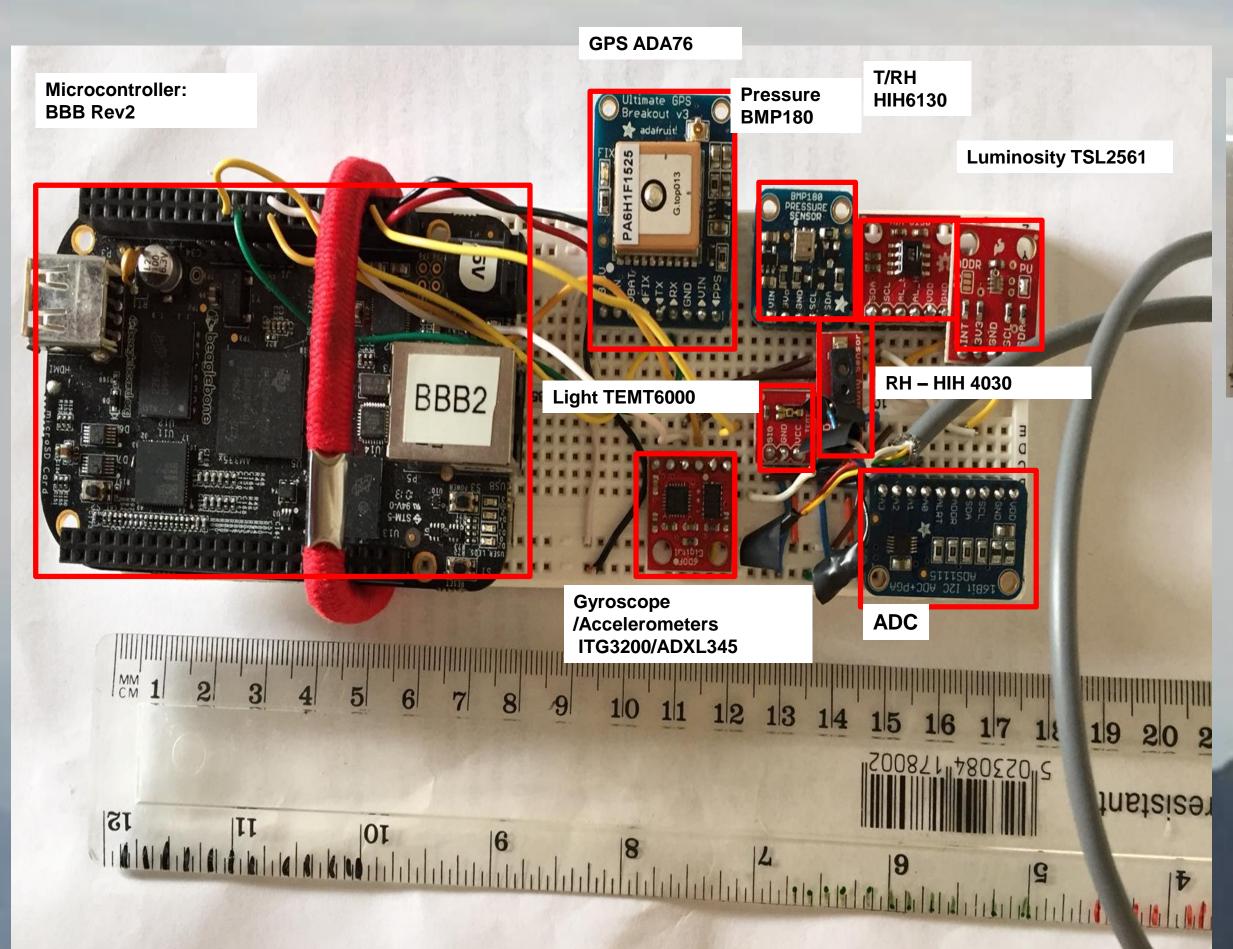


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- Meteorological measurements are required above cites to test pollution/heat transport models
- Drones require extensive permissions to legally fly in urban skies
- A bird-carried sensor offers a solution, but requires development and testing

1. Start by 'bread-boarding' the concept



Initial bread board to test off-the-shelf components supplied on breakout boards.

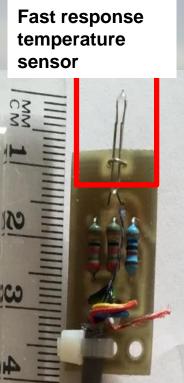
Quick shed built miniaturised sensor to test components work together with free microcontroller. Late night soldering and Python programming sessions...

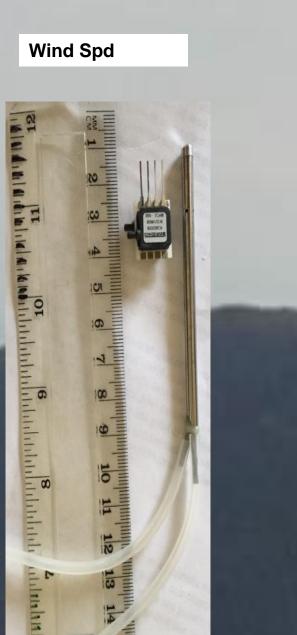
From the Shed to the Skies: A Journey of Sensor Development and **Deployment Involving Bicycles, Drones and Eagles**

Rick M. Thomas¹, and F. Cropley¹, A. R. MacKenzie¹, S. J. Reynolds¹, J. P. Sadler¹, L. Chapman¹, A. Quinn¹, J. Zhong¹, and X. Cai¹

