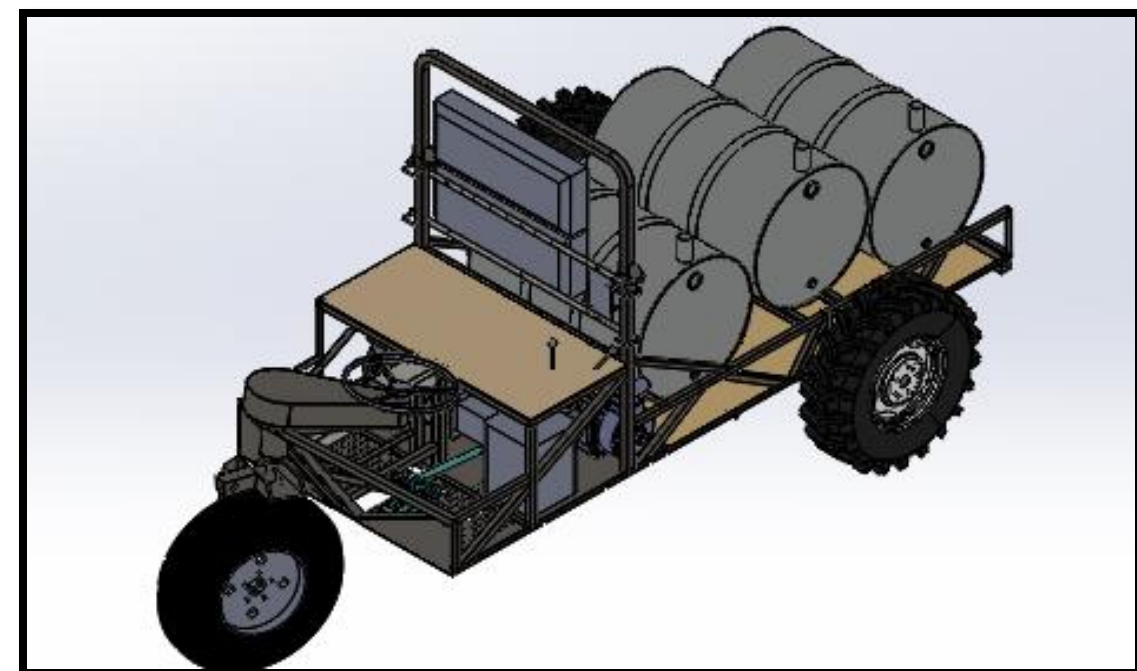


Abstract

Problem: Under-developed countries need cost effective, capable, and robust vehicles to transport building materials, agricultural goods, and water.

Project Description: Design and build a cost-effective capable vehicle that can transport 165 gallons of water and be able to compete in the BUV competition, an 8-hour endurance race hosted by University of Cincinnati. The basic utility vehicle (BUV) is a vehicle designed to be used in under-developed countries to transport goods. These vehicles are built from the ground up to fit specific needs making them more cost effective than stripping out a production vehicle.

