ARISE

Advanced AI and RobotIcS for autonomous task pErformance

Powering Up Agriculture and Green Energy with AI and Robotics

Problem Statement

In Energy and Agriculture, physically demanding and dangerous tasks have led to massive labour shortage, thus obstructing the ambitious EU targets of >55% greenhouse gas emissions reduction by 2030 and a 25% increase of organic farming land.

Workforce Forecasting:

Solar Industry: 5m workers predicted gap, only in Germany

Agriculture: A staggering 28% reduction, by 2030

Our Solution

ARISE aims to develop an advanced robotic platform to...

- strengthen Agriculture and Energy, two industrial sectors integral to the progress of the European Green Deal.
- offer unparalleled versatility in terms of autonomously or collaboratively performing long-horizon tasks, due to a toolchain of Robotic and AI/ML modules.
- contribute to the streamlined deployment of containerised AI-powered applications, by using an Edge-AI platform"

Targeted Industrial Applications

ARISE toolchain will be tested on five Use Case Scenarios (UCS) within the Energy and Agriculture sector:

Solar panel installation and repair

1. Navigation along the solar panel row, identifying backsheet cracks and deploying repairs.
2. Navigation and Rack Bolt fastening.
3. Picking up and carrying a solar panel in collaboration with a human worker.

Hydroponic lettuce transplanting and harvesting

1. Lettuce transplanting.
2. Lettuce harvesting.

ARISE Technologies

1. A novel, pneumatic-based reconfigurable manipulator, with advanced soft end-effectors.
2. A Hierarchical Imitation Learning module.
3. An Ontological framework for Knowledge Representation.
4. A cognitive algorithm module encompassing Active Perception, Semantic Mapping and Localisation capabilities.
5. An edge-native, resource-optimised and automated computing infrastructure.

Expected Impact

- Achieve substantial “next step autonomy” in robots, undertaking non-repetitive tasks.
- Accelerate enabling conditions essential for the diffusion of robots in various industries.
- Enable a step-change with respect to science towards the automation of manual tasks.
- Deliver a step change in autonomy, handle tasks autonomously for a long periods of times.
- Improve performance by reducing errors and increasing speed and productivity.

This project has received funding from the European Union’s Horizon Europe programme under Grant Agreement N° 101135959.