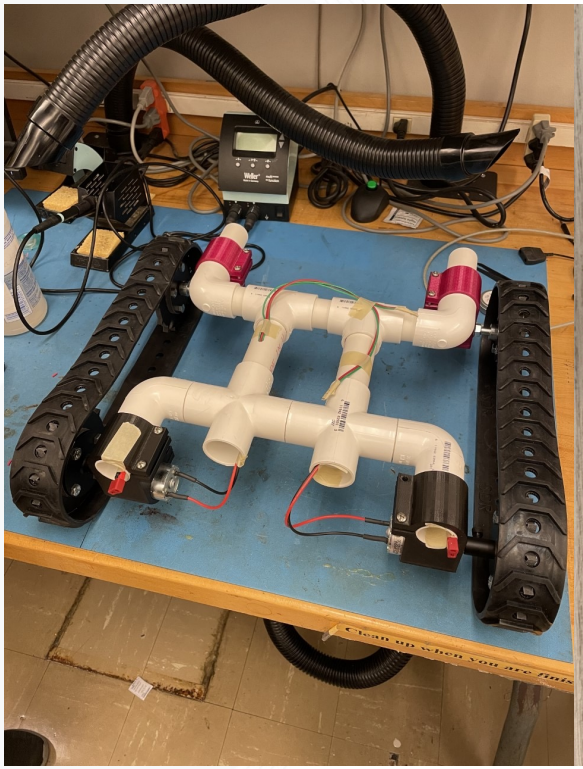
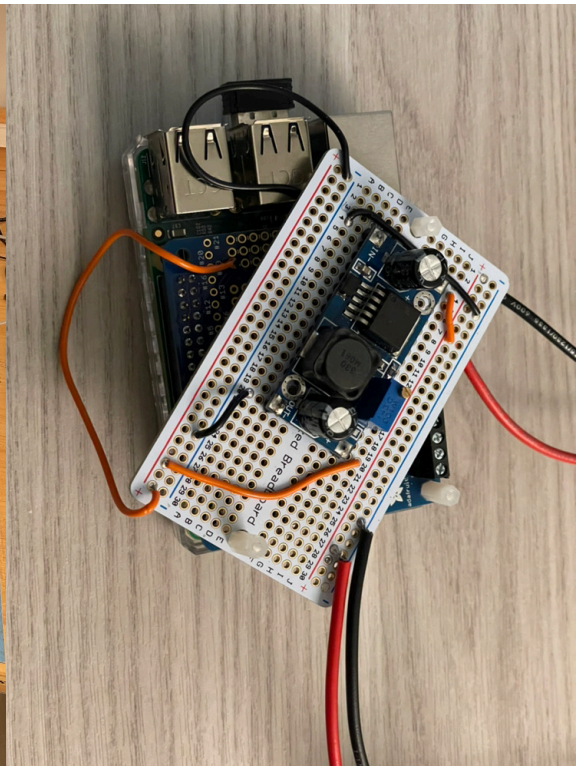
Electrical Assembly





- Wires routed through the frame for weather resistance
- Boards stacked and mounted to optimize space inside electrical housing