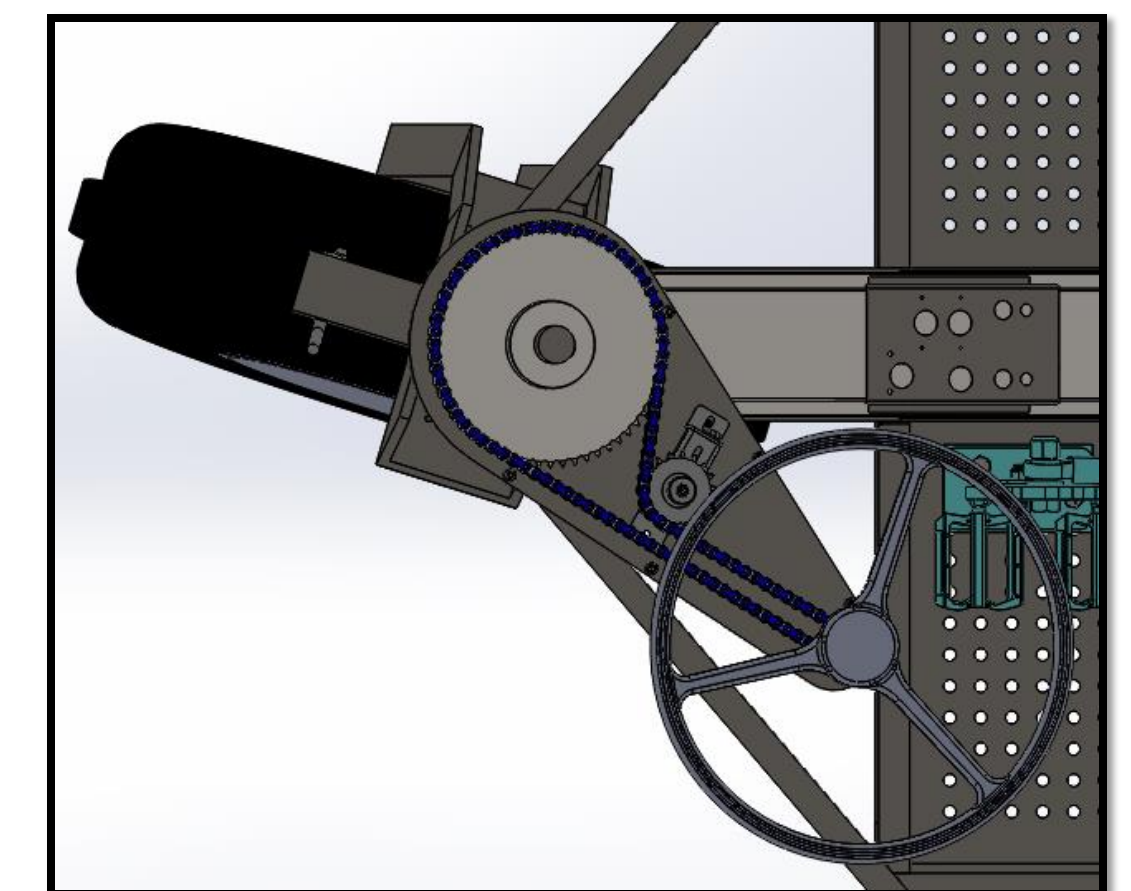
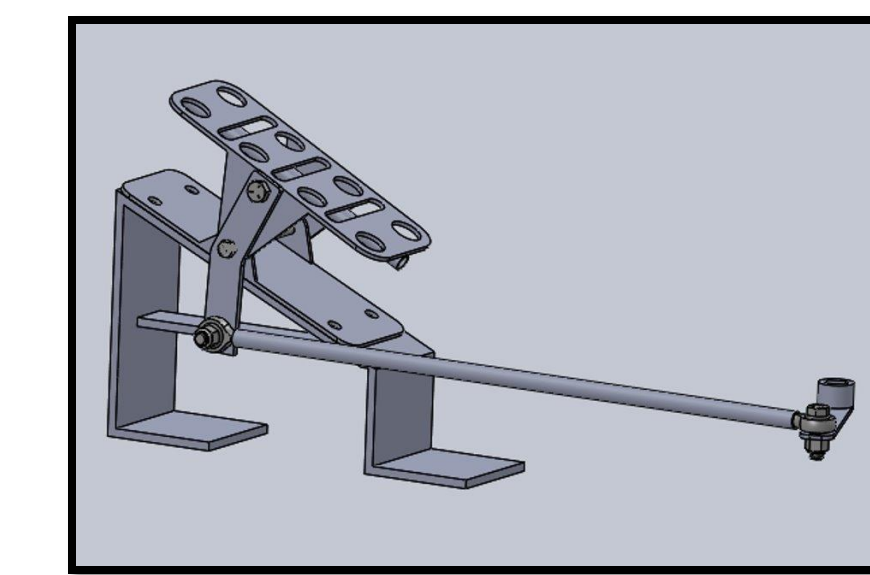
