Deployable Unmanned Aerial System To Detect and Map Volcanic Ash Clouds

The Problem

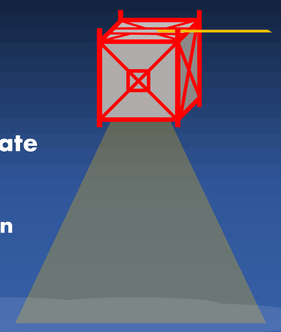
Volcanic Ash Clouds from Eruptions cause numerous issues within aviation

Volcanic Ash can seriously damage aircrafts:
- Silica melting into combustion engines
- Abrasion to Aircraft Body
- Visibility Constraints / Air Quality Concerns

The FAA and other bodies currently issue large 'No-Fly Zones' after eruptions for safer aviation but these zones are larger than necessary due to ash cloud mapping uncertainty

In 2010, the Eyjafjallajökull eruption alone caused $1.7 billion USD in the aviation industry due to flight cancelations

Current Technologies



Volcanic Ash Cloud Mapping and Dispersion is difficult to quantify and estimate

Ash Dispersion Estimation Algorithms

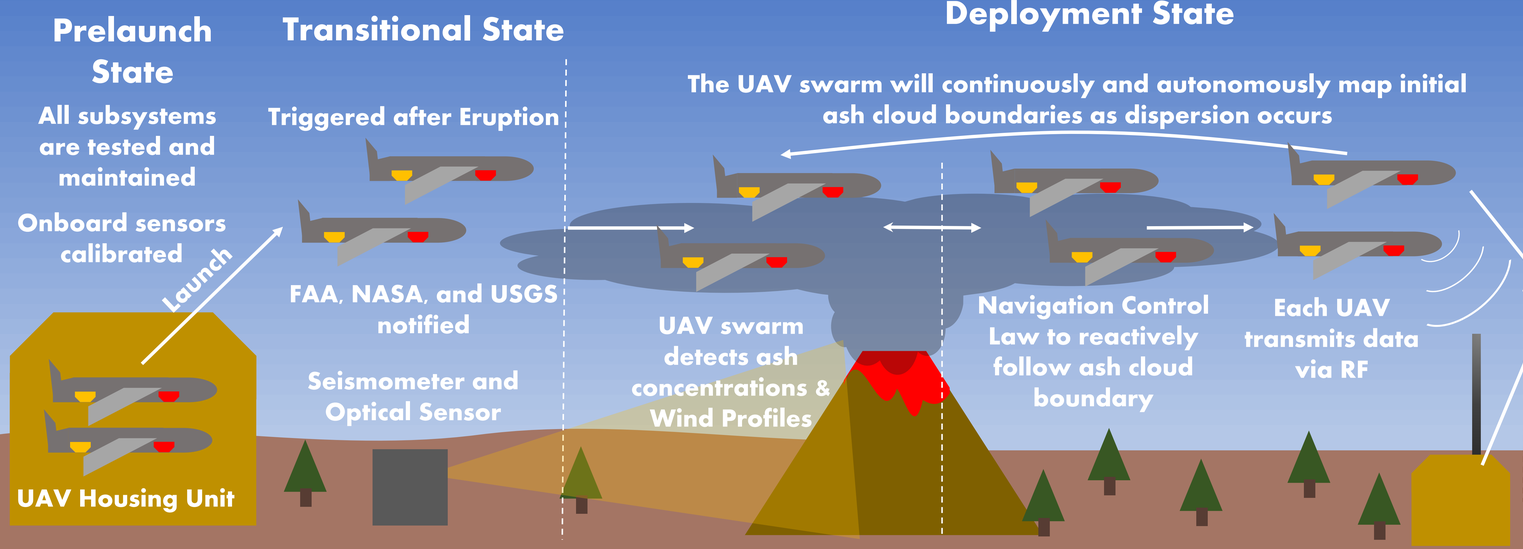
The US Geological Survey uses an algorithm named Ash3d to estimate ash cloud dispersion
- Initial State Parameters are not used (only estimated) leading to significant errors
- At the most minimum time, the program takes 10 minutes to provide estimations

