

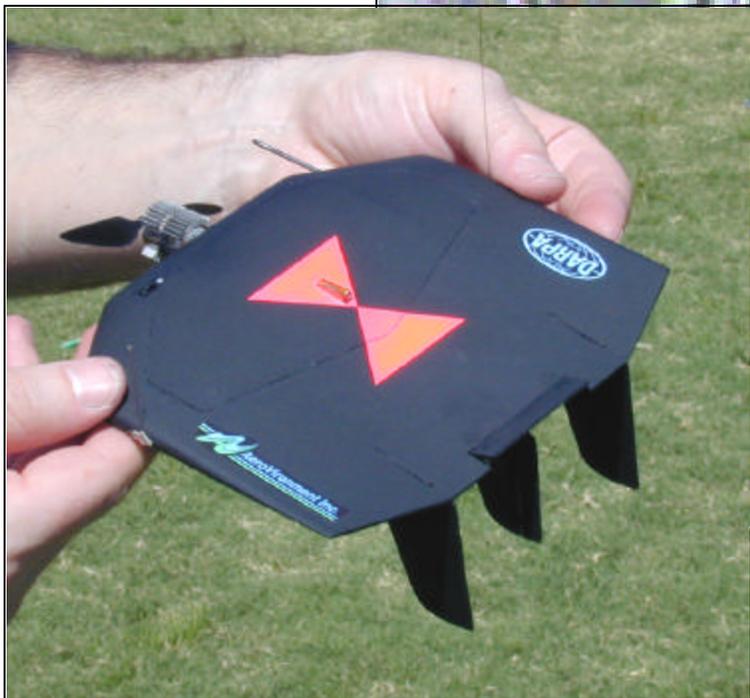


30-Minute Black Widow Flight



AeroVironment MAU
HDG 149 SOUTH
ALT 769
SPD 33
09. 53U

-69dBm





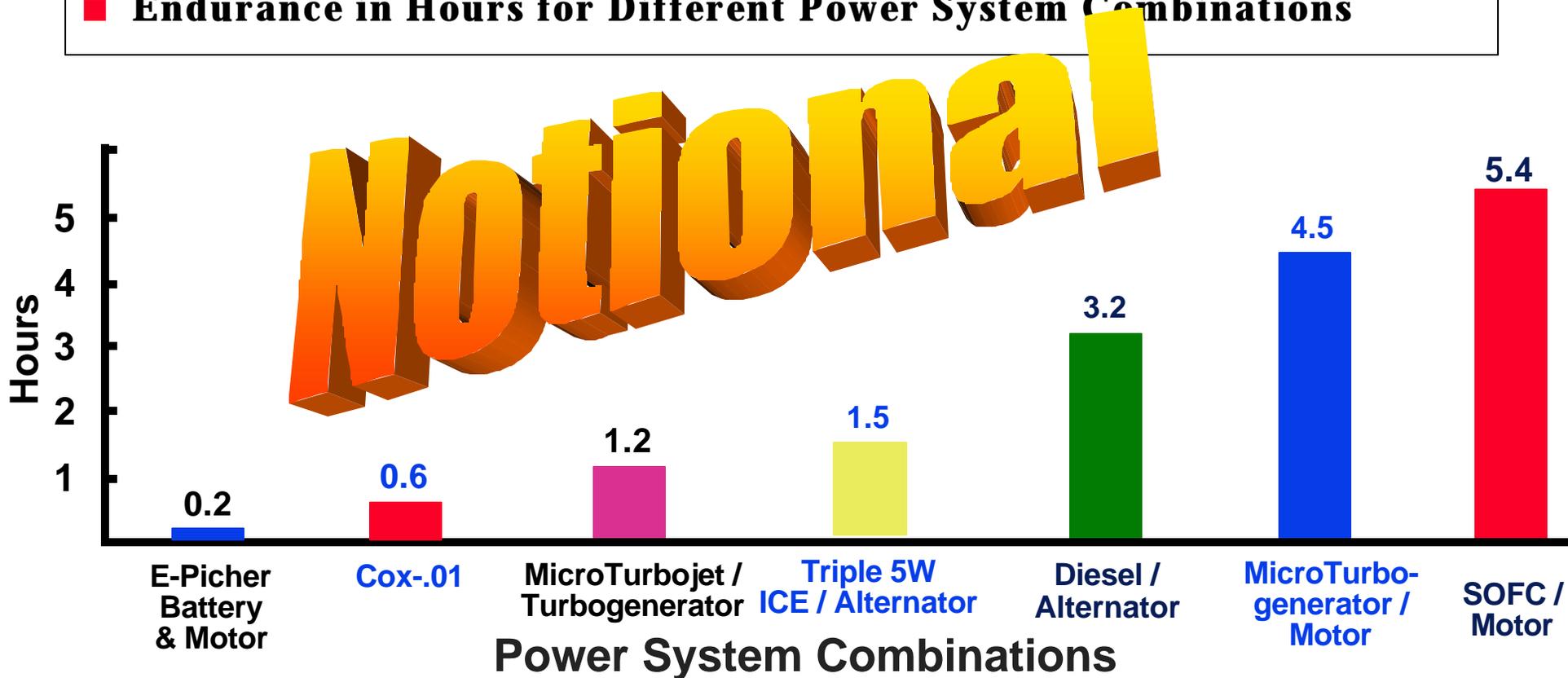
Power Options for 100 g MAV



■ Power System Requirements for 100g Fixed Wing MAV