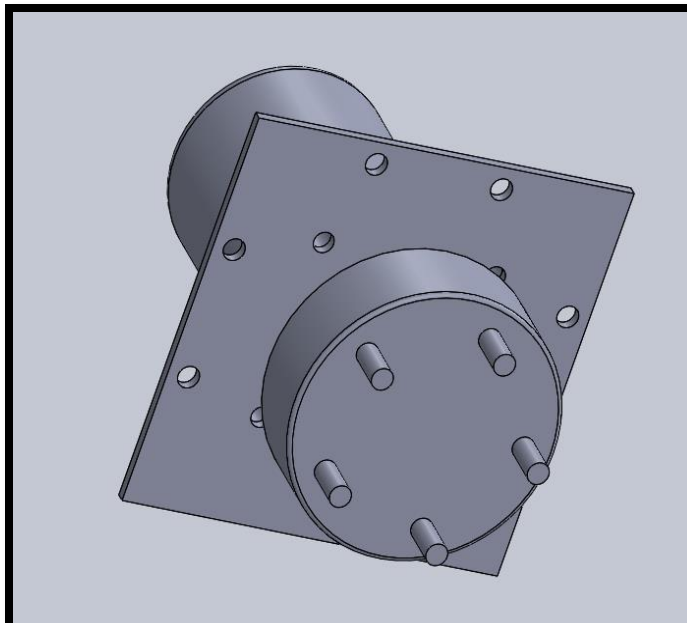
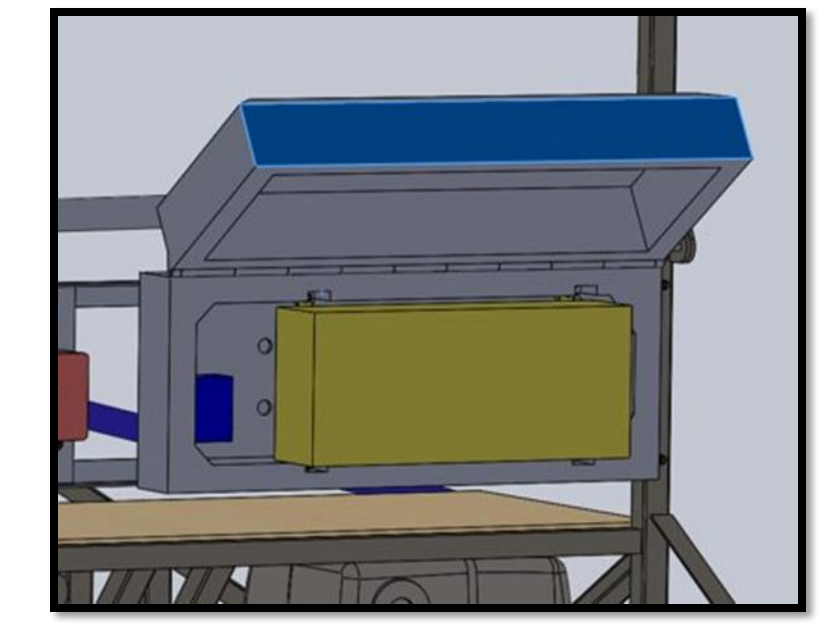