Satellite Systems for Mapping
- Can be blocked by cloud coverage
- Imaging only available during satellite passes

Ground Based Radar Systems
- Not available in remote areas
- Expensive to build and install

UAS Innovation Proposal: An Autonomous Unmanned Aerial System deployed immediately at eruption sites able to measure and map initial ash parameters

Concept of Operations



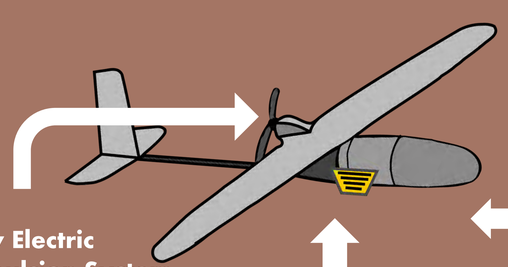
Impacts

84% Aviation Savings possible when system is applied alongside current solutions

Direct near-real time interfacing with government organizations to accurately and safely map 'no fly zones'

Significantly more accurate predictions of Volcanic Ash Clouds will affect more industries (aviation, agriculture, water) as well as human health management

Key Technologies



Fixed Wing Design for longer airtimes and aircraft body cable of high temperatures with abrasives

Propellers for Vertical Liftoff

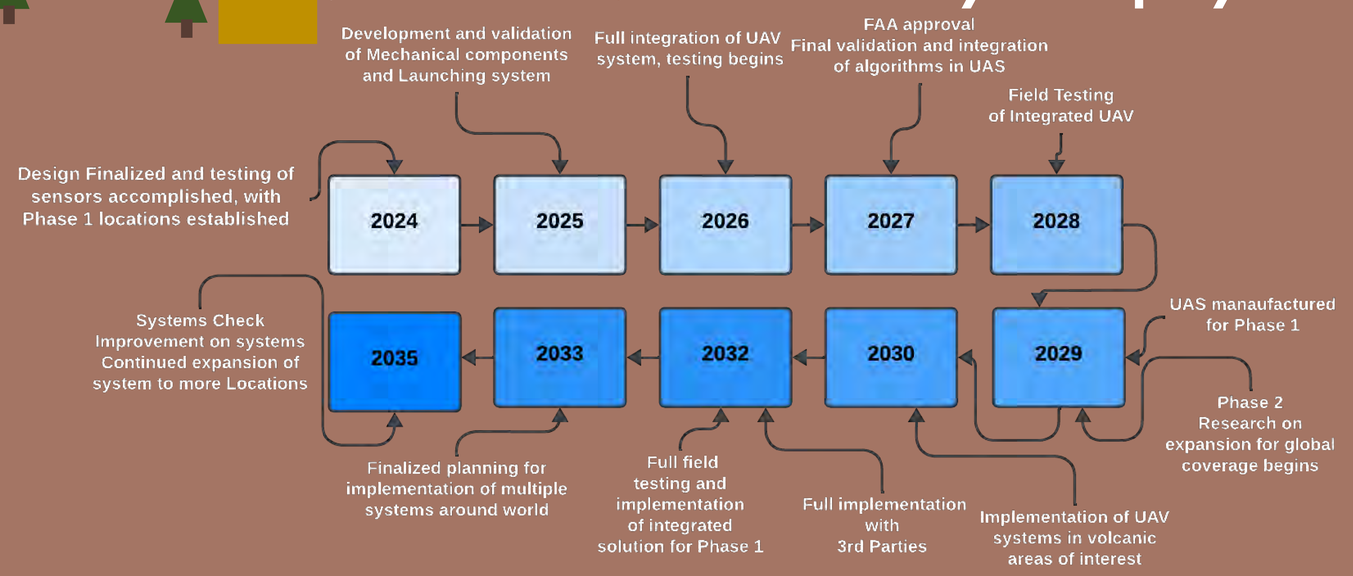
Autonomous Flight System with Navigation Control Law

Fully Electric Propulsion System (No Silica Intake from Combustion)

OPC (Optical Particulate Counter) Sensor for large particle sensing

3D Ultrasonic Anemometer for 3d wind speed / direction data and atmospheric conditions

Pathway to Deployment



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