- Power System Weight Allocation Is 60% Vehicle Weight, 60 g
- 4 W Peak Available Propulsive Power, 3.3 W Average
- 5 W Continuous Conditioned Electric Power

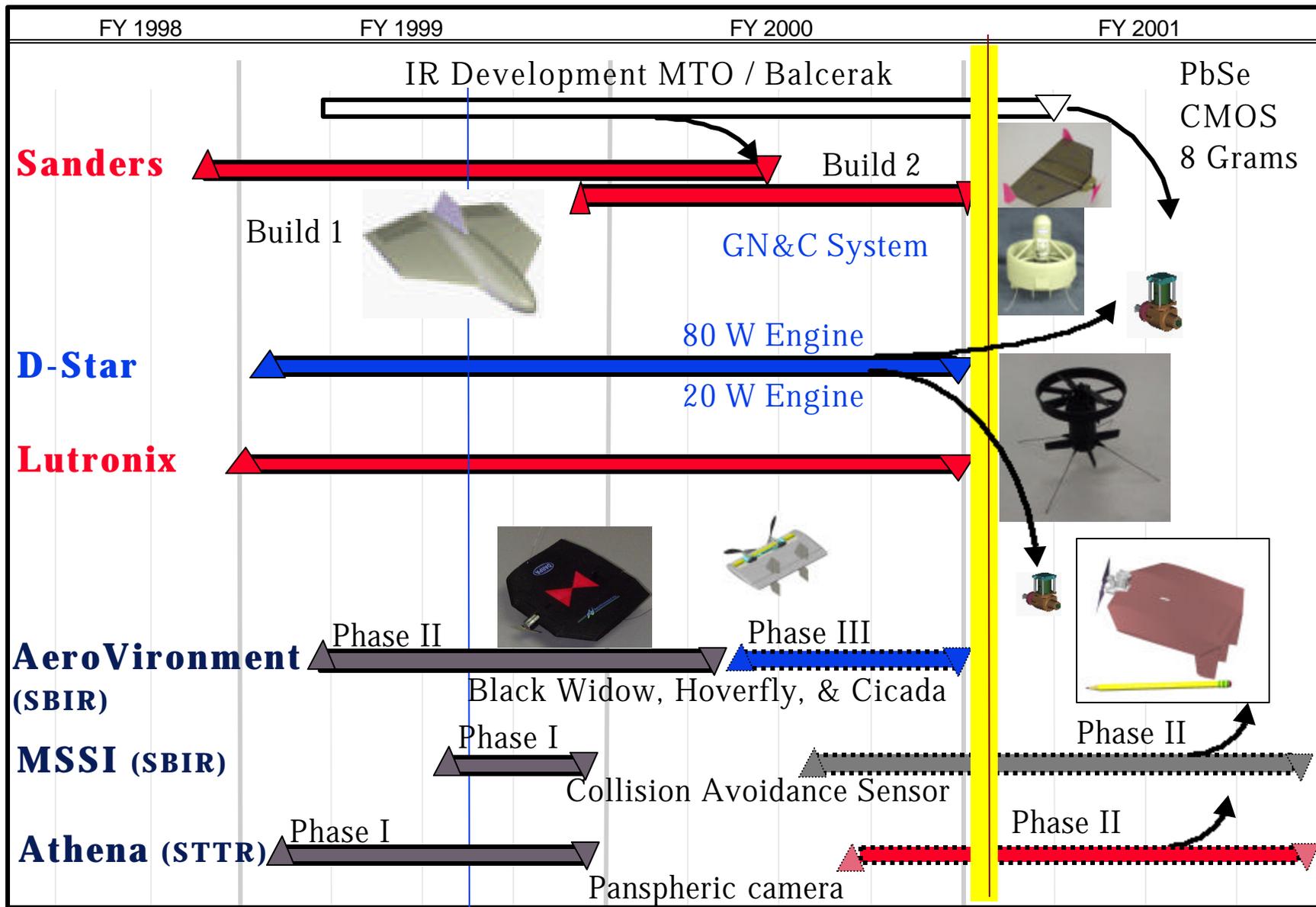
■ Endurance in Hours for Different Power System Combinations