Customer Needs and Requirements

1. Trunnion Arm and Pedal redesigned to provide full range in swash plate by actuating 15 degrees in both the forward and reverse direction. The pedal assembly must be able withstand the force of 200 pounds applied by the driver.
2. Frame fixed to withstand the weight of three 55-gallon drums filled with water (1376 lbs.) running over rough terrain.
3. Steering needs to be made more ergonomic so it will not hit the driver.
4. Electrical connections and wiring need to be shielded for safety.
5. Barrels easily removable in less than 15 minutes
6. Keep water splashing out the top of the barrels while driving the BUV.

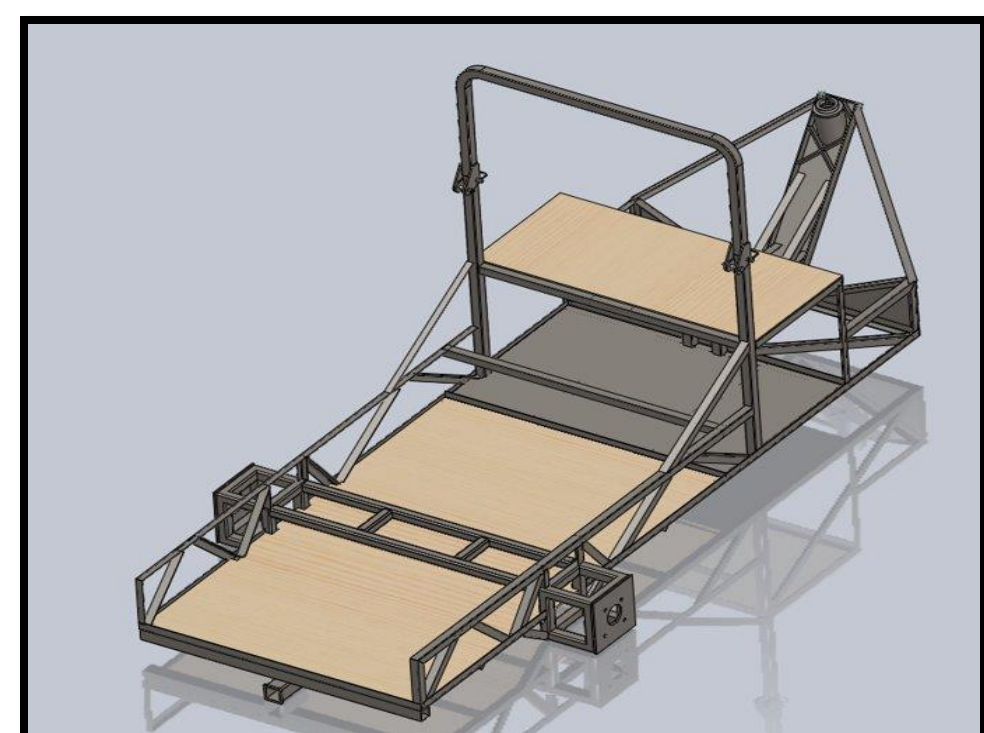
Concept Selection

- Rear Frame
- Front Frame
- Pedal and Linkage
- Water Pump
- Steering
- Inverter Box and Electrical



