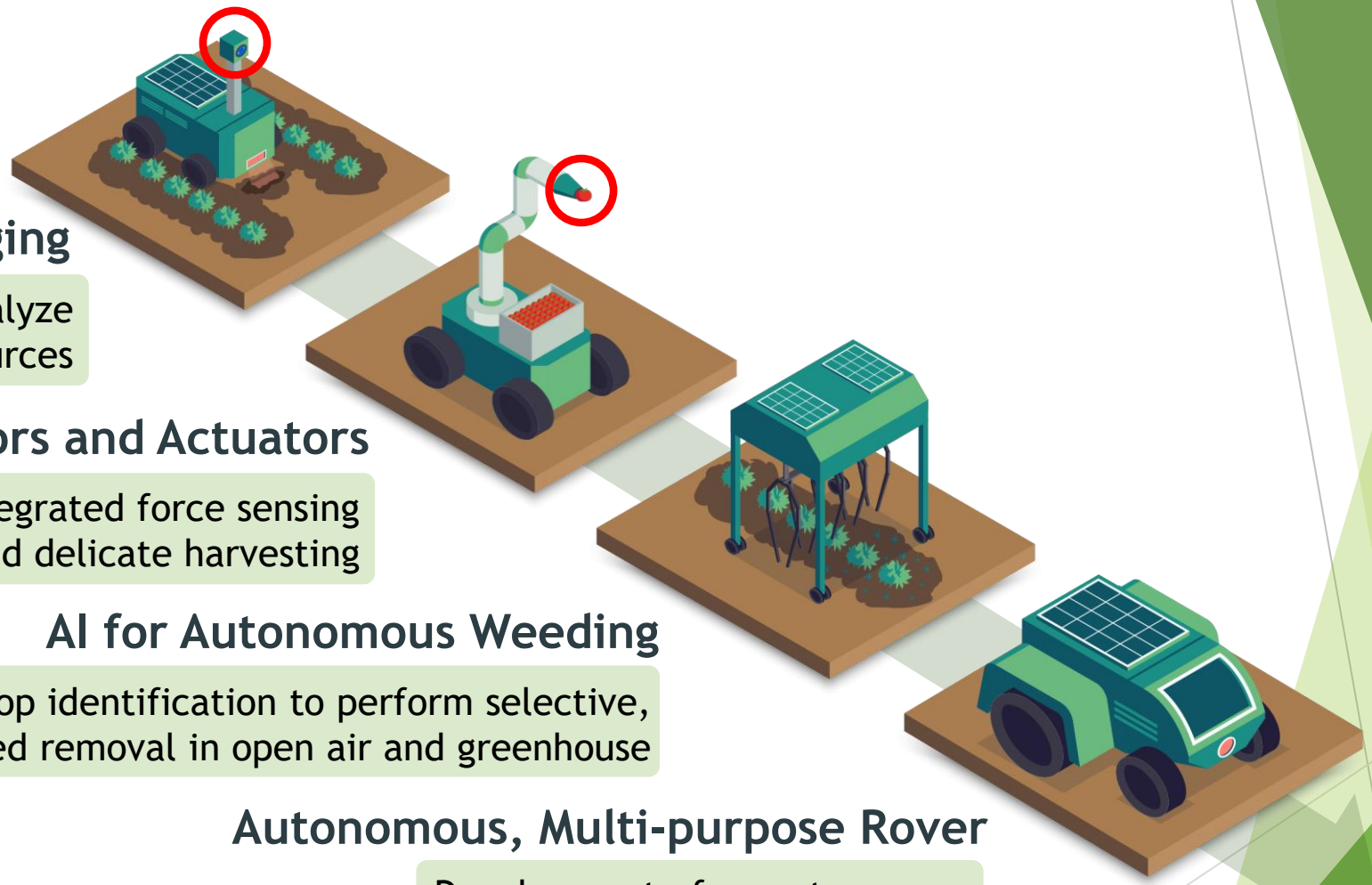
UNIVERSITÀ di VERONA

Agri Project

Riccardo Muradore, Francesco Visentin
Simone Cremasco, Edoardo Fiorini, Fabio Castellini

