Drone Market
ArduPilot

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Agenda

1. Intro
2. Drone market challenges
3. What is ArduPilot?
4. Current Projects
5. Working with Open Source
6. The Ultimate S&R system
Drone market is getting tough

Prices are falling dramatically
Expectations are high

We are at the peak of the “Hype Curve” meaning expectations are very high
Small start-ups are struggling

Three well funded Kickstarter projects in trouble

- **PlexiDrone**: 2.2 Million USD (1 year late)
- **AIRDOG**: 1.3 Million USD (16 months late)
- **ZANO**: 3.5 Million USD (Failed)
ArduPilot

ArduPilot is open source flight code:

- Supports multicopters, planes, rovers, helicopters, antenna trackers
- Partners program provides a forum for companies to collaborate on projects which are of shared interest

Other components:

- Ground Stations (Mission Planner, Tower)
- MAVLink, MAVProxy (communications)
- DroneKit Software Development Kit
Ardupilot Projects - Hardware

- Pixhawk (ARM)
- NAVIO (Linux)
- Bebop2
- QC SnapDragon
- PixRacer
Ardupilot Projects - VTOL

Canberra UAV’s OctaQuad Plane for use in Outback Challenge
Precision Landing

Thomas Stone of IRLock and SkySense inductive charging pad
Multi-Vehicle (50 planes)

Advanced Robotics Systems Engineering Lab launches 50 vehicles in 27min
Throw Mode
Active Projects

Airspace Management

- Agree protocols for no-fly-zone data
- Final solution will integrate sensors like uAvionix’s ADS-B receiver

“APSync” for Companion Computers

- NVIDIA (and similar) companion computers for vision based projects such as SLAM, object avoidance
- Cloud integration
Integrating with Open Source

Ardupilot is open source (GPLv3) but you can use a companion computer to add higher level features (even proprietary features) which allows your company to differentiate itself from its rivals. You get the reliability of the low-level flight code for free allowing you to instead invest in the higher level features.

ArduPilot is at least as reliable as the leading closed system and you are not beholden to a particular manufacturer.
Integrating example: Smart Shots

The Solo’s “Smart Shots” allows anyone to easily create very beautiful aerial videos by autonomously flying the drone in unique patterns while aiming the camera appropriately. One of the most popular is “Orbit”. These are implemented in Python using DroneKit which runs on the iMX6 companion computer.
Each company puts in at least one developer to work on that company’s priorities.

Developers review each other’s work with senior developers making the final decisions.

Weekly and ad-hoc meetings make the team function just like any other team.

The way to make it work is to dedicate an English speaking developer to the team and get them to attend the weekly meetings and engage often with other team members. If that’s impossible, find a consulting company who can do that for you.
Features of a great S&R system

High efficiency:
• Multiple vehicles per operator
• Relatively small drones
• Fast deployment

EnRoute’s UAV Van
(includes Antenna Tracker)

Michael Day of Advanced Robotics Systems Engineering Lab launches 50 vehicles in 27min
Highly Autonomous

Positions visible in real time

Instructions to individual vehicles or groups of vehicles only when necessary

Operators can see live video or manually fly a single vehicle

EnRoute’s flight over SakuraJima May 2015
Safe Real-Time Mapping

Avoids terrain and near-by manned vehicles
Data sent back to Ground Station via Phone network or long range radio
Data Distribution Locally & Globally

Raw picture, video and processed map data available locally via wifi and globally via cloud including sites like TomNod for crowd sourcing S&R.
More information

ArduPilot wiki: http://ardupilot.org/
ArduPilot software: https://github.com/diydrones/ardupilot
DiyDrones: http://diydrones.com/
DroneKit: http://dronekit.io/
MAVLink: http://mavlink.org/
Developer email group: drones-discuss@googlegroups.com

Questions?