Technical Accomplishments

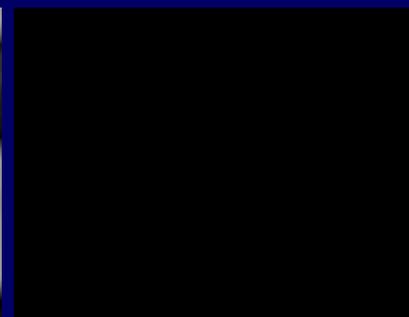
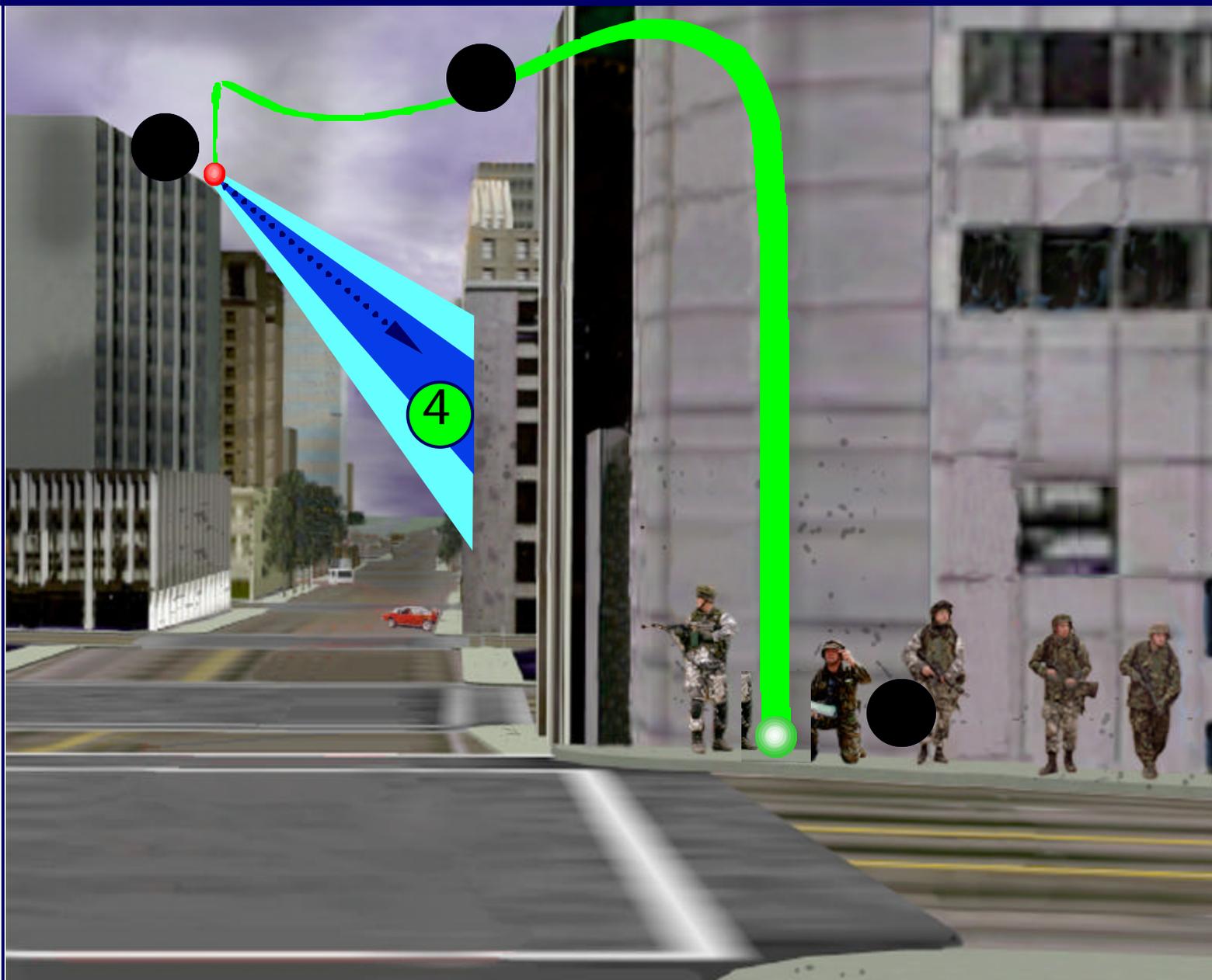
Vehicle Development Plan





