FLEXIGROBOTS

Flexible robots for intelligent automation of precision agriculture operations

Motivation

FlexiGroBots aspires to harness the potential of Artificial Intelligence and Robotics to create versatile, diverse multi-robot systems that collaborate efficiently in executing intricate tasks across diverse domains.

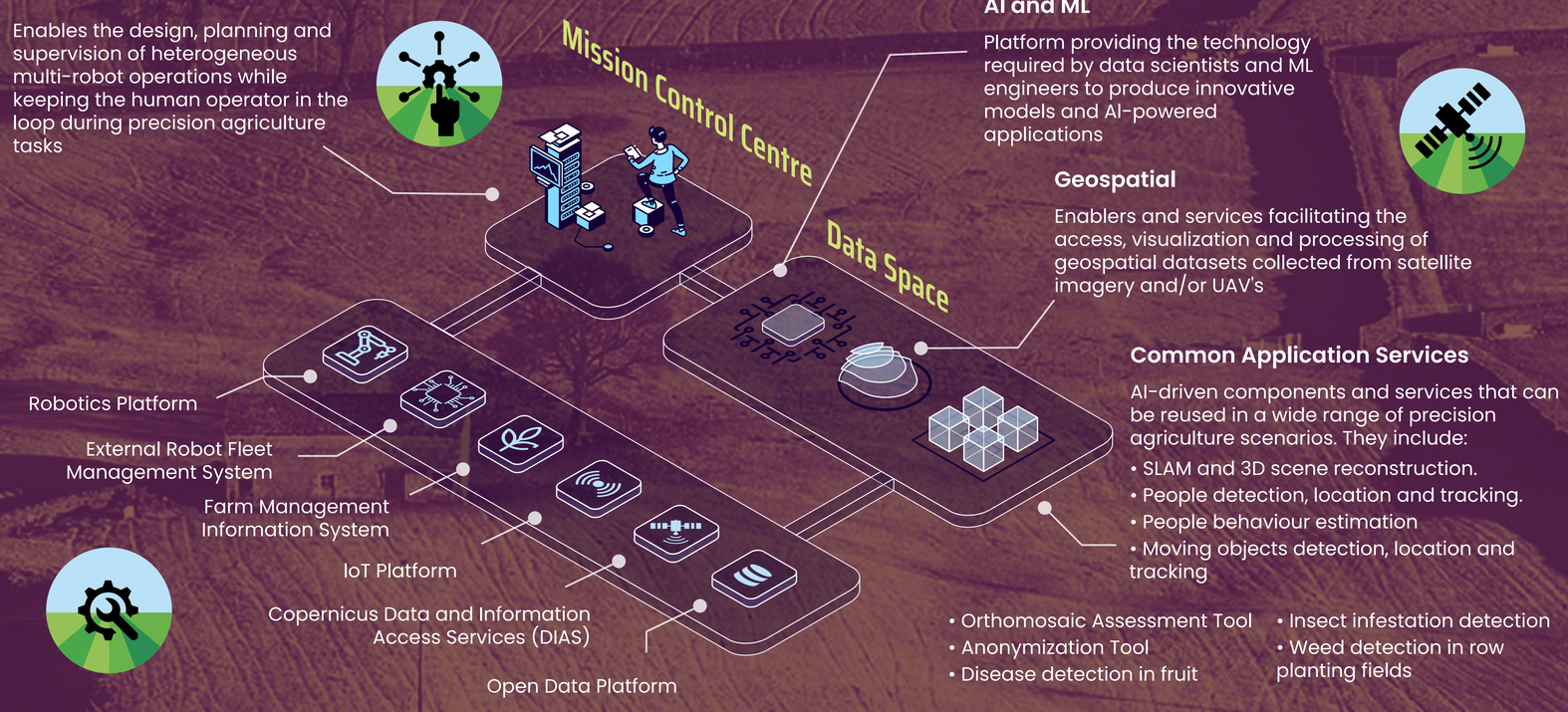
In addressing the challenges hindering the integration of unmanned vehicles and robotics in agriculture, FlexiGroBots envisions a future where fleets of small to medium-sized robots, in conjunction with drones, operate flexibly to cater to farmers' requirements, enabling real-time decision-making, field monitoring, cost reduction, and crop performance optimization.

Project Information

Funding programme	H2020-EU.2.1.1.
Grant agreement	No 101017111
Duration	36 months
Start date	January 1st 2021
Overall budget	8,154,443.75 €
Coordinator	Atos IT

The FlexiGroBots Platform

One of FlexiGroBots' key goals was to create an AI platform specifically designed for the management of a wide variety of robot types. Considering that, we have invested significant resources in expanding and improving this platform.



AI and ML

Platform providing the technology required by data scientists and ML engineers to produce innovative models and AI-powered applications

Geospatial

Enablers and services facilitating the access, visualization and processing of geospatial datasets collected from satellite imagery and/or UAV's

Common Application Services

AI-driven components and services that can be reused in a wide range of precision agriculture scenarios. They include:

- SLAM and 3D scene reconstruction.
- People detection, location and tracking.
- People behaviour estimation
- Moving objects detection, location and tracking
- Orthomosaic Assessment Tool
- Anonymization Tool
- Disease detection in fruit
- Insect infestation detection
- Weed detection in row planting fields

Benefits

1. Enhanced robot versatility for diverse crop tasks
2. Improved ground-aerial robot collaboration
3. Increased data input for AI-driven Agri-Food operations
4. Precise insect detection introduced
5. Data Space integrated with AI platform
6. Enhanced precision in agricultural operations for reducing cost and environmental footprint

Achievements on Pilots

Gravepines (Spain)

In pilot 1, soil, plant, and weather conditions were analyzed to detect Botrytis on grapes. Images were captured, indicating the location of affected bunches for training detection models. Detecting Botrytis was challenging due to its non-appearance, but algorithms were improved. The pilot demo inspected the area and treated affected bunches. Harvest assistance was demonstrated, with robots assisting grape pickers. Harvesting time was reduced, enhancing grape quality and ease of harvesting.

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Rapeseeds (Finland)

FlexiGroBots Pilot 2 focused on demonstrating collaboration among drones and robots under one fleet manager. A grassland renovation scenario was created, where weeding robots, ground robots, and autonomous drones collaborated in tasks based on drone surveys and AI analyses. They were supervised using the FlexiGroBots MCC Fleet Manager software. Multi-vendor and multi-party cooperation were enabled through MCC Mission workflow management and data sharing via FlexiGroBots agriculture data space.

Blueberries (Serbia and Lithuania)

Showcase the use of aerial and ground robots in fruit production which usually require a lot of manual labour and frequent visits Robots and drones were used in Pilot 3 to gather data for blueberry cultivation. This data aids in yield prediction, plant health assessment, and nutrient content estimation. Farmers can optimize fertilization, irrigation, and post-harvest activities with these insights. UGV Gari, performs soil sampling, analysis, and weed spraying, replacing manual labor. This achievement results from interdisciplinary UGV development, navigation, computer vision systems, and advanced deep learning algorithms processing UAV images. Gari enhances efficiency, yield, and blueberry quality.

flexigrobots-h2020.eu

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