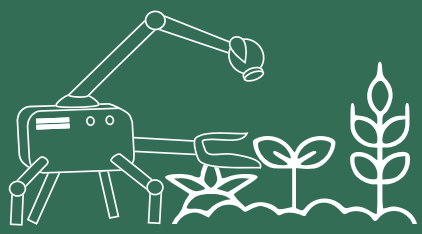
ROBOTIC InterCropping

UNIVERSITY OF COPENHAGEN · WAGENINGEN UNIVERSITY & RESEARCH · DTU · SDU Syddansk Universitet

A collaboration project to co-design robotics and intercropping systems



Smart Implements for Robotic Intercropping

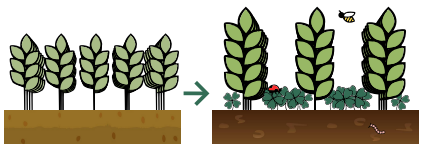


Sustainable Agriculture · **Autonomous Robotics** · **AI & Perception**

Jeppe Hansen, Aljaz Kramberger, Leon Bodenhagen, Simon Faarvang Mathiesen

The Maersk Mc-Kinney Moller Institute, University of Southern Denmark

1. Motivation



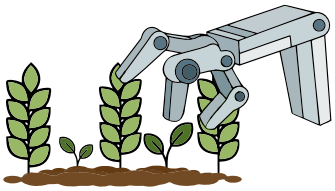
- Monoculture farming leads to **soil degradation**, **biodiversity loss**, and high chemical use.
- Intercropping offers a more **sustainable**, resilient alternative.
- Challenge: intercropping is **complex** and incompatible with conventional machinery.

2. Goal



- Autonomous robots make intercroping **practical**.
- **Plant-level precision** using AI, sensing, and control.
- **Reduced** chemical inputs, **increased** biodiversity, and better land use.

3. Research Focus



- Design lightweight, task-specific **robotic implements**.
- Integrate **sensors and actuators** for precise interaction.
- Enable **selective** and **targeted crop management** in mixed systems.

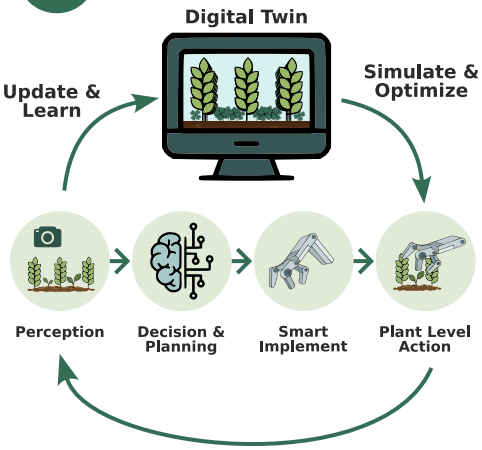
4. Approach

1. **Perception** — Vision-based crop and anomaly detection using deep learning.
2. **Control** — Visual servoing and real-time trajectory generation for precise interaction.
3. **Digital Twin** — Simulate field, plants and robot for testing, decition-making, and optimization.
4. **Field Deployment** — Evaluation and validation in real intercropping fields.

5. Research Questions

1. What is **required** to achieve successful intercropping?
2. How to **design** smart implements to accomplish these requirements?
3. Can **AI-based** methods assist in automating implement design and suggestions?

6. System Overview



Perception → Decision → Action → Learning
Precision intervention in complex environments

Funded

novo nordisk foundation

Follow the project

Connect

Jeppha@mmmi.sdu.dk

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