Title: Systematic Testing of Agricultural Robots in Simulation and Reality with a Focus on automatic Design and Optimization of Sensor Configurations for Tractor-Implement Combinations

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Abstract:

The integration of robotics and artificial intelligence in agriculture represents a new dimension of innovation that has the potential to revolutionise the sector. However, a major challenge is the translation of robotics and AI research into practical, commercial products, particularly in agriculture. This is particularly relevant as modern mobile robots in agriculture increasingly rely on combinations of autonomous tractors and implements, creating a complex ecosystem of machines that require precise coordination and control. The multitude of possible combinations between tractors and implements places high demands on the robots' environmental perception, navigation capabilities and sensor configuration. This complexity highlights the critical need for physical and virtual test facilities that are capable of evaluating and optimising these systems in a comprehensive manner.

This work addresses these challenges by developing an approach for testing and optimising sensor configurations for robot-implement combinations using a combination of simulation-based test environments and real-world experiments. It should be possible to map the dynamic interactions between these elements as accurately as possible under different operating and environmental conditions. The aim is to automatically design and optimise the sensor configuration for effective navigation and environmental perception. The simulated evaluation of the sensor configuration will be complemented and validated by physical tests of the robot-implement combinations.

References:

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