3D Drone Surveying

Todd Stellanova
todd@droneflow.com

Droneflow
Current Drone Surveys

- You see a lot of fixed wings (planes) covering farms and forests
- Flying relatively high and fast (planes have a high minimum stall speed)
- Great for covering lots of area because they move so fast
- Basically 2D with some ability to extract 3D information
The Problem

• What if you need to cover a smaller volume in much greater detail?

• What if you want to use special sensors that require slower flight?

• What if you need to map 3D features such as cliff sides, caves, lava tubes, sinkholes, forest canopy structures?

• What if you want to monitor the same spot over and over at altitude?
Hovering VTOL Drones

- Copters / multicopters
- Able to cover 3D volumes with precise flight control
- Able to move at a speed you dictate— no minimum stall speed
- Many sizes/payloads
3D Mapping

Precise 3D flight control

+ S.L.A.M.

+ New lightweight sensors

= Real-time 3D mapping
SLAM: Simultaneous Localization and Mapping

- Real-time mapping of the drone’s environment
- Can be used for collision avoidance without a priori knowledge of the environment
- Indoors: Visible+IR (Kinect), Outdoors: Sonar, Lidar, SFM
Google self-driving car uses SLAM with LIDAR and CV
Alternative Sensors

Take advantage of flying low and slow
Acoustic Mapping

- Flying low and slow means you can record & map sounds
- Copter acoustic signature is fairly consistent (~4kHz), easy to filter out
- Recurring population surveys
Air Sampling

- Samples of air from specific altitudes with timestamps, temp, pressure, humidity…
- Gases (e.g. SOx, NOx)
- Microorganisms
- Realtime analysis or sample and analyze later
Radiation Sampling

- Fly compact geiger counters over dynamically changing landscapes
- Monitor EMF signatures at the same time
Virtual Observation Tower

Deploy a variable-height observation platform wherever you need it
A Tower Where You Need It

- Dronehaus monitoring stations could be deployed anywhere