ECS 2024 GHENT BELGIUM 5-6 December

Embedded Intelligence

DAIS – Distributed AI Systems

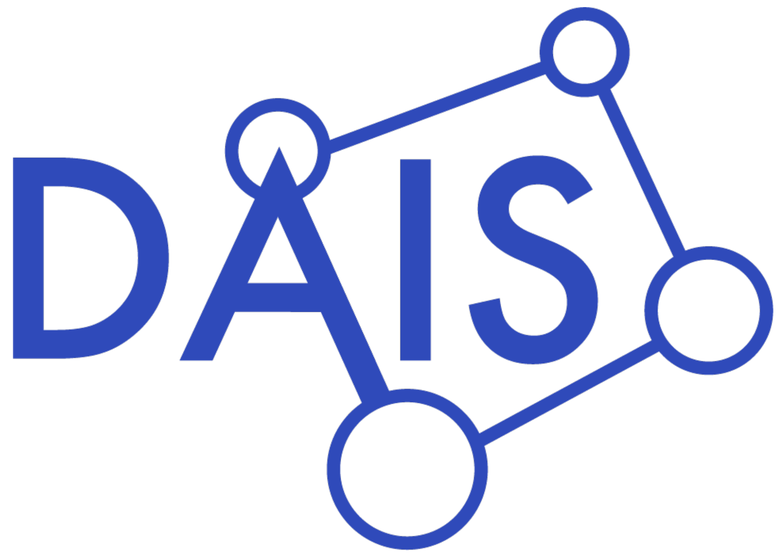
Challenges and objectives

Application Challenges

- *Digital Industry applications*
  - application of digital twins into industrial applications requires obtaining vast amount of real time in a time critical way to optimize system and improve energy efficiency.
- *Digital life applications*
  - data processed on the cloud systems could breach the security and privacy and considered to be risky.
- *Transport and smart mobility*
  - Processing data without delay for self provisioning, detecting and avoiding obstacles while transporting goods, monitoring fires, and other hazards.
  - The dynamic nature imposes several restrictions on of edge AI methods.

Overall Objectives

- *Develop Edge AI Components in hardware and software that are self-organizing, energy efficient and private by design*
- *Securely Integrate Edge components to cloud and fog*
  - Orchestration of AI tasks in different parts of the topology
  - Distributed security & privacy
  - Communication needs for highly distributed solutions
- *Work driven by demonstrators and Proof-of- Concept.*



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Selected technical results

Digital Industry

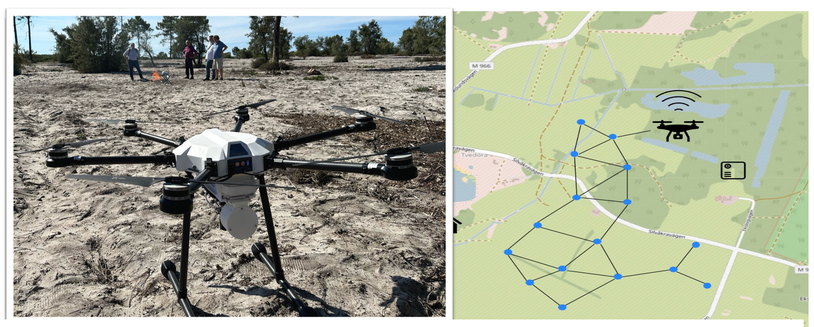
- *AI-driven AGV*
- *Enhanced production in process industry*
- *Frequency converters as edge nodes for automation*

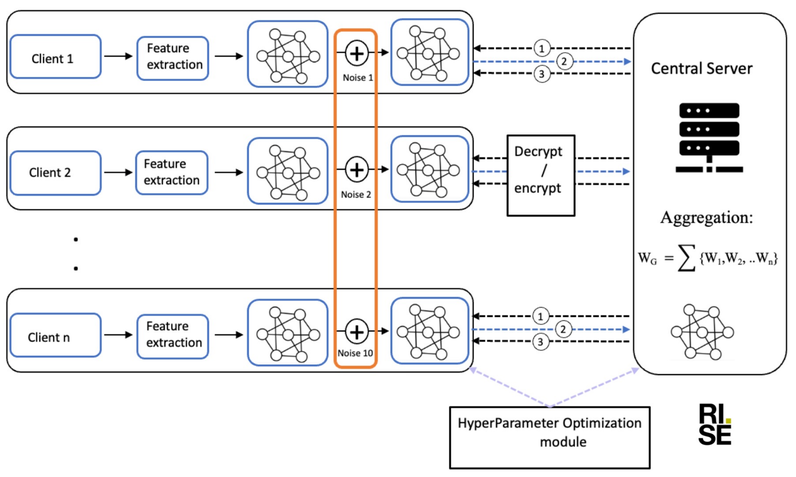
Digital Life

- *Privacy preserving AI & Federated Learning*
- *Emotion detection & User-centric AI*
- *Integrated Asset Tracking/Localisation*

Smart Mobility

- *Search and Rescue*
- *Intelligent Swarms for Object Scanning*
- *Environmentally Optimized Route Planning*





Example spanning multiple application areas: Demonstrator focusing on using AI for real-time fire detection and prevention, aiming to identify fire risks and send timely alerts. Explores methods for integrating AI with emergency response systems. **Expected results:** highly responsive system capable of preventing large-scale fires through early warnings. **Potential impact:** significant improvements in public safety, particularly in wildfire-prone areas, with scalable applications for urban disaster prevention.

Expected impact

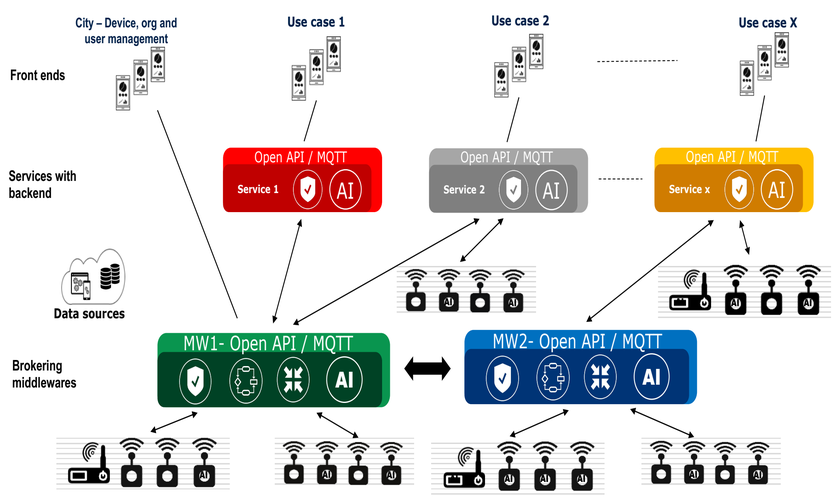
New European collaborations spanning hardware and software for edge computing and distribution AI systems: *The wide range of partners collaborating across the technology and application areas of DAIS ensures improved European digital sovereignty in AI and edge.*

Smarter Industries: *Improved industrial processes through AI-driven methods, leading to cost reductions and increased productivity.*

Enhanced Mobility Solutions: *Safer and more efficient transport systems powered by AI, supporting smart city initiatives and aerial search & rescue and monitoring.*

Data Privacy and Cybersecurity: *Deployment of robust, privacy-preserving AI systems that ensure GDPR compliance and safeguard critical infrastructures against cyber threats.*

Cross-Domain Innovation: *Demonstrators showcase seamless integration of distributed AI technologies, fostering scalable and interoperable solutions across industries, smart buildings, and urban environments.*



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