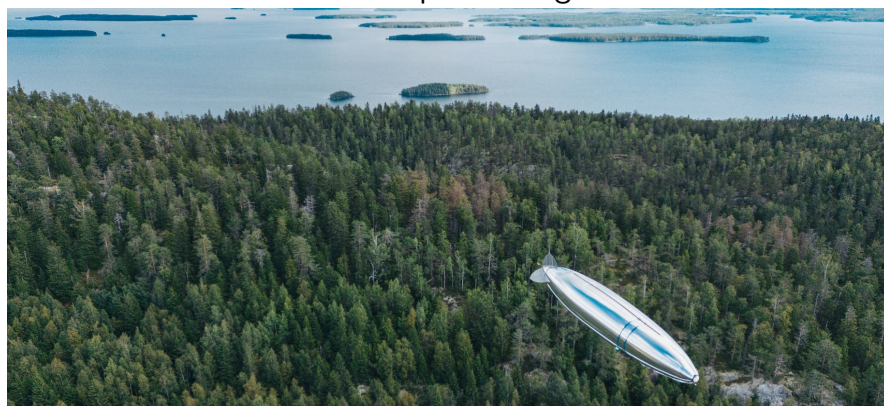**PRACTICE ABSTRACT**

60

Kelluu – an airship that collects extensive accurate information about forests and the environment

Kelluu is an artificial intelligence-controlled airship solution that involves very precise and continuous remote mapping and artificial intelligence-based data analysis. It is particularly well suited for extensive forest surveys, where information about forests and the terrain can be collected simultaneously with several measuring devices.

Compared to traditional drones, the Kelluu airship, as its name suggests, floats in the air. The ship has propellers and control wings for movement and steering, and hydrogen serves as energy. This guarantees, depending on the weather, a flight time of 8-12 hours, long flight distances and an emission-free flight mode. It is possible to install several sensors, scanners and cameras on the floating airship to collect data on the terrain, vegetation or infrastructure.

As a data collection method, Kelluu is the only land-operated technology that offers large-scale data collection and the simultaneous use of several different measuring devices and numerous vessels (e.g. 10-30). The airship itself is very quiet, which also enables sound tracking. The processor included in the ship offers high computing efficiency, and thus collected data can be processed on the ship without sending it to a cloud server via 4G/5G connections for further processing.

KEY WORDS

Airship, artificial intelligence, remote sensing, multispectral imaging, photogrammetry

LINKS

https://kelluu.com/

COUNTRY

Finland

AUTHORS

Kari Väätäinen
Robert Prinz

DISCLAIMER

DOWNLOAD

www.branchesproject.eu

KELLUU OY'S OPERATIONAL CONCEPT

"The technology we developed is the only one in practical operations in the world at the moment. The technology also has European Space Agency (ESA) regulatory approval," says Janne Hietala, CEO of Kelluu Oy. The business idea is based on an AI-controlled aircraft solution, really accurate and continuous remote mapping and AI-based data analysis. Kelluu Oy is a fairly new company, in December 2022 a factory manufacturing airships was opened in Joensuu, Finland. The company offers a "turnkey" overall service that includes vessel operation, data collection and real-time data analysis. The flight technology enables the use of highly accurate (1 cm/pixel) RGB multispectral photogrammetry with several different viewing angles and an optimal shooting height where clouds are not an obstacle.

The technology is currently being used in the real-time identification and monitoring of forest damages. The measurement and monitoring method enable the collection of accurate spectral image data and time series. In one of the ongoing projects, the Kelluu airship is used to investigate the condition of forest roads and road moisture. The precision data, based on photogrammetry, reveals the profile of the road surface, individual potholes, and road ruts. The interpretation of multispectral image data also provides information on the road's moisture and thus increases the predictability of the road's condition and load-bearing capacity.

In addition, the method has already been tested in the observation of biodiversity signs and forest sapling inventories. Combined with thermal imaging, Kelluu is also a very interesting method in animal counting. Activities in other industries include, for example, the monitoring of the condition of power lines and railways. There is also great potential in the utilization of this technology in agriculture.

Coordinator: Johanna Routa - (Luke) johanna.routa@luke.fi
Dissemination: itabia@mclink.it

www.branchesproject.eu

ABOUT BRANCHES

BRANCHES is a H2020 "Coordinaton Support Action" project, that brings together 12 partners from 5 different countries. The overall objective of **BRANCHES** is to foster knowledge transfer and innovation in rural areas (agricolture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.

THE PARTNERSHIP