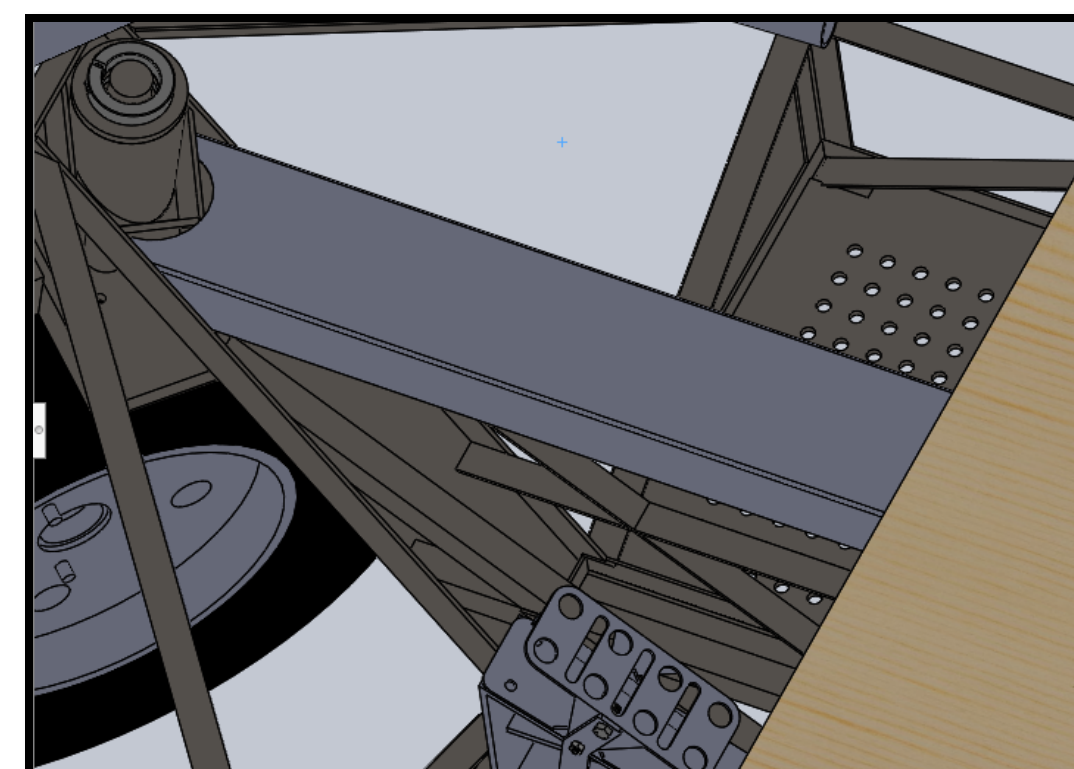
Design Solutions

Rear Frame



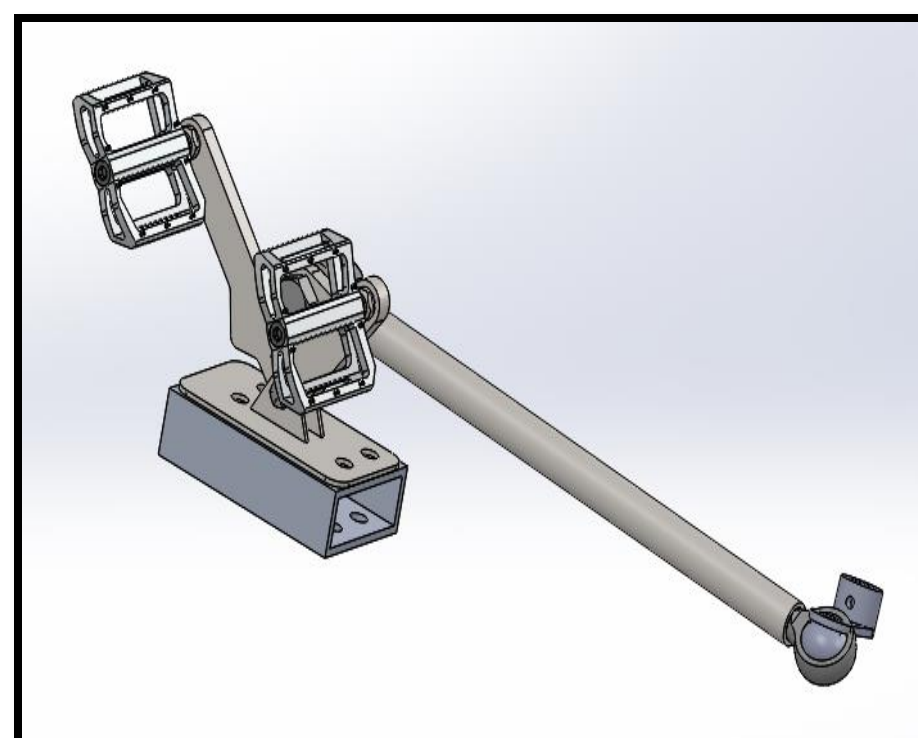
- Rear supports remove negative camber from the rear wheels.
- Reduced rear maximum deformation to ¼"

Front Frame



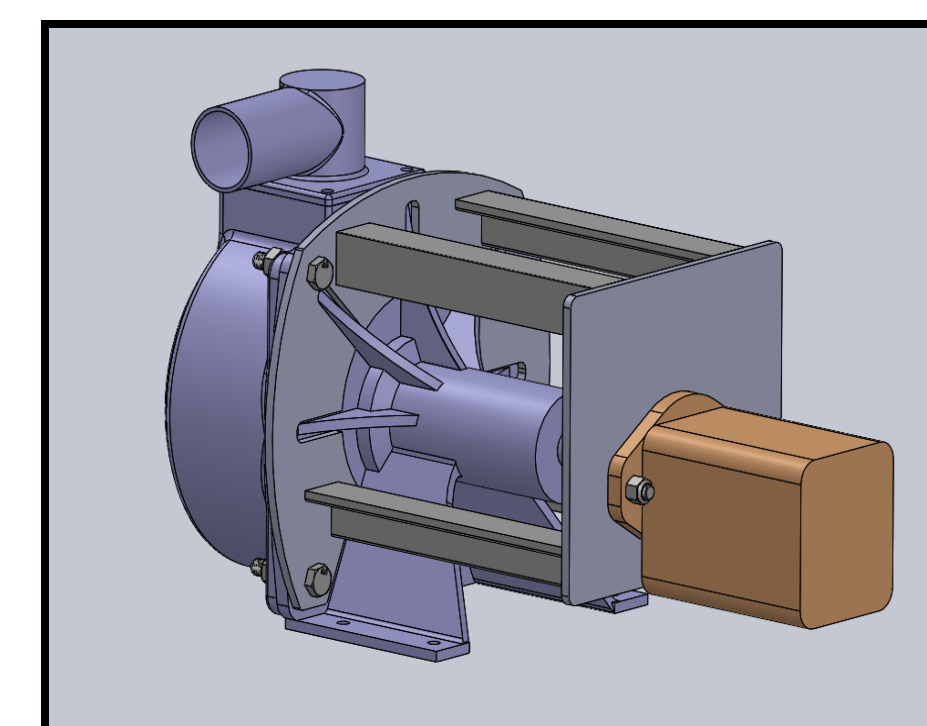
- Front stiffener prevents prior deformation of the front frame

