

Problem Statement

In recent attempts, biologists have had issues with being able to physically look and measure further than 3 feet deep into a pygmy rabbit burrow using hand operated probes with limited reach. All other current methods have produced the same results. The need is for alternatives to design a better method/device to explore the burrow systems.

- ### Project Goals
- Ability to Explore Entire Burrows
 - Visual Documentation of Burrows
 - Volumetric Measurements
 - Mapping Burrow Systems

- ### Constraints
- Limited size due to burrow dimensions
 - 4.3-inch average max burrow entrance diameter
 - Burrow structure has possibilities of having sharp corners calling for a shorter design in addition to a small diameter
 - Wireless communications and data retrieval are impractical due to soil conditions

- ### Solution
- User-operated/driven
 - Designed to fit in less than a 3-inch diameter hole
 - Onboard power supply
 - Powered by twin motors on skid steer design
 - Multiple range finder sensors
 - Onboard computer
 - Front and rear camera system
 - Onboard Digital Video Recorder
 - Coaxial "tether" line for live composite video feed and signal communications



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Project Learning

Lemhi
Area of Research

- Smallest rabbit species in North America.
- Sagebrush dependent species that uses areas dominated by big sagebrush.
- Females dig natal burrows, separate from their residential burrow systems.
- In 2003, the United States Fish and Wildlife Service listed the distinct population of pygmy rabbits in the Columbia basin as endangered
- Switching among burrow system is a common behavior for both sexes, as well as the overlap of home ranges

About the Pygmy Rabbit...

Average

- Burrow Hole Diameter: 4.3-inches
- Burrow Depth: 3-feet
- Burrow Length: 30-feet
- No. of Entrances for each Burrow System: 3 - 7

Design

iMX233-OLinuXino-NANO Computer

- iMX233 ARM926J processor at 454Mhz
- 64 MB Ram

SparkFun VL6180 Range Finders

- 5-inch absolute range
- Tested up to 10-inches

Tenergy 11.1V 1350 mAh Lipo Battery

pz-2 mini FPV Camera with DVR

A.L.I.C.E.

Powered by Twin Pololu 115:1 Gear motors

Custom-Built Chassis made from Aluminum and Brass

Dual Motor Skid Steer Driven On 22 Tooth Track System