Avionics in Commercial UAV’s: What data is available to drone pilots?

Wednesday, November 2, 2016 | 3:00 p.m. – 4:30 p.m.

PRESENTED BY:
Kevin Gould, CEO of Hawk Aerial, LLC
Manual Flight

*Inspection, Documentation; individual stills & video*

*E.g., DJI Matrice 100 + Controller + iPad with DJI GO app*

Sources: author
DJI GO app

Preflight scan:

**SYSTEMS CHECK**
DJl GO app

Preflight scan:

SYSTEMS CHECK

Sources: author
DJI GO app

Inflight scan 1:

FLIGHT DATA

Sources: author
DJI GO app

Inflight scan 1:

**FLIGHT DATA**

• Heading NE
• Height ~50 m
• Horiz. dist. 64.2m
• Horiz. to pilot 68m
• Horiz. speed 11.3 m/s ~22 kts
• Vertical speed 0.0 (level flight)

Sources: author
DJI GO app

Inflight scan 2:

ENDURANCE

Sources: author
DJI GO app

Inflight scan 2:

ENDURANCE

• 8:21 Flight time remaining
• 69% Battery capacity

Sources: author
DJI GO app

Inflight scan 3:

NAVIGATION

Sources: author
DJI GO app

Inflight scan 3:

**NAVIGATION**

- Path flown (white)
- Relative location (138 m ENE)
- Heading (SE)
- Return vector (green line)

Sources: author
Camera Control

RGB Optical

Infrared

Sources: author
DJI GO app

Camera Controls:

- Pitch up ~30° to see underside
- Pitch down 90° (nadir) for top view, landing spot

Sources: author
DJI GO app

Camera Controls:

• Focus: Auto or Manual
• Zoom
• Still or Video
• Shutter trigger

Sources: author
DJI GO app

Camera Controls:

Advanced camera settings:

- Auto
- Shutter priority
- Aperture priority
- Manual

Sources: author
DJI GO app

Auto Assist:

- Auto Takeoff & Land
- (Gimbal control)
- Return to Home
- Reset Home Point

Sources: author
Flight Stabilization

Hands off = stationary hover:

- 3 gyroscopes
- 3 accelerometers
- Barometer
- Magnetic compass
- GPS
- **New**: ultrasonic and monocular sensors for lateral stabilization w/o GPS

Sources: author, DJI Phantom 4 User Guide
Autonomous Flight

Agriculture, Mapping; precise overlapping images

E.g., SkySquirrel Technologies Aqweo/Quanta + Mission Planner PC App

Sources: author
Auto Flight
Step 1:
Draw border around area

Sources: author
Auto Flight

Step 2:

Autofill Grid & Waypoints

- Automatically calculates overlap, photo frequency & ground speed

Sources: author
Auto Flight

Step 3:

- Upload flight plan to drone
- Flip 3 switches
  - Arm: On
  - Auto: Takeoff
  - Mission: On
- Available: Auto Land

Sources: author
Info during autonomous flight:

- Artificial Horizon
- Heading
- Vertical Speed
- Altitude
- Ground Speed
- GPS status
- Flight tracker traces progress
- Selectable fields

Sources: author
Technologies under development

- Dynamic Collision avoidance/ADS-B (drones, manned aircraft)
- Precision AGL & Terrain avoidance (ground)
- Object avoidance/3D corridors (vertical structures)
- Live datalink:
  - Very remote piloting
  - Real time data upload

Sources: author