Pedal



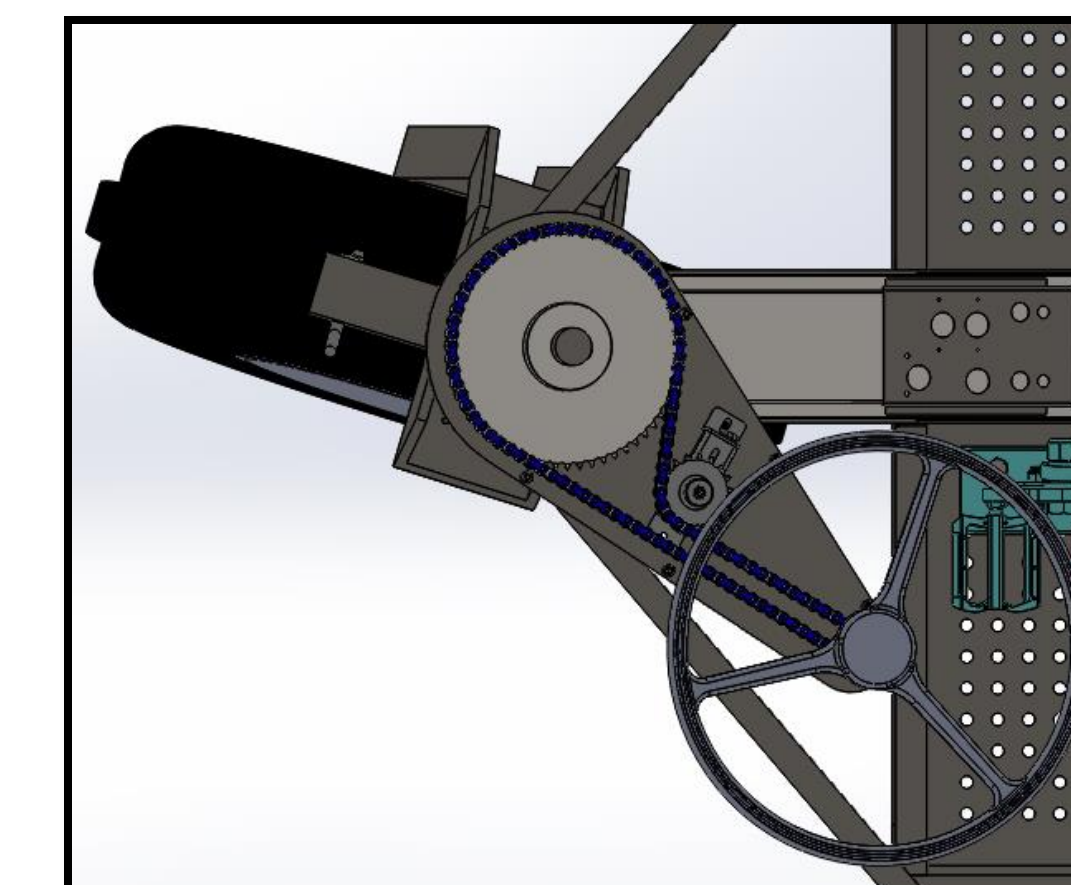
- A new pedal was designed and manufactured. This strengthened the pedal and made driving the BUV easier and more comfortable.

Water Pump



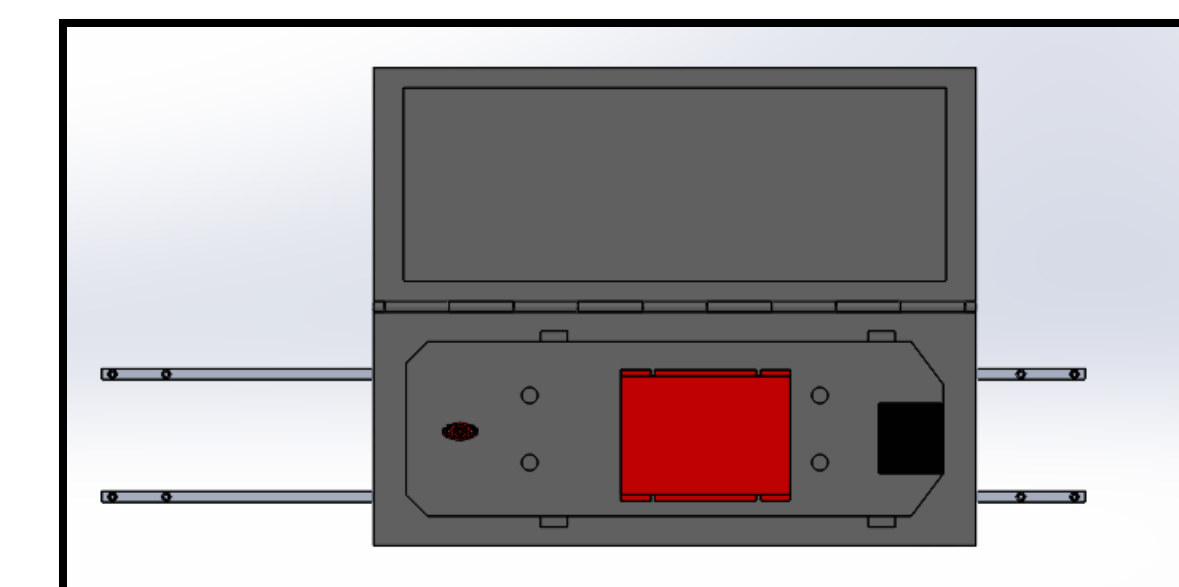
- A new water pump mount alleviates vibrations in the pumping system