LTAIR robotics lab

ROBOTICS & AUTOMATION IN AGRICULTURE



Advanced Imaging

A multispectral camera to analyze crops using different light sources

Smart Sensors and Actuators

Soft gripped with integrated force sensing for precese and delicate harvesting

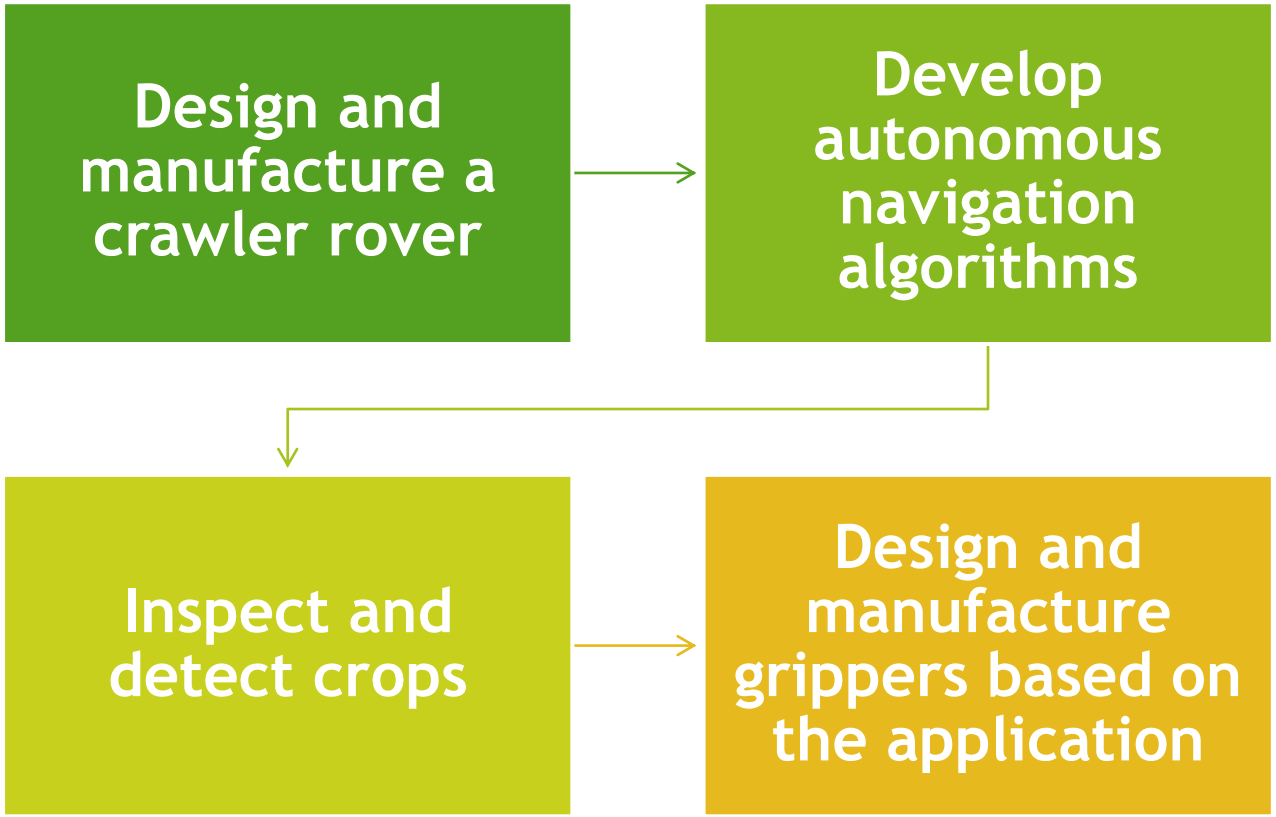
AI for Autonomous Weeding

AI-based crop identification to perform selective, autonomous weed removal in open air and greenhouse

Autonomous, Multi-purpose Rover

Development of an autonomous rover for agrifood applications

PROJECT OBJECTIVES



The Crawler Rover

Achievements

Modular, easily customizable and robust mechanical structure.

Modeling of a differential drive crawler rover.

Anthropomorphic Cobot (UR5e) to perform crop detection and inspection routines.

Integration of sensors such as LIDAR, GPS, RGBD and Multispectral cameras, IMU.

