Drones and Ham Radio

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Not Your Childhood RC Toy

- Highly Accurate GPS receiver
- Magnetic Compass
- R/C Transmitter/Receiver
- Accelerometers/Gyros
- HDTV & HQ Still Camera on a “Smart” Gimbal
- Video and Telemetry Transmitter

Terminology

- Drone = UAV (Unmanned Aerial Vehicle)
- Fixed Wing vs. Rotary Wing
- Intelligent and Programmable vs. Traditional R/C Craft
- FPV, RTH, RTF, NAZA, Gimbal

Rules

- Non Commercial – Kind of
- 400’ Ceiling
- Airports/Stadiums/Crowds Restricted
- Beyond That Lots of Gray Area
- Don’t be a Jerk

Communications Uses

- Hams have hoisted ropes for antennas
- A flying repeater in a fixed wing UAV craft has been tested to provide HTs a 150 mile LOS range.
- Flying repeaters could provide near instant, wide area communications for Forest Firefighting, Disaster Relief, Search and Rescue etc.
- This could be of interest to ARES teams. Two alternating craft (battery changes) could provide round the clock communications.
- Internet Access to remote or disaster stricken areas

Military

- Replacing Satellite Imagery in some cases. Much higher resolution. Cheaper, quick to change coverage area. Hover capability.
- Mobile weapons platform. Controversial, but safer than pilots. Hover capability for hours or days. Targeting for other aircraft and missiles.

Other Uses

- Disaster Relief – Deliver RX, Damage Assessment, Search & Rescue
- Research – Volcano Research, Tracking Salmon Spawns, Wildlife Counts, Risk Analysis, Archaeological Survey
- Sensors – Water Quality, Radiation, Biological, IR
- Livestock Monitoring, Wildfire Mapping, Pipeline Security, Anti Piracy
- Filming of 2014 Winter Olympics - Skiing and Snowboarding events

Future Potential

- Consumer Deliveries – Amazon & TacoCopter unlikely
- Atmospheric Research 60k feet and above. Solar powered for 5 years.
- Autonomous functions, including combat
- Your ideas?

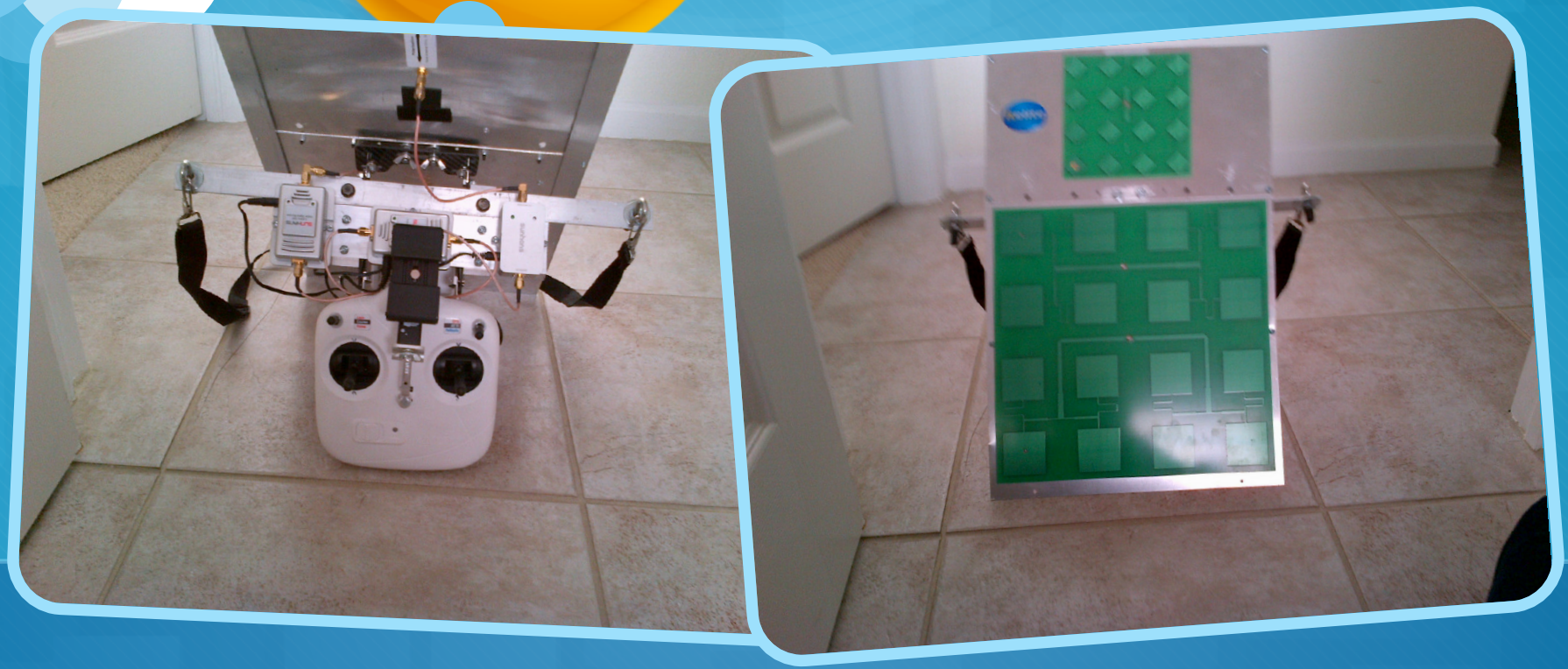
So What does this have to do with Ham Radio?

