

Test and Validation

2025WP3_Octiva_002

Status: Completed



Technical Functionality

Problem Owner

Octiva BV

Involved

TomatoWorld
InnovationQuarter
Plantfellow

More information?

Jan Anthonis



Extension of the navigation capabilities of an autonomous vehicle through the application of visual markers

With the development of a universal implement interface in UC12, Octiva's autonomous vehicle can also be deployed for tasks other than powdery mildew treatment. During such treatments, the vehicle navigates sequentially through crop rows. New implements require trajectories other than simply following crop rows in sequence, and for these applications the navigation capabilities of the Octiva vehicle are often too limited.



Broad knowledge question

Autonomous navigation has long been known in greenhouse horticulture but is generally limited to fixed aisles due to rigid infrastructure elements that cannot be installed within crop rows. Can flexible infrastructure elements lead to a breakthrough in autonomous navigation throughout the entire greenhouse, including within crop rows?

Approach

- Determining the detectability of Aruco markers under operational conditions
- ArUco markers are used (a type of QR code for navigation). Various conditions are created and tested, including lighting conditions, viewing angle, marker positioning relative to greenhouse infrastructure, crop influence, and others.
- Detectability and positioning accuracy are determined using a known reference.
- Tests were carried out both under controlled conditions and in the operational greenhouse environment at TomatoWorld.

Goal

- Assess the detectability of ArUco markers under operational conditions.
- Determine positioning accuracy using ArUco markers.

Results and reflection

- The optimal marker size, combined with the appropriate number of cells and texture, was identified.
- The camera must have a wide dynamic lighting range. Resolution is of lesser importance. Image sharpness should be good but is not critical.
- Standard lenses are sufficient.
- Accurate XYZ positioning is only possible when the camera views the marker perpendicularly.
- Localization is better when the marker is positioned at a higher elevation than when placed close to the ground.
- Depth measurements are generally quite accurate.
- ArUco markers are a valuable addition to localization methods but are not sufficient on their own to achieve high positioning accuracy.