Autonomous navigation

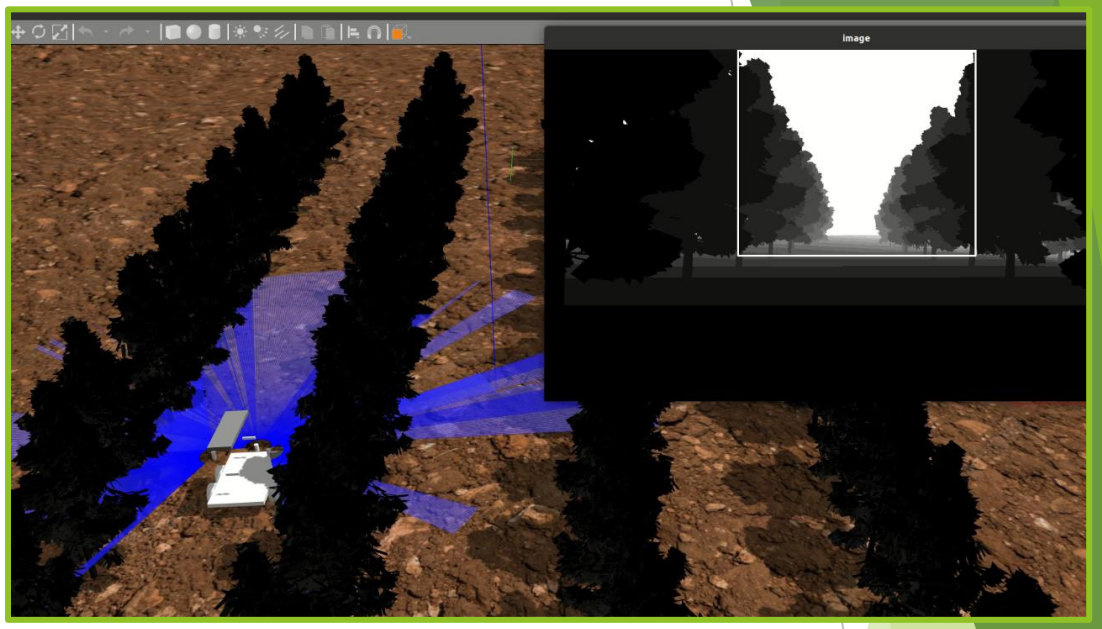
Achievements

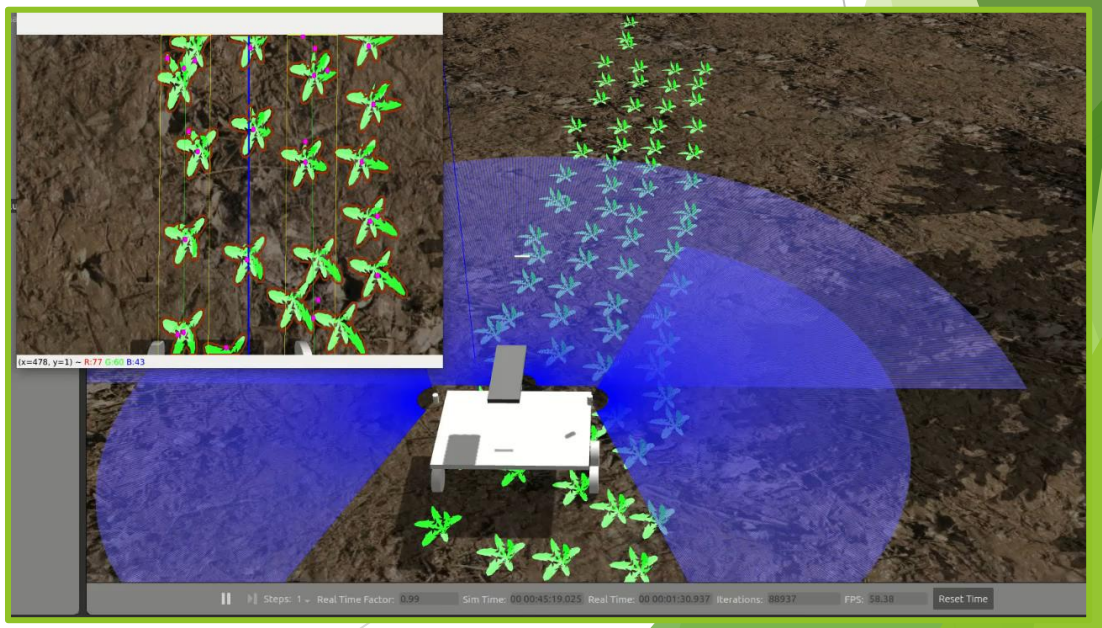
Navigation algorithms based on visual features for ground and vertical cultivations.

Obstacle detection algorithms that exploit 3D cameras and 2D LIDAR sensors.

Automatic alignment to the detected crop row.

Short range manual teleoperation using a radio controller; ***long range teleoperation*** capabilities through web interface.





Inspection & Detection

Achievements

- ***Deep Learning models*** to detect and classify crops at runtime.
- ***Computer Vision algorithms*** to identify crops based on a certain HSV/RGB/LUV color band.
- ***Inspection capabilities*** exploiting an assembled multispectral camera (NDVI or related indices).
- ***Ability to store information*** such as crop location, ripeness, vegetation index.

FUTURE GOALS

- Test the developed algorithms on field and make them robust
- Design and manufacture grippers based on the required application
- Perform inspection and grasping while navigating through the rows

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Thanks for the attention

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