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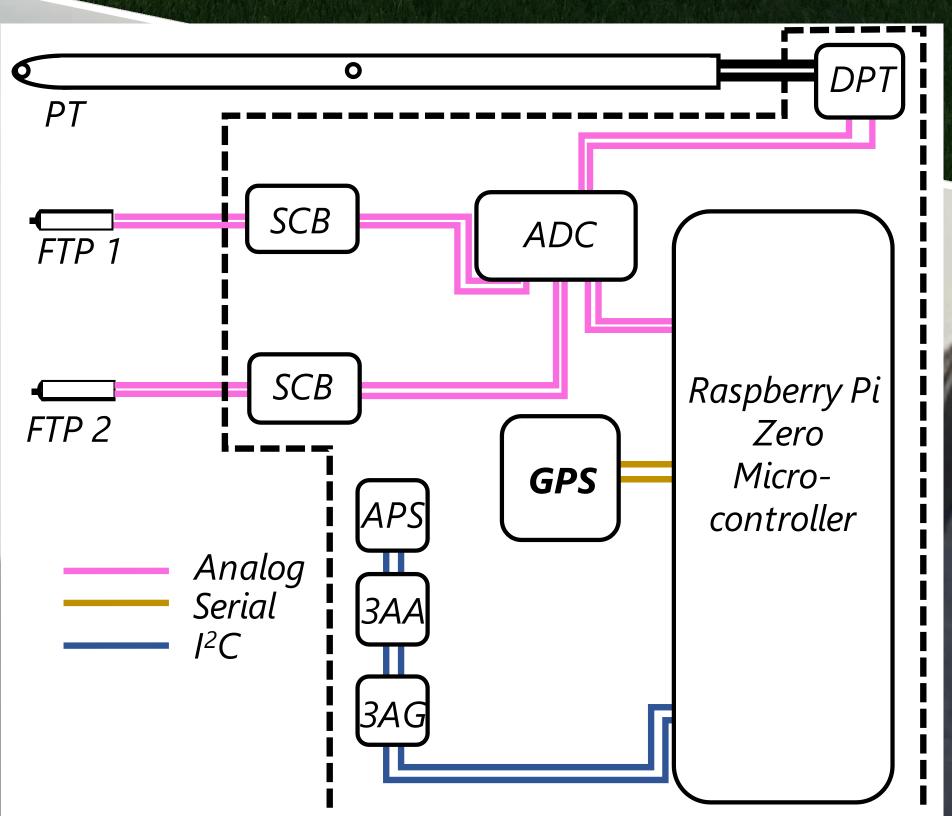




3. Think of weaknesses and ways to test them

Drone and Bicycle mounted tests

- GPS signal strength and speed
- Pressure altimeter vs laser altimeter accuracy
- Wind sensor response
- Temperature sensor response
- Sensor robustness



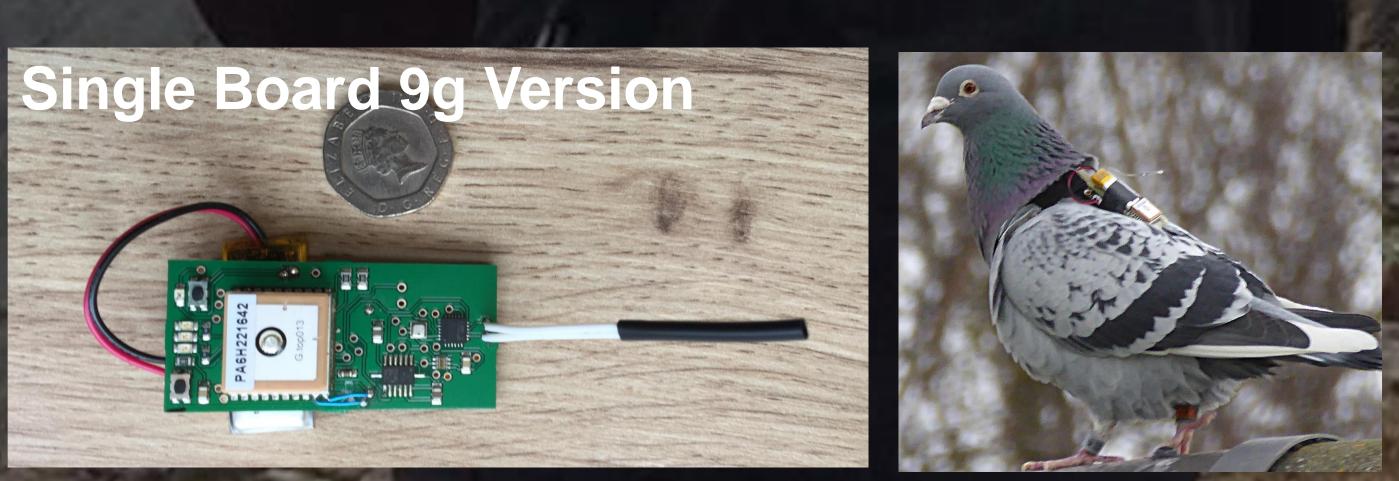
Schematic of initial miniaturised sensor

2. Rapid Miniaturisation









See paper for more details and data...

Thomas, R.M., et al., Avian Sensor Packages for Meteorological Measurements in Complex Terrain and Urban Environments. Bulletin of the American Meteorological Society 2017. (In press. Early release available: http://journals.ametsoc.org/doi/10.1175/BAMS-D-16-0181.1).

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5. Testing the refined prototype

Freedom Conservation's trained Eagle Victor carried the sensor to check response to bird body heat and accuracy of meteorological measurements.

SCIENCE OF THE

NVIRONMENT

 Wifi and LoRa Network testing underway for real-time data CO2 and Fast humidity sensor added Solar Panels being installed for

long-term deployment