



# ADVANCED IMAGING DRONE

*For the Birds*

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## Background

The National Oceanic and Atmospheric Administration (NOAA) is currently tracking the population of marbled murrelets, an endangered species of bird, in the coastal forests of Oregon. Population tracking is done by having researchers climb roughly 300 feet to the forest canopy to check potential nesting sites. In order to move away from this slow and dangerous task, researchers need a drone which can reliably navigate the dense forest canopy.

## Overview

The goal of this project was to develop an unmanned aerial system that could successfully navigate the forest and scan trees to locate bird nests. Creating such a system was essential in order to make the population tracking process safer and more efficient. Our system provides the pilot with far more feedback than they were previously working with, and allows them to fly confidently through the crowded forest canopy. Future goals for this product include integrating autonomous function to streamline the process.



Full assembly of components on a DJI Matrice 100 drone.

## Hardware / Key Components



### 1 Thermal Camera

Thermal camera mounted on single axis gimbal gives a pilot the ability to scan a tree for nest heat signatures



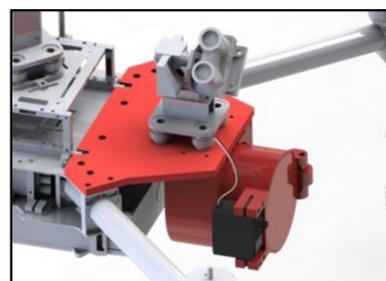
### 2 Stereo Vision System

Visual camera (center) for standard video, and stereo vision camera (sides) to provide depth data for areas around and below the drone.



### 3 Ultrasound & LIDAR

The Ultrasonic sensor warns pilot of nearby obstacles above the drone. The Sweeping LIDAR sensor then generates a map of the environment above the drone.



### 4 Parachute

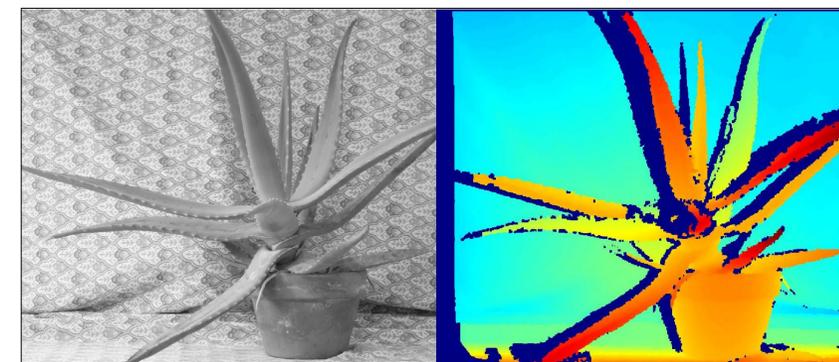
Parachute mounted on the drone will bring the drone down safely in the event of a crash or loss of power.

## Thermal Camera Feed



Thermal overlay of bird's nest in forest canopy environment.

## Stereo Vision Depth Map



Test using stereo imaging system to generate depth map.

## Sweeping LIDAR Map



Point cloud generated using sweeping LIDAR system.

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