Multi-Sensor Bio-Logging Camera Tag

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Introduction

Bio-logging is a data acquisition approach to collect challenging information from direct observation of long-distance traveling animals or animals that are out of boundary of visibility. Bio-logging encompasses the use of usually compact animal attached electronic tags to collect information such as foraging behavior from videos, energy budgets and behavior patterns from accelerometers and environmental data such as pressure (depth) and temperature.

Objective

Design a cost-effective, waterproof, and easy to integrate multi-sensor bio-logging camera tag platform with enough versatility to replace and integrate sensors of choice.

System Overview

- Two camera views allow up to 360 views of a tagged animal
- Platform records sensor data and videos on bootup
- System can be turned on and off with magnetic switch
- 6.7 Ah battery allows for system recording to last up to 11 hours
- IR light sensor modules allow for recording in the dark with minimal affect on natural behavior

Hardware

- StereoPi- Stereoscopic camera board based on the Raspberry Pi Compute Module which allows attachment of two camera modules to the compute module.
- Sensor PCB- Small 0.75x 2” board that integrates GPS, accelerometer/gyroscope, light sensor and a pressure transducer (pressure and temperature data)
- IR light sensor modules with light sensors that turn IR lights on below set threshold
- Two Raspberry Pi camera modules with no IR filter for night vision

Mechanical design concept:

Potted version:

- Integrates potted camera housings
- Form-factor will allow for a more hydrodynamic and compact design to decrease drag on the animal
- StereoPi USB Remote Network Driver Interface Specification can allow network connection with the board through USB pins to transfer files from system
- Pins will also be integrated for recharging batteries

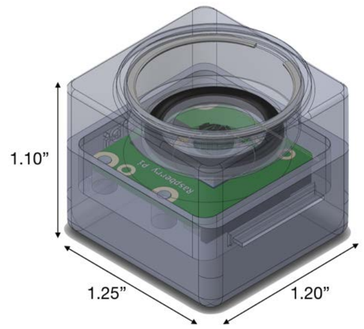

Figure 1. Camera Housings for potted version

Housing version:

- Housing will have two dome end caps for cameras to record forward and behind animal
- Lights will be integrated outside the cylinder housing to prevent scattering of light inside the dome
- Sensor board will be placed so it has access to light for the GPS and light sensors. The pressure sensor which plugs into the board also needs to touch the water

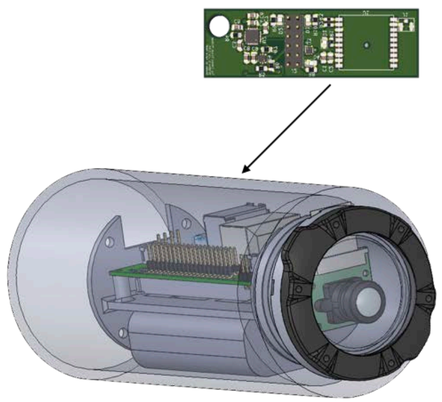

Figure 2. Rough concept of placement of hardware in housing. The housing won’t simply be cylindrical since the lights and the board need to be properly waterproofed. Sensor PCB is also shown in the image.

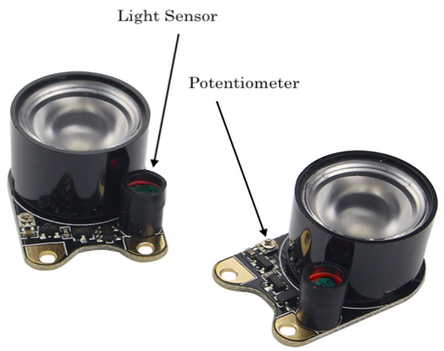

Figure 3. IR LED Modules with light sensors

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