



INTEGRATED UAV

- Robust RPAS Missions In Arctic Environments
NAVISP EL-2

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The Consortium

Integrated UAV

- Drone manufacturer since 2013
- Specialists in RPAS design and development
- Integration API for external systems
- Customized Autonomous RPAS
- Customized RPAS Charging stations (Drone Box)

AFRY

- International engineering, design and advisory company
- 17,000 devoted experts within the fields of infrastructure, industry and energy
- Making Future



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The Background

During our extensive work with researchers in the Arctic environment we have come across several examples of crashed or missing drones

- This amount of mishaps is unproportionable high
 - 100% failure from Swedish Polar Research Secretariat
 - Our own mishaps during INTERACT project in the Arctic
 - Our own mishaps during flight test in Kiruna (Sweden)
 - Reports from our network of pilots in the arctic
 - DJI mentions in their user manual that you should not fly in “Polar Regions”
- The consequences of this:
 - costly due to loss of drone and sensor
 - safety risk since people in the vicinity might get injured
 - Resistance of using new valuable technology



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The Background

Swedish Space Corporation was really interested in learning more about the issues of navigating RPAS in the arctic and to find a solution.

Contract with ESA under the NAVISP Element 2 program in June 2019.

- The duration of the project is 12 months
- The contribution from ESA is €152.000 EUR
- First ESA project

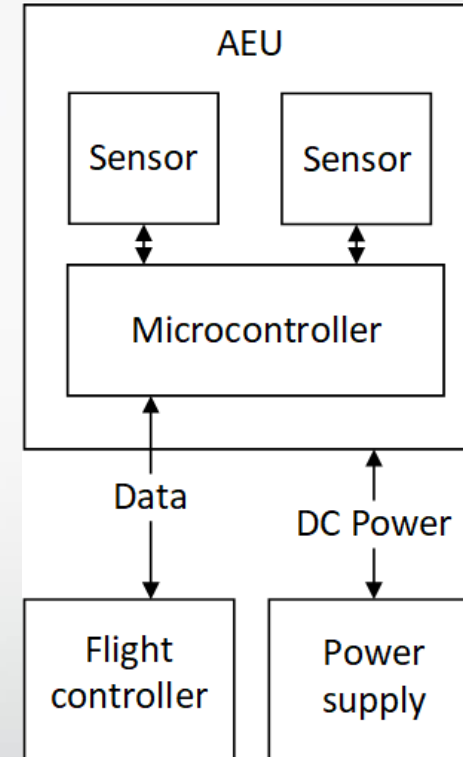


The Product

Attitude Enhancement Unit (AEU)

The AEU will be a separate hardware unit that can be connected to an existing RPAS.

This hardware unit will correct navigational errors that is caused by the Arctic environment and send the correct navigational data to the RPAS.



The Project



Data collection

- 17 Test cases
- 2 RPAS with similar config
 - Ardupilot 3.6.11
 - Pixhawk 2.1 (CUBE)
 - Here+ RTK GNSS
 - Mission planner 1.3.68 (GCS)

The Project

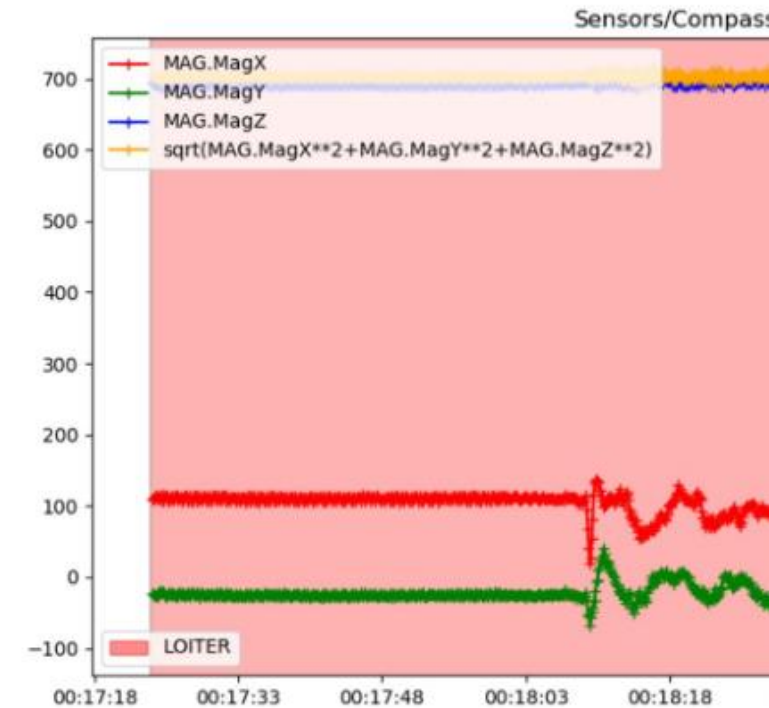
- RPAS 1 inconsisten compasses
- RPAS 2 consistant compasses but strange behaviour in air
- Good satellite coverage



The Project

- Analysing flight logs
- Finding the disturbance sources
 - Inclination
 - Ground Interference
 - Space weather (magnetic field)
 - Space weather (GNSS)
 - Environmental temperature
 - Fluctuation of the magnetic field
 - Magnetic declination

error with the Here2 GPS units has previously been reported by the vendor and a fix for it is in progress - <https://github.com>



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The Future

- Continue to analyse logs
 - Find other navigation related studies for the Arctic
 - Find viable solutions to mitigate the disturbing sources
 - Document and report our findings
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- Definition of System Requirements
 - Definition of System Architecture and Design
 - Prototype Algorithm
 - Prototype Test Plan

The Results so far

Product/Project

- Data collection
- Data analysis
- Initial high level design of module

Company

- Connection with new suppliers
- Connection with new customers
- New experience for our employees
- New market opportunity

Consortium

- Second project
- New connections within the consortium
- New opportunities and customers



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Questions?

