

# Special Thanks

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# GAME OF DRONES

# Team Members

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## Problem

Mapping unknown areas efficiently and effectively serves many purposes, whether it's for geology or even for the military. However, creating maps of unknown territories is currently either:

- *Expensive* - LiDAR sensors that provide mapping capabilities start from \$4,000 and can go up to \$75,000.
- *Lacking Details* - Other mapping methods like photogrammetry can't provide as many details as LiDAR.

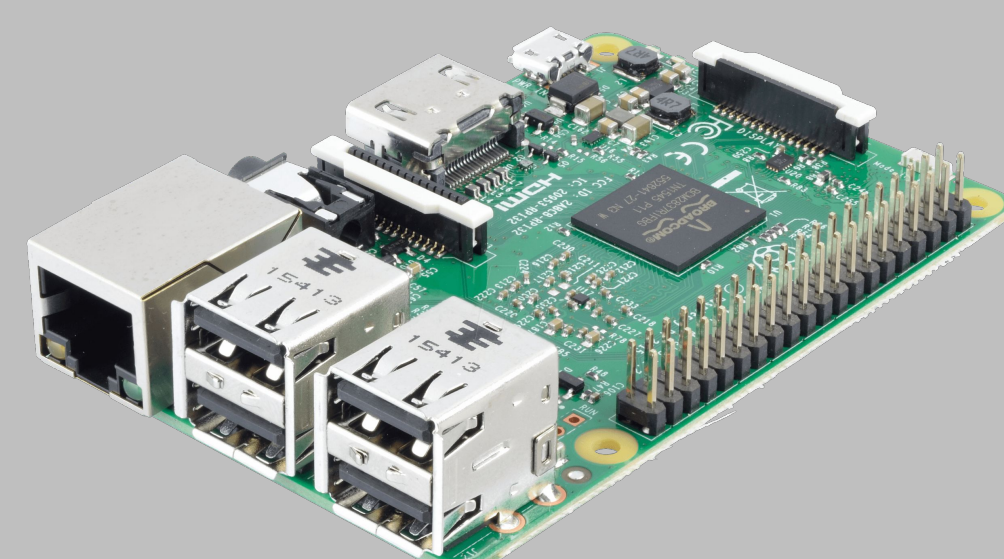


Velodyne LiDAR \$4,000

## Our Solution

Our solution allows flexible and accurate mapping but is much cheaper than other solutions. Other LiDAR mapping systems range from 10 to 100 times more expensive than ours. This is done by:

- Using a drone, Raspberry Pi, and a cheap, but limited LiDAR sensor
- Generating the map by using telemetry information to transform our 2-D LiDAR data into an accurate 3-D map



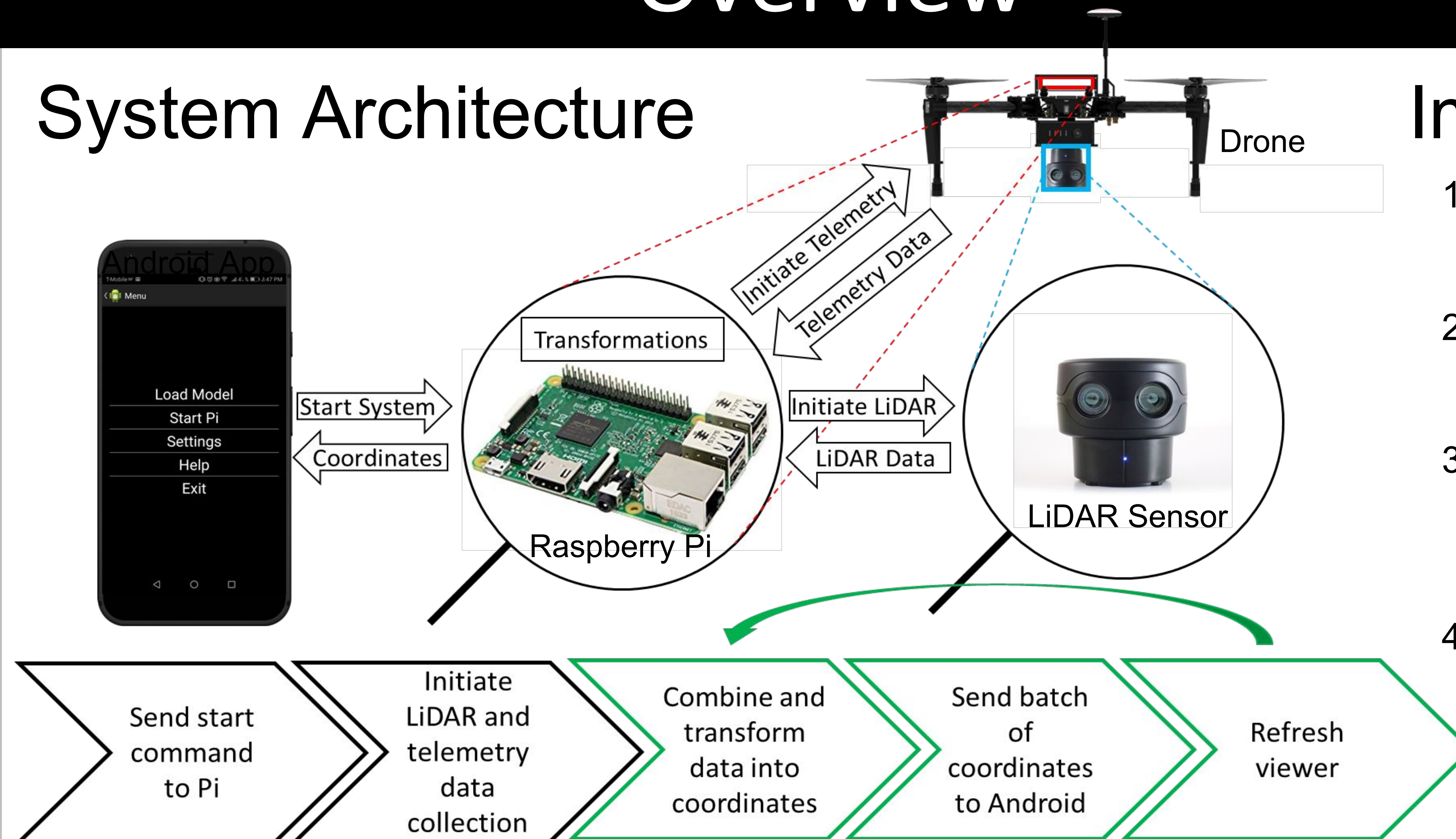
Raspberry Pi 3 \$35



Scanse Sweep LiDAR Sensor \$350

## Overview

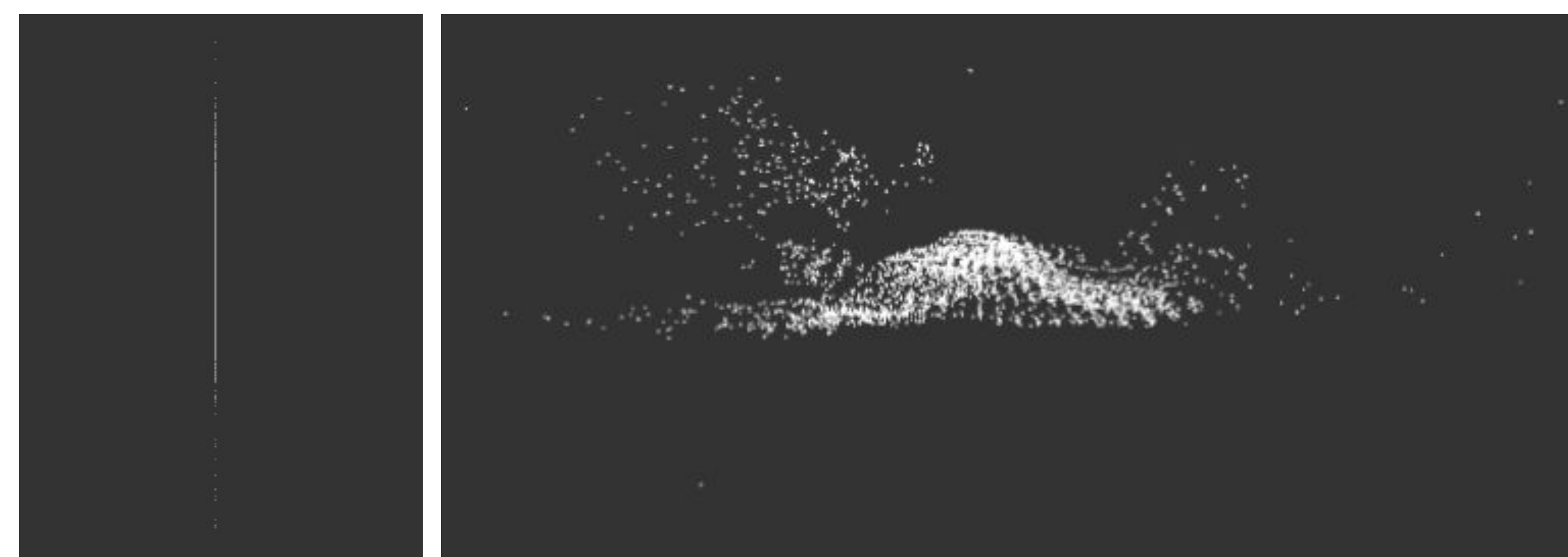
### System Architecture



### Implementation

- 1) 2-D LiDAR points from the sensor are sent to the Raspberry Pi.
- 2) Telemetry data (yaw, pitch, velocity, etc.) are sent to the Raspberry Pi.
- 3) Raspberry Pi transforms the 2-D LiDAR points with the telemetry data to create a 3-D map.
- 4) Raspberry Pi sends the map packet by packet to the Android App in real-time.

### Transformations



Area scanned by LiDAR sensor onboard drone

Apply drone position and angle transformations

The LiDAR point data returns a 2-D array of points beneath the drone. By taking into account the position, roll, pitch, and yaw of the drone, we're able to transform the points from a 2-D array of points into a 3-D map of our target area.

