



Robotic Systems for Vegetable Crop Management

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Harvesting tool

- Customized robotic end-effector
- Crop-specific and interchangeable

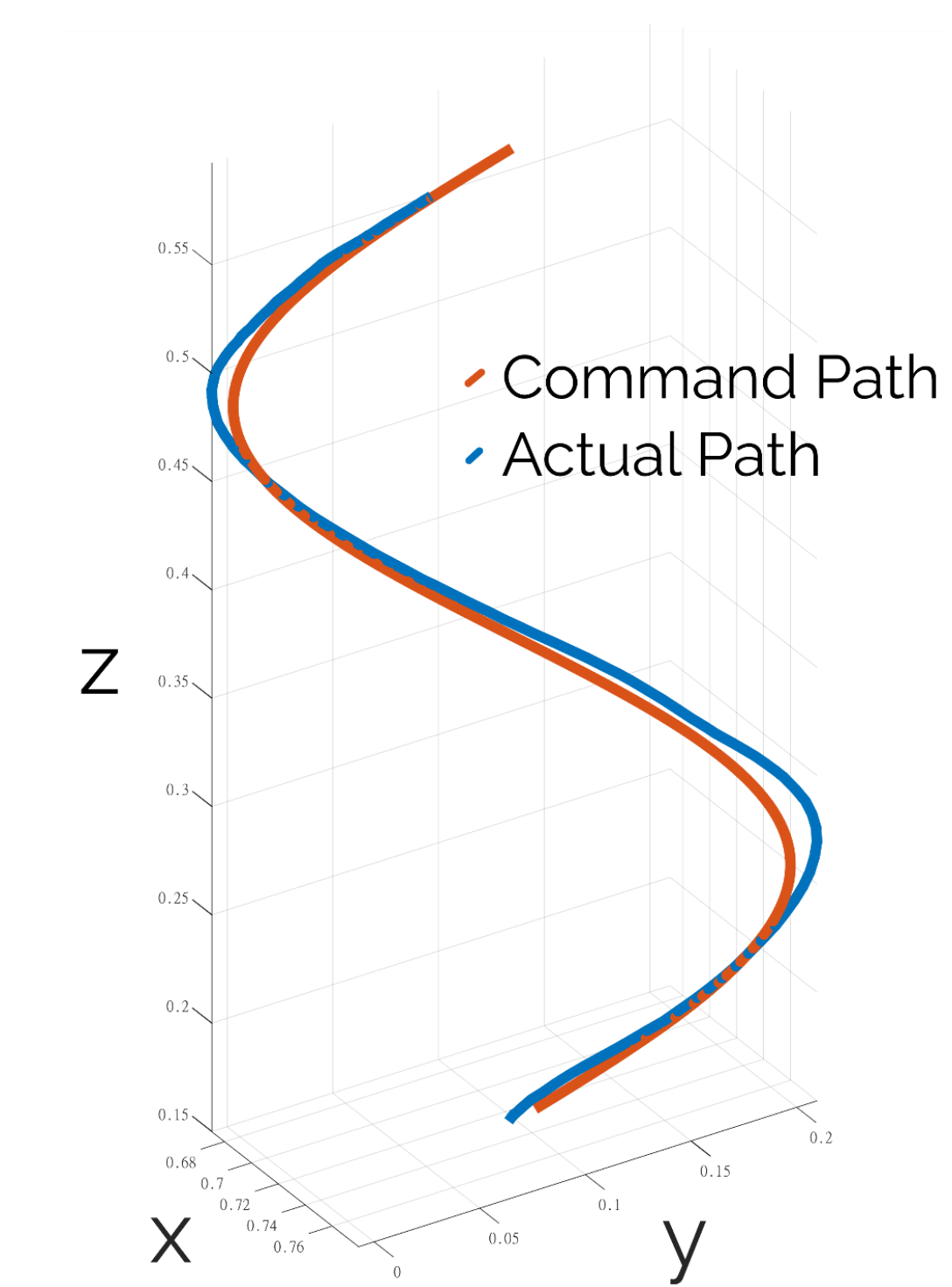
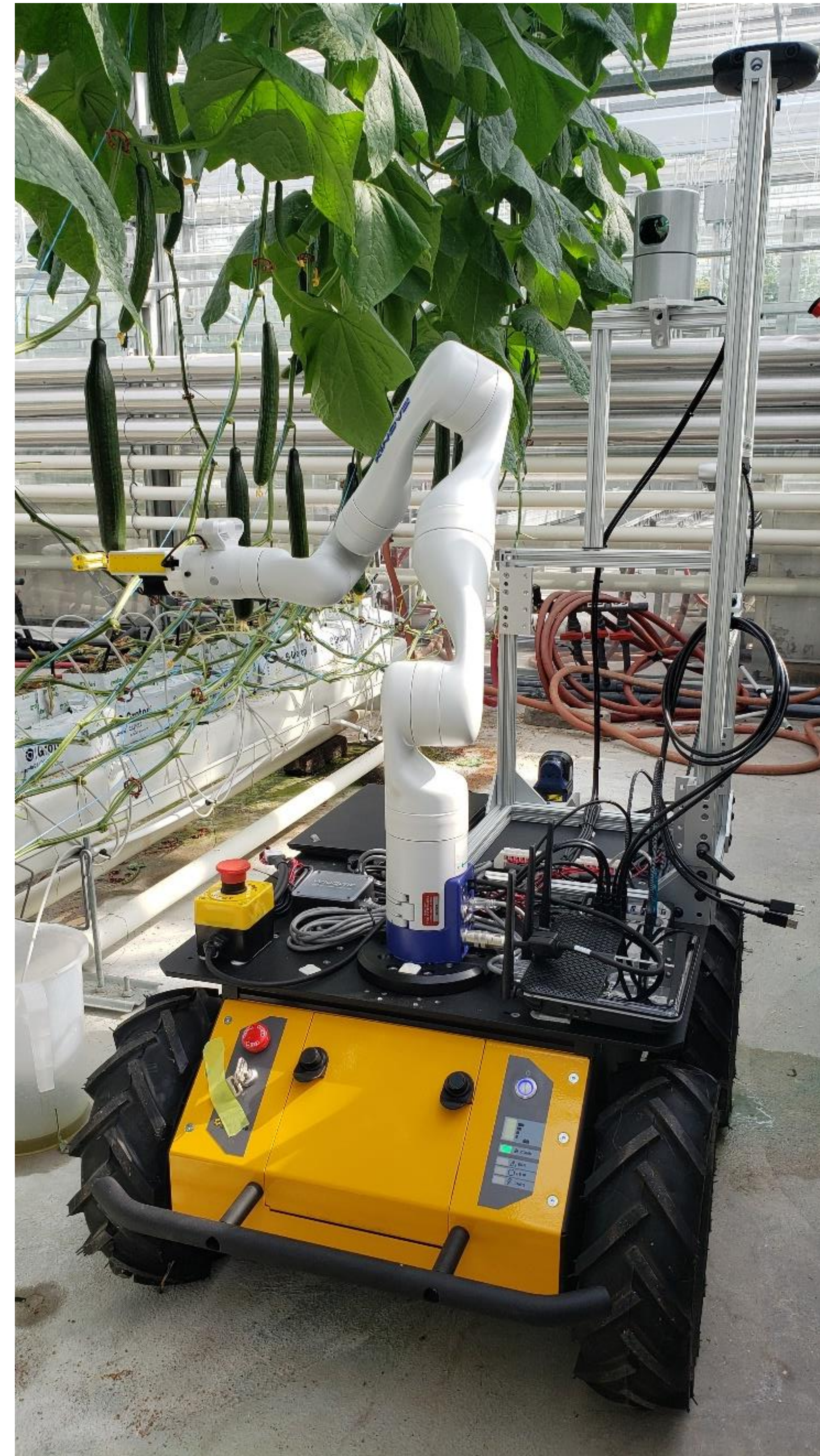
Robotic manipulator

- Versatile motion control and placement of the harvesting tool within crop area
- 7 degrees-of-freedom (DOF) for positioning in any orientation in 3D space
- Collaborative design for safely working alongside greenhouse staff and reduced risk of damage to plants



Mobile platform

- Allows practical travel throughout the greenhouse
- Accommodates pipe rails or bare floor
- Equipped with sensors and cameras for fruit detection, 3D mapping, localization, etc.