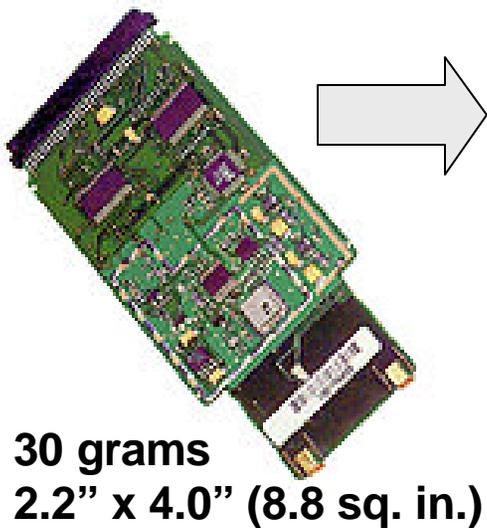
MOUT ConOps

Micro Air Vehicles

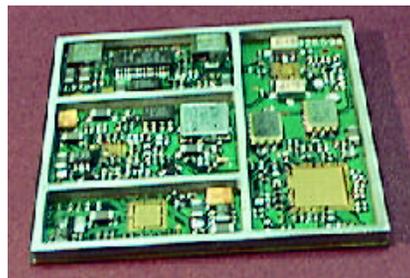




Data Link Weight and Size Reduction with Simple User Interface



30 grams
2.2" x 4.0" (8.8 sq. in.)



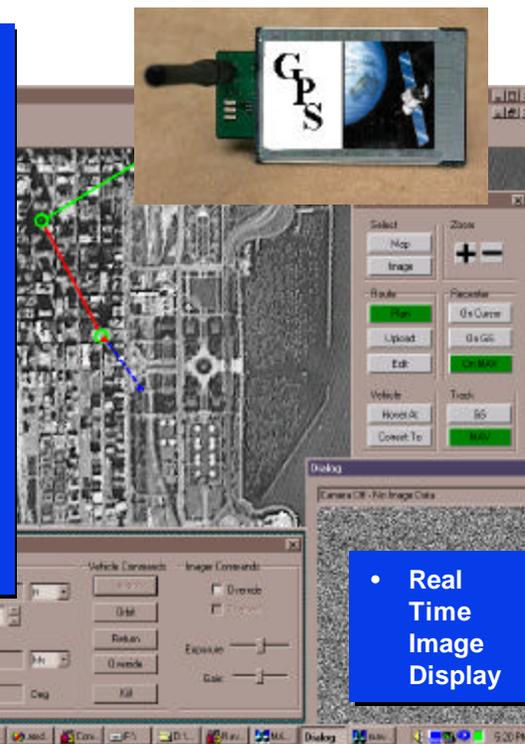
9 grams
1.9" x 1.9"
(3.6 sq. in.)