Steering



- Steering mechanism increases mechanical advantage and improves cockpit ergonomics

Inverter Relocation and protection



- Weatherproofing of electrical system and improve instrument visibility

Manufacturing and Testing

Pump Testing:

- Measured total run-out of completed pump mount (Shown Right)



Pedal Testing:

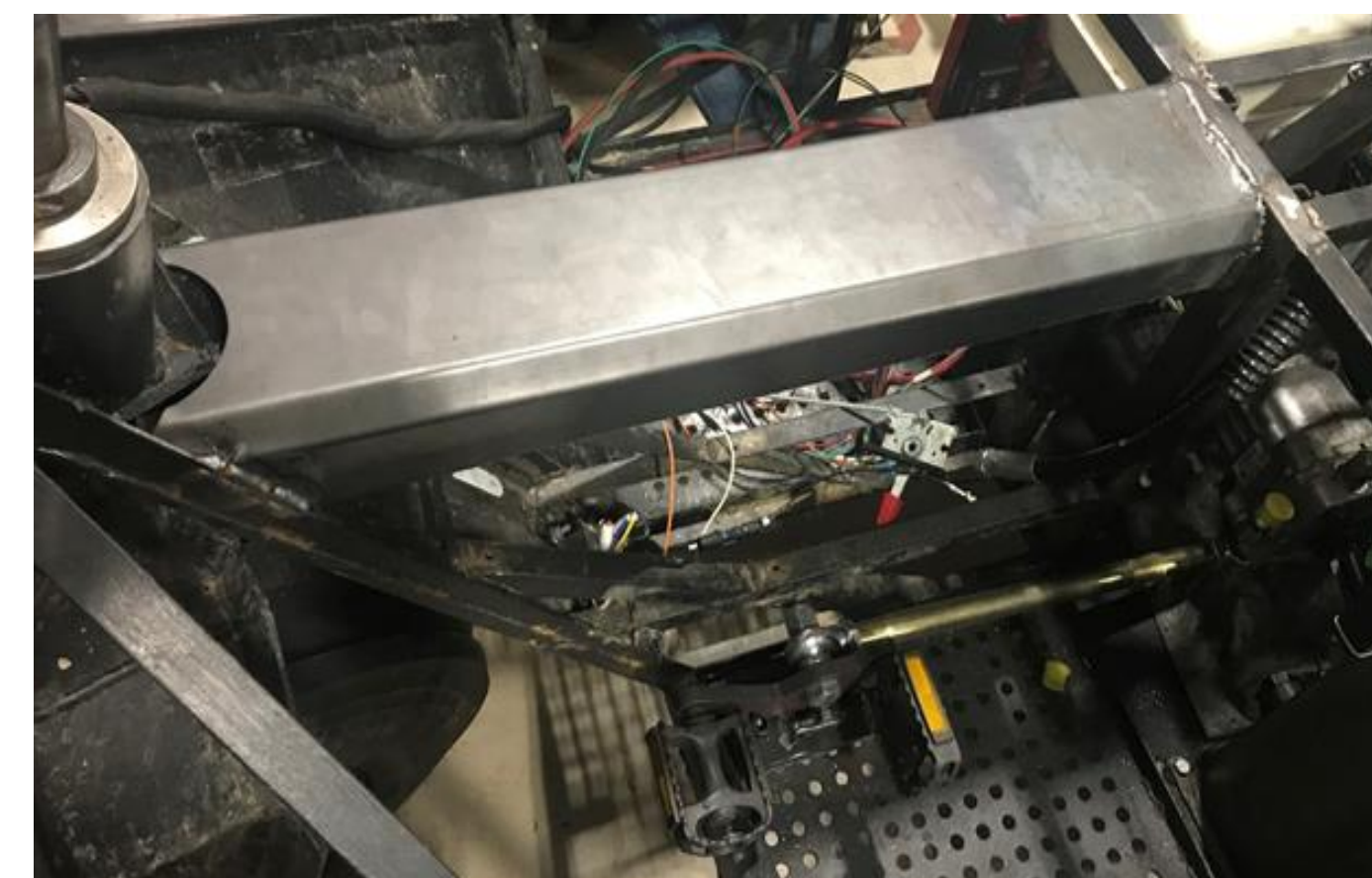
- The pedal was tested to see if was able to achieve full actuation



