

AERIS

Aerial Research Inspection and Surveillance

An unmanned aerial vehicle capable of continuous flight by using remote power

Introduction

From 2016, aerial Earth observation as we know it shall change forever. The Aerial Research Inspection and Surveillance unit (AERIS) will provide the Netherlands with the means for continuous monitoring. AERIS uses a hyperspectral imager as well as an infrared camera to take pictures of the ground, and is partially remote powered by laser. This not only provides the Netherlands with a highly practical solution to monitor the environment, it also provides a market competitive one.

Key Requirements

- At least 20% of the energy used by the system shall come from renewable energy sources.
- There shall be a continuous stream of data available during the entire mission.
- The system shall be capable of monitoring every part of the Netherlands.
- The UAV shall sustain continuous flight in normal operational and meteorological conditions.

" AERIS shall provide a reliable, sustainable and accessible system capable of accurate and continuous monitoring urban areas, natural landscapes, coastlines and weather in the Netherlands from 2016 and onwards"

Safety

- Parachute
- Navigation and beacon lights
- Double redundant flight controls
- Sense and avoidance system
- Back-up battery
- Manually controllable

Structure

- 3D-printed titanium-ABS composite
- Double boom for increased camera stability
- Accessible payload
- Recyclable materials
- Impact resilience
- Low Ecolizer® score

Propulsion

- Efficient push-prop
- Only 600 RPM
- Diameter: 1 [m]
- Cruise power : 100 [W]
- Peak power: 450 [W]
- Foldable blades

Payload

- Hyperspectral Imager
- Ecological monitoring
 - 100 spectral bands
 - High resolution: 2048x2048
- Infrared Camera
- Night-time monitoring
 - Monitor thermal emissions
 - Thermal accuracy: < 0.05°C
 - Temperature range: -25°C to 160°C

Market Analysis

Potential clients include the Dutch government, local farmers and various businesses that require additional information about their main processes. Emissions and the characteristics of the local environment. Having a modular payload makes AERIS highly versatile to a changing technical, economic and social environment.

- Price: 780 [€/km²]
- Continuous availability
- Quick response time

Communications

- Live-stream
- Auto-tracking
- Range up to 70 [km]
- Downlink: 2.4 [GHz]
- Uplink: 430 [MHz]

Laser

- Accurate up to 1600 [m]
- Output of 2000 [W]
- Wavelength of 1064 [nm]
- LIDAR automatic wildlife protection

Performance

- Cruise speed: 50 [km/h]
- Maximum speed: 100 [km/h]
- Maximum altitude: 4000 [m]
- Battery endurance: 7.8 [hrs]
- Range on batteries: 310 [km]

Sustainability

Throughout the project, sustainable development has been considered as a key value in AERIS' value-sensitive design philosophy. All engineering trade-offs have been performed whilst considering several highly rated performance parameters that evaluated different aspects of the design's sustainable qualities.

Solar Cells

Normally solar panels are heavy and bulky. Therefore solar film is used on AERIS instead of regular panels. The film is thin, lightweight and flexible in order to follow the airfoil shape. These cells are the world record holder for single junction cells and are made by Alta Devices.



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