

Department of Electrical & Computer Engineering

Airborne Sampling/Sensing of Distal Volcanic Ash

Project Group Meeting #12

Minutes

**Minutes of the weekly meeting 1 July 2016**

**Present:**

Maan Alkaisi, Adrian Weller, Jamie Van de Laar, Jake Campbell, Ryan Taylor, Mike Shanaher

**1. Apologies:**

* Parth Thakur

**2. Minutes from last meeting**

* (look at Minutes, June 10 2016)

**3. Matters arising**

* DTA wind tunnel sent today, should arrive next week. Key points:
  + Motor controllers may not be configured correctly
  + Need to seal up gaps in tunnel with tape
  + We need to build the final section
  + High speed running is limited by thermal cut out of ESC’s
  + 30-40% power gives 5 m/s, get ~10 mins on motorcycle battery

**4. Correspondence**

**5. Progress Reports:**

* Ryan Taylor
  + Cyclone separator 3D printed prototype works using compressed air with ash and a collection jar.
  + Having a smoother surface in the separator may give better flow and sample yield. Could use a solvent.
  + Need to think about orientation of the cyclone in the airframe – direction of gravity.
  + Need to use wind tunnel to test
* Mike Shanaher
  + Looking at being able to send ash data in a “Mavlink message” – 255 bytes long (all data from PMS1003 is 32 bytes).
  + Need very low latency when Pixhawk polls sensor via I2C
  + Pixhawk has flight modes for loitering, return to base etc.
  + Looking at adding additional flight mode for ascent phase with balloon.
  + There is a “TLog” where all telemetry data is dumped.
  + Could use Python script to filter ash data from mass telemetry “TLog” data at ground station.
  + Adrian asked if we had thought about telemetry being separate to Pixhawk – then don’t need to modify Pixhawk code. However the two telemetry radios could interfere
* Jamie Van de Laar
  + Have been testing in chamber using PMS1003 sensor
  + Using AC fine test dust due to finer particles that hang in air better
  + Suspending/dispersing in chamber using compressed air
  + Was able to see correlation between sensor reading and opacity meter reading, peaking at ~5000 ug/m3 then reducing as ash settles.
  + Resolution of opacity meter is only 100 ug/m3. Sensor is about 1 ug/m3
  + Have ordered connector to interface OPC-N2 with Raspberry Pi
* Jake Campbell
  + Advice from Jamie and Sally: sensor readings may be dependent on temperature – may change at very low temps.
  + DTA has an environmental test chamber to emulate very cold environments.
  + Could use closed loop heating circuit to regulate sensor temperature.
  + Could use parasitic lost heat from motor speed controller, batteries etc. to heat sensors.
  + Particle sensors have large heat loss due to cold air flowing through.
* Adrian
  + Think about termination from balloon
  + Does plane need to be released level, or can it be dropped pointing downwards (from tail)?

6. **Other business:**

* Adrian may be able to visit in a few weeks’ time.

**Meeting ACTION LIST**

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| **ACTION** | **ASSIGNED TO** | **DUE DATE** |
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**Next meeting date: Friday 8 July, 3pm**