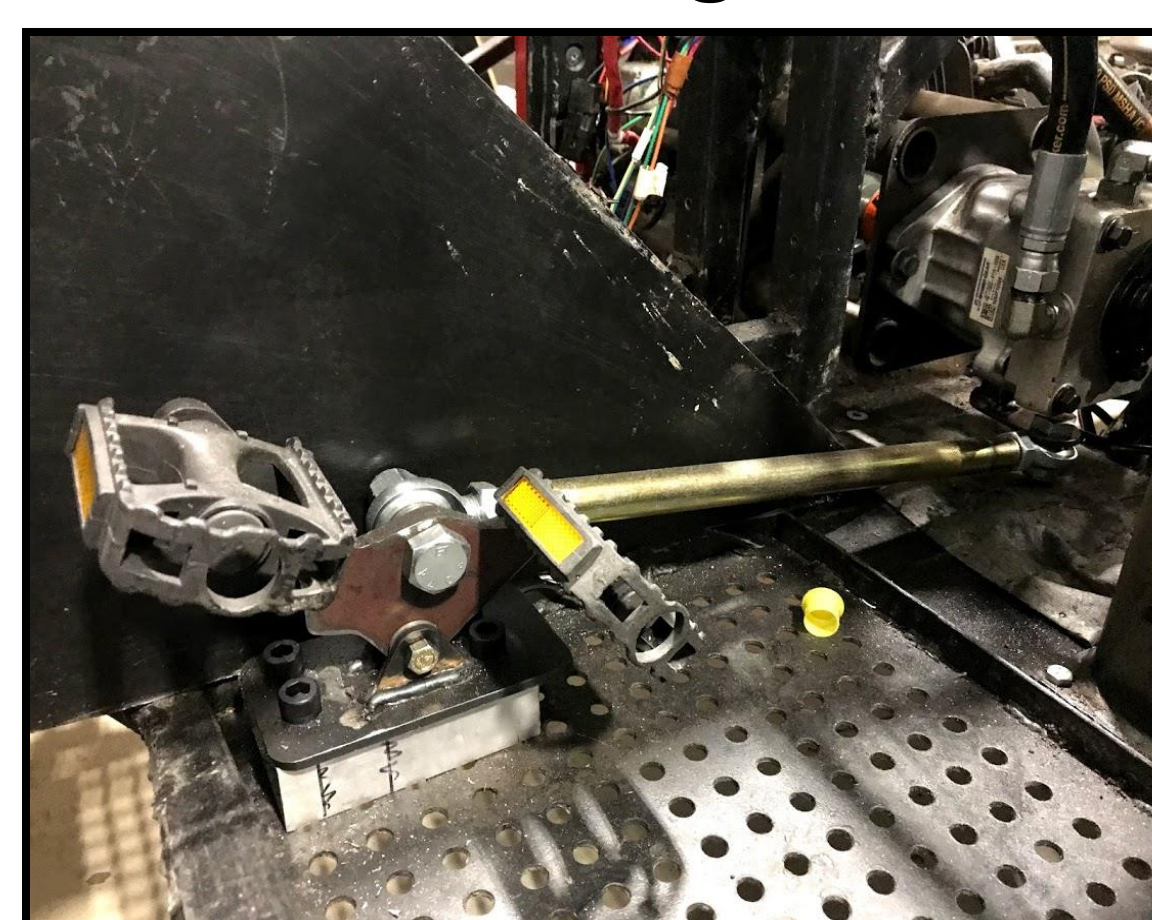
Rear Frame



Front Frame



Pedal and linkage



Water Pump



Acknowledgments

Bike and Soul – Angola, IN



Disacknowledgments

SARS-CoV-2