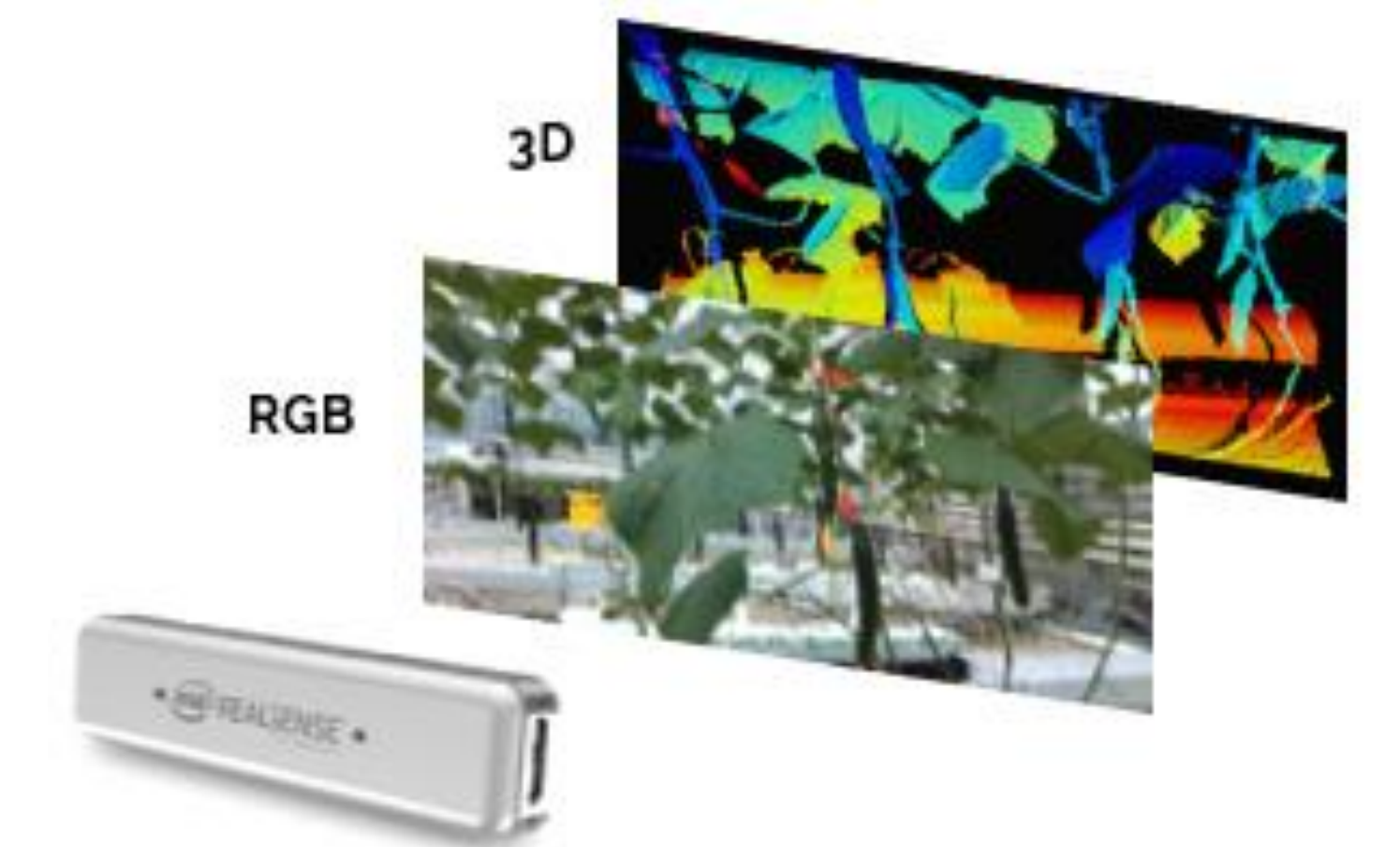


Path tracking algorithm

- Predictive control method precisely directs the end-effector along a path at a consistent speed
- End-effector oriented perpendicular to the path to control contact with targets
- Mobile platform motion integrated to remain on path while the platform moves

Vision

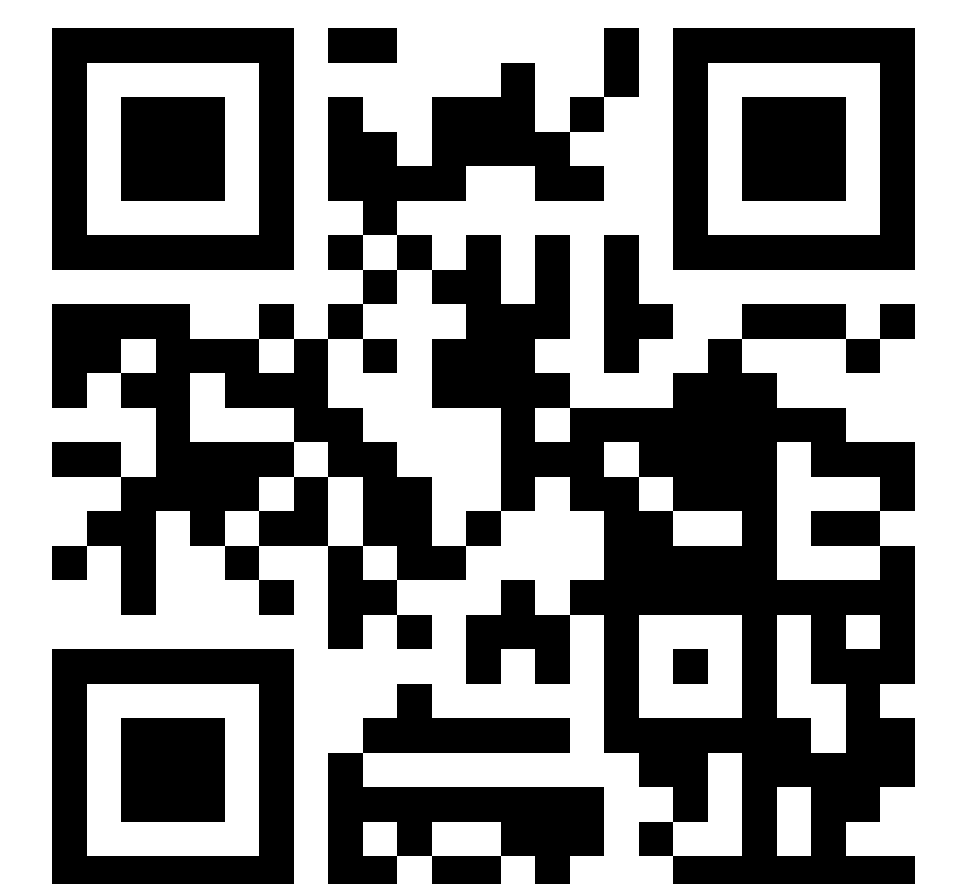
- Detects fruit
- Determines ripeness
- Localizes in 3D space
- For more information, see CGC 2021 poster *Computer Vision for Horticulture Robotics*



System control

- Uses Robot Operating System (ROS), an open-source software framework for modularity
- Centralizes control over computer vision, robotic manipulator, harvesting tool and mobile platform

Follow this QR code or click the hyperlink below to see a video of the cucumber harvesting system:
<https://youtu.be/fbJzuCIZO14>



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