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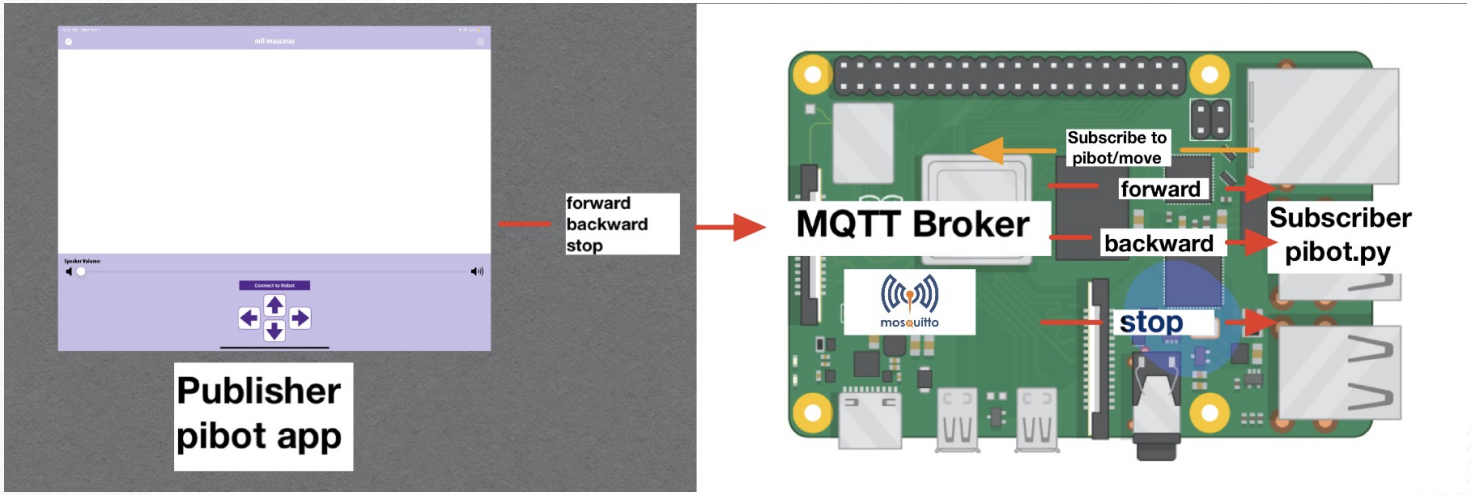
Software

- MQTT
  - A low over-overhead way to send and receive messages
  - It takes up very little space for devices and very bandwidth when messages are sent back and forth



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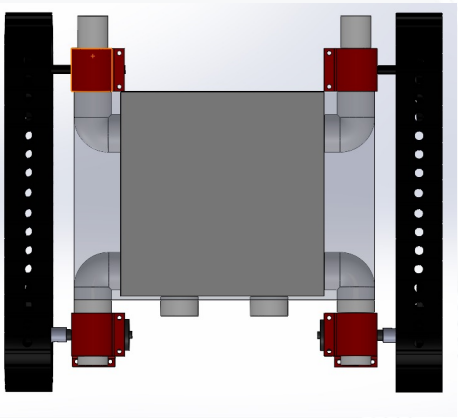
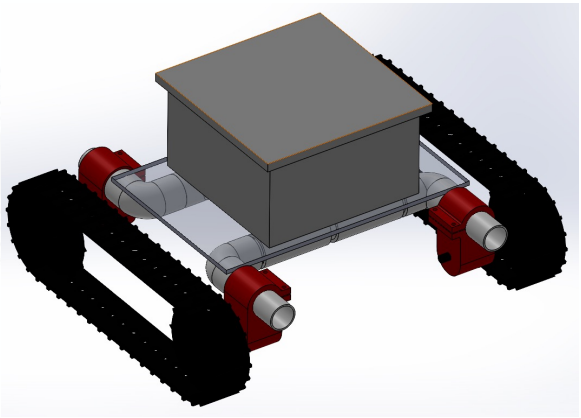
Final Result:

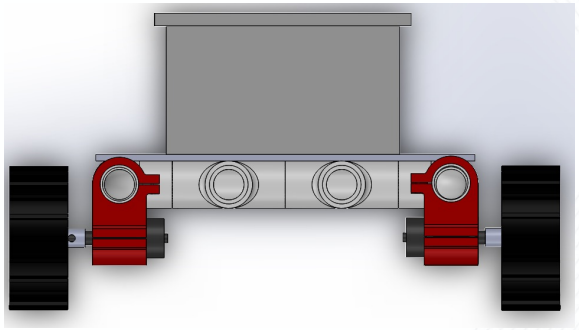
Top:



Isometric:



Front:



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Future Improvements:

- Incorporate camera for remote navigation
- Add a solar battery charger for increased autonomy
- Update suspension system to dual sprocket drive gears
- Expand robot chassis to support peripheral mounting
- Add additional protection against the weather/outdoors
- Upgrade motors in order to tackle more obstacles

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Questions?

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