# Robotic Gopher Tortoise Scope

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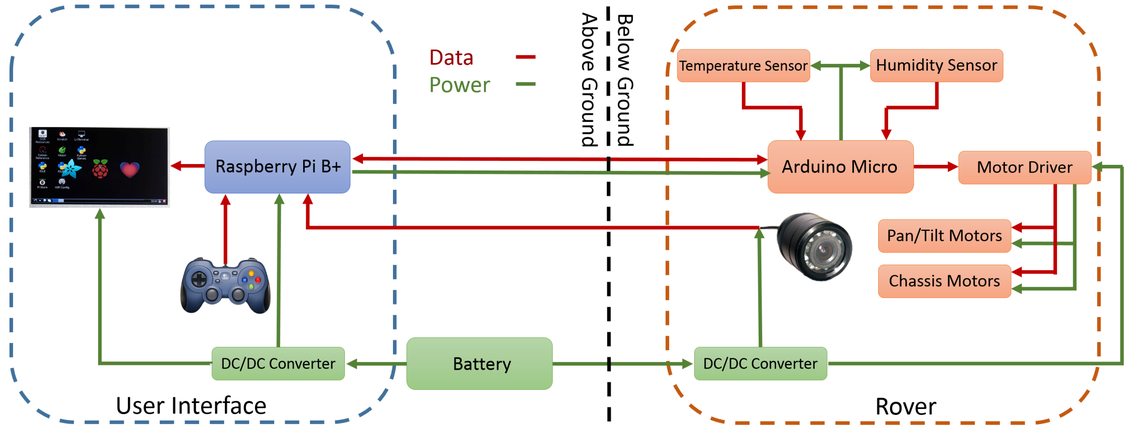
## Abstract

The main goal of this project is to design a scope that is more durable, mobile and automated than the current system (shown below). The system is to include an infrared camera with pan and tilt capabilities, treaded tracks, and video and image recording capabilities. The rover currently weighs 0.157 kg, runs off of a 12V power source, and can scale a 45° incline.

## Background

Tall Timbers Land and Research Conservancy focuses on the study of fire dependent ecosystems. A species they study is the gopher tortoise, which is a keystone species whose burrows can be up to 15 meters long.

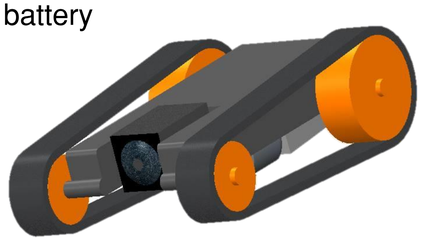
*The current scope used by Tall Timbers is not water proof and is difficult to operate.*




*A block diagram illustrating how the major components of the scope will fit together.*

## Selected Design

- The user interface will consist of a screen, gamepad, and Raspberry Pi B+
- Infrared camera with pan and tilt ability
- Stable planar chassis with treaded tracks
- Durable 15 m tether (guide-wire, power, and communication)
- Arduino Micro manages temperature and humidity sensor, and motors
- Lightweight high energy density lithium-ion battery



## Future Work

- Build the pan and tilt system that has been designed for the camera
- Create the plexiglass housing for the Rover
- Weatherproof the Rover and User Interface
- Capture images and record video using the gamepad controls
- Test the design in the field using a mock burrow
- Design a case to transport and store the scoping system
- Explore reproducibility of the final design

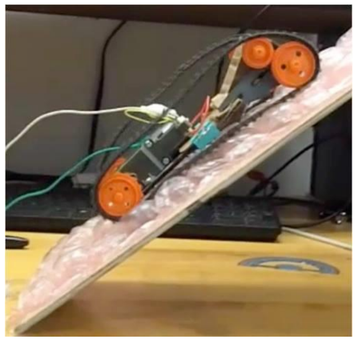
## First Prototype

Important Specifications

- 4 cm tall, 11 wide, 16 cm long
- Wideview colored infrared camera with 7 IR LEDs and night vision range of 6 m
- IR transmitting plexiglass
- 3 V twin motor gearbox

Testing

- Installed a Linux-based operating system onto the Raspberry Pi B+ and were able to read commands from the gamepad
- Demonstrated that the rover could climb inclines as step as 35° and 45° when bubble wrap was added for traction



- Tested camera's IR visibility through plexiglass. It was found that the angled plexiglass (shown bottom right) had less glare than the upright orientation (shown bottom left)