- Lots of RF in these UAVs
- GPS
- Control, FPV, Telemetry, Sensors are typically in unlicensed 2.4GHz and 5.8 GHz bands shared with WiFi
- Off the shelf units use manufacturer antennas, but DIY builders buy and make higher gain and directional antennas as well as RF amps

Did He Say Antennas?

Circular Polarized & Directional

Just like radio, lots of opinions and lots of options.



Think About What's Happening

The bird is moving, turning, but you can point your TX at the craft.

First upgrade - Directional on the TX, Circular Omni on the aircraft.

How to Start

- It's Like Ham Radio – you can go cheap or get a second mortgage
- Inexpensive units (under $100) are very small, no camera, no GPS assistance in hovering, flight
- They are harder to fly, but cause fewer tears when you crash or lose it
- You WILL crash or lose one, probably in the first week

Entry Level – Toys - RTF

- Typically Small or Micro – sensitive to wind
- No GPS – Can be flown indoors, once you get the hang of it, but offer no hover assist
- Very basic transmitter
- No camera, or a crummy one
- SYMA X1, Hubsan X4, under $100

Hubsan X4 - $50

Mid Level (Enthusiasts)

- Many choices in the $500-1500 price point
- These typically include GPS, Camera with Gimbal, or Gimbal for your GoPro
- Better range, FPV, telemetry, much easier to fly
- RTF - Ready to Fly, few tweaks beyond calibration needed
- DJI Phantom and Phantom 2, ARDrone Parrot
- RTH – Return to Home feature - Lifesaver

DJI Phantom - $700-1500

Professional

- Carbon Fiber with 4 sometimes 6 or 8 rotors add stability, redundancy, and much higher payload capacity – including large SLR Cameras
- Electronics, Antennas are better, better TX and RX for distance
- $3,000 – 15,000 – Wait for tech to filter down

Cinestar-8 MK Heavy Lift - $8000 Base

FAQs

- What if I lose Signal? Backup Plan?
- Can I control the Camera, Gimbal?
- How Far, High, Fast can I go?
- Can I do Tricks?
- How much does it cost?

My Advice

- Consider your budget, now triple it
- If unsure, or have no R/C experience get a Hubsan or Syma for under $75
- Experience includes crying over lost/destroyed craft
- If you are having fun and yearn for more, look at DJI's Phantom 2 line next, or consider building
- Use common sense, like kites, model rockets, shooting, know your area, away from people and expensive things

Links

- Great introduction: tinyurl.com/DroneIntro1
- DJI Phantom Users: www.phantompilots.com/
- Builders – Intermediate/Advanced: diydrones.com/
- Humanitarian/Disaster: uaviators.org/introduction
- Hams-ARES: tinyurl.com/ARESDrones
- Beautiful Footage Milwaukee: tinyurl.com/MilwaukeeFlight

Eye Candy……

KNIGHTS

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