aerOS
EUROPEAN IOT-EDGE-CLOUD

aerOS: Autonomous, scalablE, tRustworthy, intelligent European meta Operating System for the IoT edge-cloud continuum

PILOT 3: High Performance Computing Platform for Connected and Cooperative Mobile Machinery to improve CO2 footprint
John Deere & TTControl

Pilot & Scenario Overview

John Deere is a global leader in manufacturing agricultural, construction, and forestry machinery and operates several development centers across Europe, with significant presence in Germany, France, and Finland.

Within the Pilot 3, John Deere European Technology Innovation Center, involved in RD&I innovative agricultural machine technologies and related services, including precision farming, test fields, prototype construction machines, cooperates with TTControl, an experienced partner specializing in electronic control systems, including Electronic Control Units (ECUs), connectivity, electronic visualization, and Human Machine Interface (HMI) units.

The main motivation is to establish real-time connectivity between machines across extensive agricultural production systems thus enabling remote supervision and control of the agricultural work processes.

The pilot scenarios in Kaiserlautern (DE) are the following:
1. Cooperative large-scale production focusing on improving John Deere's fieldwork operations to achieve overall performance optimization
2. Basis for CO_2-neutral intelligent operations, e.g., farming, construction, forestry, by using collaborative swarm vehicles.

Infrastructure & Technology

The infrastructure consists of a prototype of a High-Performance Computing Platform where the data from sensors (e.g. cameras, machine sensors, geo-positioning) as well as operating instructions from a cloud that will be safely and securely processed to feed a grid-connected electric swarm vehicles. Cloud to cloud interoperability will be adopted for the optimization of the data used to remotely control the swarm of vehicles.
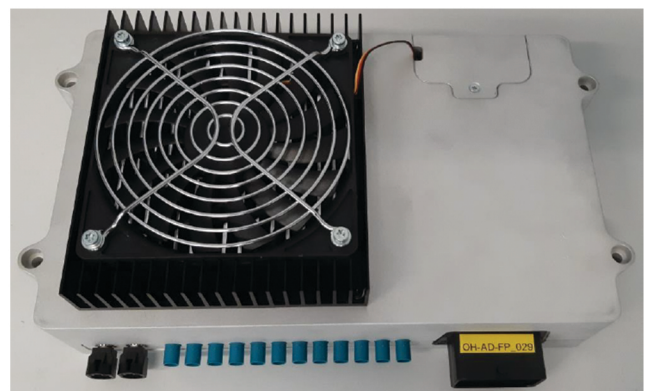
The developed solution will be capable to e.g. perform computational tasks in support of demonstrating fully electric swarm of vehicles safely and securely operating in platooning (up to TRL5) which will be integrated and validated in John Deere's functional prototype vehicle.

Objectives & Benefits

The objectives of the pilot are the following:
- Optimizing farming process by demonstrating closed-loop control of swarm vehicles and ensuring fully automated, safe, and secure execution at the edge.

- Creating an IoT environment with real-time, high-bandwidth, and low-latency connectivity in temporary networks, based on next-generation electronic building blocks and providing a safe and secure platform for executing advanced automation applications.

- Expanding the Open Edge Ecosystem which integrates standard-based interfaces (such as GMSL2) and widely available software elements (like Linux-based systems) and orchestrates various applications as on-demand services for facilitating midcaps, SMEs, and start-ups in developing new functions or services.

The expected benefit is promoting sustainable farming practices which optimize energy usage.

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