

Department of Electrical & Computer Engineering

Airborne Sampling/Sensing of Distal Volcanic Ash

Project Group Meeting #18

Agenda

Date: Friday August 19th 2016

Time: 10.30am

Venue: VH 457

Chair: Jamie Van de Laar

Secretary: Mike Shanaher

**1. Apologies**

No apologies

**2. Minutes**

(Attached)

**3. Matters arising**

* No matters arising other than usual individual progress

**4. Correspondence**

All CC’d in all correspondence

**5. Progress Reports:**

* Ryan – Ash sample capture – cyclone separator
* Mike – Telemetry
* Jamie – Sensor testing
* Jake – Energy requirements
* Parth - Electrostatic sensor

**6. Other business:**

NIL

Minutes from last meeting below:



Department of Electrical & Computer Engineering

Airborne Sampling/Sensing of Distal Volcanic Ash

Project Group Meeting #17

Minutes

**Minutes of the weekly meeting 12 August 2016**

**Present:**

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

**1. Apologies:**

**-**

**2. Minutes from last meeting**

* (look at Minutes, July 29 2016)

**3. Matters arising**

* Wind tunnel testing by Parth and Ryan:
  + Injected AC test dust through a tube with holes drilled through it.
  + Only tested for a few seconds, got dust deposit on outside of jar.
  + Tested at approx. 8m/s, but should test at 5 m/s
  + Need to test for longer and see if ash collects inside jar.
* OPCN2 flow rate/pressure testing by Jamie:
  + Correct way to measure pressure drop shown in email.
  + Can use jars and dust to verify flow rate (OPC flow rate reading seems unreliable).
  + Probably better to do some testing in chamber with housing off for unconstricted outflow.
  + May need the outlet unconstricted in the airframe too.

**4. Correspondence**

* All are CC’d in emails

**5. Progress Reports:**

* Ryan Taylor
  + Talked about personal air samplers (info sent through by Adrian)
  + Too late in project to bother buying one but DTA may buy one in future.
  + Inlet design of sampler is important.
  + Smoothing inner surface of cyclone could be useful – could use acetone?
  + Sampler and sensor could be in series, although sampler needs air forced through and sensor doesn’t (this is bad).
  + If cyclone doesn’t work could look again at using SEM carbon tape – could use heat loss from components (e.g. radio) or heat by applying an electric current through the tape so it remains sticky.
* Mike Shanaher
  1. Can graph ash data in ground station but not in real time.
  2. Standard telemetry data can be graphed in real time, working on being able to graph ash data in real time too.
  3. If it becomes a problem, may look at using other ground station software.
* Jamie Van de Laar
  1. George has a high volume pump/flow meter/filter arrangement that we could use to verify ash concentration in chamber.
  2. Need to know assumptions that the Opacity Meter uses to calculate the mass concentration – i.e. particle density, refractive index.
  3. In the final solution, need to send down and/or store on-board ALL data from OPCN2 for particle size distribution.
  4. Going to look at being able to graph particle distribution for chamber testing.
* Jake Campbell
  1. Looking at power/energy requirements – Raspberry Pi requires more power than Pixhawk, but may be able to turn off unnecessary peripherals.
  2. Obviously, most power consumed by motor.
  3. Total energy requirement for a 1 hour flight would be 260Wh.
  4. Also looked at flight modelling/glide ratio code from last years project.
  5. Calculated glide ratio of 3/1, i.e. for an altitude of 10km, can expect to travel 30km horizontally. This assumes journey back is into a headwind (balloon traves downwind).
  6. Mini Talon not hugely ideal for long range flying, would probably want to look at another airframe for long range testing, these are relatively cheap anyway.
  7. Being able to be heavier would be better – for wind penetration and if other gear (e.g. parachute) is required. Balloon can carry up to 4kg anyway.
  8. Adrian is waiting to hear back from CAA about being heavier than 2kg, and about parachute etc. failsafe requirements.
* Parth Thakur
  1. Need a 10mV source for electrostatic sensor circuit.
  2. Could use a voltage divider but not ideal, might be able to use an adjustable regulator.
  3. Planning to test in wind tunnel – could test in chamber but not ideal as need a high flow of ash past plate.

6. **Other business:**

* Maan:
  1. Need 2 paragraphs for oral presentation abstract, one on overall project target/aim, and one on our progress.
  2. During inspections on 16 September, examiners are looking for testing results/physical prototypes etc.
* Adrian:
  1. Should also think about tether release and parachute, how these could interface with the system.
  2. Mike and Jamie noted these could be controlled using GPIO pins or servo (PWM) outputs
  3. Need to get on to wind tunnel testing!

**Meeting ACTION LIST**

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| --- | --- | --- |
| **ACTION** | **ASSIGNED TO** | **DUE DATE** |
| Wind tunnel testing | Whole team | ASAP |
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**Next meeting date: 19th August 2016, 10.30am**