[UTOPIA]

UTOPIA

aUtomaTed Open PrecIsion fArming Platform

AUTOMATED OPEN PRECISION FARMING PLATFORM

UTOPIA will focus on a single (standardized) platform where (robotic) paths, monitoring strategies can be set and the drones/USV's/AGV's automatically deployed when certain conditions are met. Precision-farming needs large-scale adoption to increase production at such a level that it significantly contributes to minimizing the gap between actual and required world-production of food. Increasing the measurement and actuation intervals of e.g. monitoring for pests and watering are expected to contribute to e.g. increased yields. This would also increase the burden on the farmer, as the measurement-time and data-processing time increases significantly. This can be mitigated with Automated (cooperative) Precision Farming with the use of autonomous driving vehicles, vessels, drones and dedicated installations mounted on regular agricultural machinery.

BACKGROUND

According to the UN, in this century the world population will increase rapidly till 6 billion people. Moreover, even today there are 815 million people, around 11% of the world population, who suffer from chronic hunger or lack of proper nutrition. There is a consensus that farming needs to become sustainable by increasing the yield per square meter, as creating more farmland would most likely come at the expense of other ecological systems. More unconventional resources will also need to be utilized; the UN has identified seafood as a promising food source, thus making use of the oceans that cover 70% of the world. However, offshore farming has additional challenges compared to land-based farming due to reduced accessibility.

Precision-farming is identified as one of the promising developments to mitigate a large part of the aforementioned challenges. New affordable sensors and agri-robotics are becoming available in the market, enhancing the land/sea concession processing with precise geospatial sensor-data.
Increasing the measurement and actuation intervals of e.g. monitoring for pests and watering are expected to contribute to increased yields and e.g. lower water consumption. Moreover, derived data like yield estimation can contribute to a more optimized food-chain from source to store.

MAIN PROJECT ACTIVITIES

UTOPIA targets multi-stakeholder, complex heterogeneous, autonomous, data-rich and highly-interconnected power-efficient systems in an agricultural context. The academic work, therefore, relies on real-world specifications to identify the needs of the envisioned framework. Two promising use-cases in two different sectors for automated precision farming are selected, to provide commercial (buyer), agricultural (farmer) and technical (system developer) input.
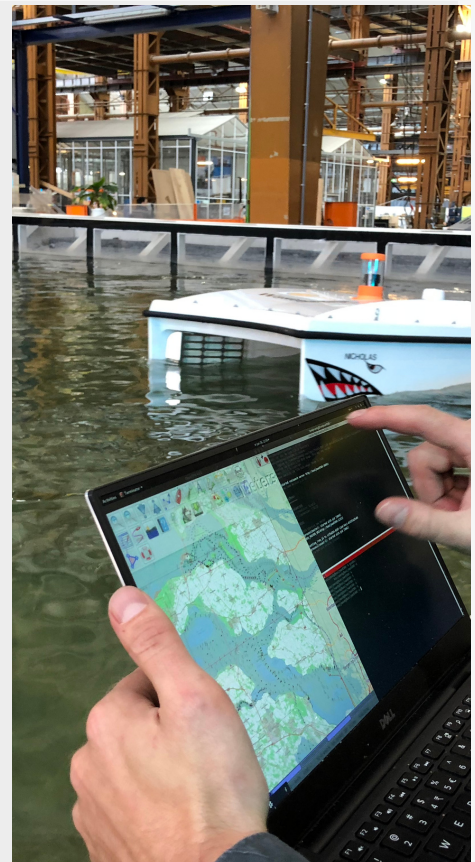
EXPECTED SOCIAL IMPACT

Currently the agricultural sector is facing huge sustainability challenges, especially those related to environmental, labour and social aspects in production. Various factors limit further incremental improvement of current systems. Breakthroughs and a paradigm shift are required for next-generation agricultural production systems that are sustainable, circular and nature-inclusive. UTOPIA proposes such a change through scalable data-driven precision agricultural practices. Increased yields will contribute to the required increase of food production for the world.

The automated data retrieval, processing and remote management of an offshore farm are required to enable safe and cost-effective growth of offshore crops. In order not to make the same mistakes as made with extensive monoculture farming on-land it is important to obtain a scientific and nature-inclusive approach. UTOPIA brings tools that are instrumental for support of scientific research, just-in-time seeding, installation, nurturing and harvesting the crops, with eye on ecology and yield while reducing unsafe work.

Keywords

- Cooperative
- Autonomous vehicles
- Digital twin
- Spatio-temporal interpolation

Duration

01/03/2021 - 30/06/2023

TRL

Technology Readiness Level 4 - 5

Consortium

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