RoverPi – Wildlife Observation Rover

Team: Reece Brownell, Cory Majek, Katie Mann, Lorena Pritchett, John Smith, Jaron Zell

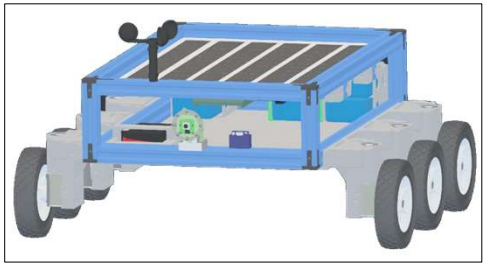
ME 4371
Instructor: Jeff Hanson
Faculty Advisor: Jacob Stephens
Project Sponsor: TTU Physical Plant

Mission Statement:

Design and fabricate a semi-autonomous wildlife rover capable of traversing diverse terrain with artificial intelligence image detection to track wildlife.

Design:

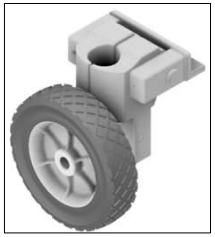
Modular 1” aluminum extrusion frame assembled with SLS printed Nylon 11 corner brackets. Sensor suite records local environmental conditions and location. 6-wheel torsional spring suspension system for various terrain. Pan/tilt camera module allows full field of vision. Raspberry Pi equipped with AI image detection software, capable of detecting objects and animals.



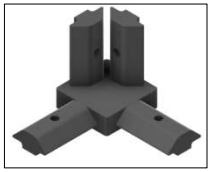
Full Assembly

Mechanical:

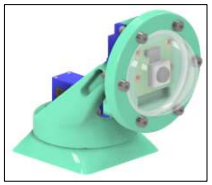
- Proprietary torsional suspension system



- Custom Nylon 11 printed corner brackets

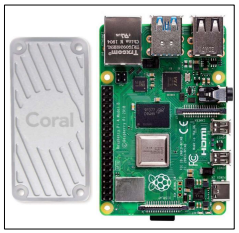


- 2-DOF pan/tilt camera mechanism with protective dome



Electrical:

- Raspberry Pi 4 computer with Google Coral TPU
- Custom designed circuit board (PCB)
- 30W/12V solar panel
- Environmental & positional sensors
- Xbee-PRO 900 HP Wireless control and communication



- 6, 5200mAh batteries in series enables operation for over 6 hours

Manufacturing:

Suspension
- Milled aluminum axis rods & L-brackets
- Wire EDM cut aluminum static spring retaining lugs
- 3D printed motor mounts (PETG)
- Custom motor shaft to wheel adapters

Frame
- Cut & milled 1” aluminum frame rails
- Cut vertical & bottom plexiglass panels
- 1/64” neoprene weather sealing
- SLS 3D printed Nylon 11 corner brackets

Electronics
- Soldered PCB assembly
- 3D printed pan/tilt camera mount and electronics mounts

Custom PCB: