Game of Drones

A [Top Secret] Northrop Grumman Project

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Our Project

Our goal is to use a drone and third-party components to build a tool that is capable of creating a 3D model of a specified area.

The essential hardware components of our project include:

- Matrice 100 developer drone by DJI
- Sweep V1 360° Laser Scanner
- Raspberry Pi 3
Hardware Analysis (SWaP-C Analysis)

**Size** - Limited space on DJI Matrice 100

**Weight** - max 3600g payload = ~600g components

And

**Power** - Battery must support Raspberry Pi, sensor, and drone.

**Cost** - As cost efficient as possible while maintaining quality.

(biggest bang for your buck)
System Architecture

**DJI Guidance:**
- Weight: 64g (core) + 43g x 4 (sensors) + 11.6 (VBUS cable) = 247.6g
- Power: 12W Max power, 11.1 ~ 25V

*Note: If we fly in clear skies with no obstructions we should be fine w/o*

**DJI Guidance Sensors**

**DJI comes with:**
- Dual parallel CAN ports for DJI compatible components
- Dual parallel UART ports for 3rd party components
- 3 XT30 ports for power
- 28V / 10A

**DJI connector Kit**

**Not yet implemented**

**DJI Matrice 100 and battery**
- Best SDK out there

**Weight:**
- Max takeoff = 3600 Grams
- Weight
  - 1755 = drone
  - 428 = parts
  - 45 = expansion box
  - 160 = battery compartment
  - 600 = battery
  - Total = 2988

**Laptop or Mobile**

**WiFi**

**Power & USB**

**Second battery is an option for 675 grams**

**Lidar Sensor**
- 5V / 400mA
- USB connection
- 40 meter range
- 120 Grams
- $349

**Sweep V1 360**

**Raspberry Pi 3 B**
- 5V / 2A
- Has WiFi & 4 USB ports
- $35
- 60 Grams
Software Tools

Currently Used

TeamViewer - To control Raspberry Pi with a mobile device

Scanse Sweep SDK - Retrieve sensor data and create 3-D coordinates

Mobile Point Cloud Visualizer (Open Source) - Displays the sweep data for viewing on mobile

Future Tools

DJI Onboard SDK - Telemetry data

DJI Mobile SDK - Integrate viewer with app to fly and control drone mapping

WS (Node.js websocket server) - Websocket connection for sending real time data to android app

Google Testing - Test framework for transformations
Demo

https://www.youtube.com/watch?v=a0cjhDRETx0
Demo
Future Goals

- Transformations based on telemetry data
- Real-time modeling for User
- User defined flight path