- Windows NT
- Ethernet interface to receiver
- Hostable on any Pentium platform



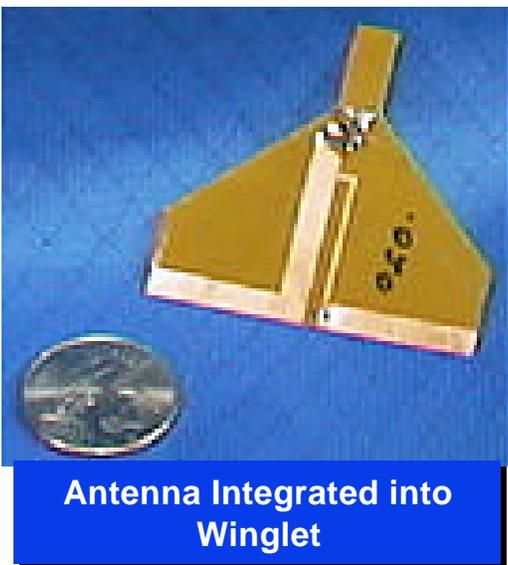
- Select Map of Local Area
- Select Flight Path Using Waypoints
- Upload Flight Plan to MAV
- Re-task As Necessary During Flight
- Orbit or Return to Base



- Real Time Image Display

> Direct sequence spread spectrum radio

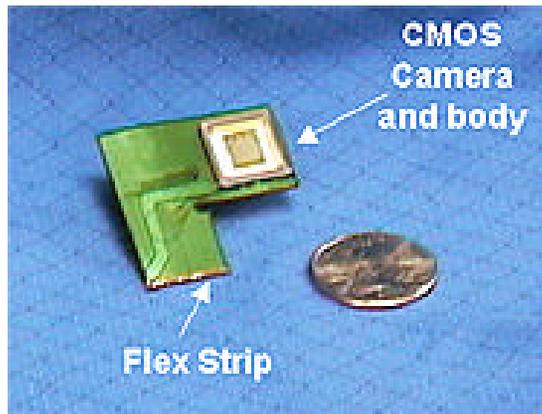
- 1 Mbit/sec data rate
- Tested to 1 km range
- Image processing and forward error correction capable of extending range to 5+ km
- Telemetry and imagery downlink
- Command uplink, including dynamic retasking commands



Antenna Integrated into Winglet



Imaging Sensor Navigation and Stability



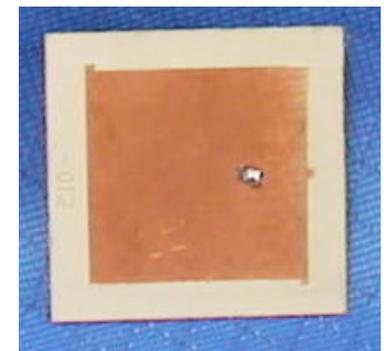
➤ Stability (inner) loop

- 3 gyros for roll, pitch and yaw rate
- 2 pressure sensors for elevation and airspeed
- Onboard algorithms to filter sensors, control level and straight flight, and recover from gusts

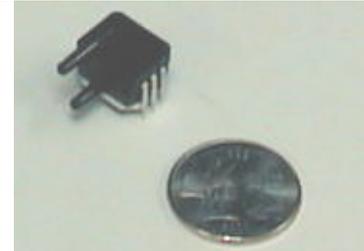
➤ GPS positioning for autonomous waypoint navigation



GPS Receiver Assembly



Patch Antenna on Back Side



Pressure Sensor



Miniaturized Gyro

- **Digital imager**
- **CMOS triggered to capture frame at intervals of 1-2 fps**
- **Sized to resolve a 6' target at an altitude of 200'**
 - 45 degree FOV, 3 element lens, focal length = 5.8 mm
 - 352 x 288 resolution
 - Pixel size - 12 micron x 11 micron
- **1.0 lux sensitivity (f4 lens @ 30fps)**
- **Programmable exposure time, gain**
- **8 bit dynamic range**





Sanders – Fixed Wing Vehicle



➔ **Size: 9 inches & Total Mass ~158 grams Autonomous Guidance and Control**



Bio-Chemical Sensing Mission



- ✈ Chemical Cloud Tracked by MAV**
- ✈ Cruise Mode Required - Flies Far & Fast**
- ✈ MAV Does Not Come Back If Contaminated**

