CPS: Small: Learning to Pick Fruit using Closed Loop Control and In-Hand Sensors

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Motivation: fresh market tree fruit growers still rely on a large seasonal labor force for harvesting. Robotic harvesters are not yet commercially available.

Objective: use proprioception, localized sensing, and observed forces to develop robust, autonomous fruit picking methods.

Progress:

- We have fabricated a prototype gripper with custom tactile sensors that provide inertial and pressure data during a picking sequence
- We have developed an artificial apple proxy with realistic mechanics to enable ground truth, year-round collection of the large datasets required for reinforcement learning techniques

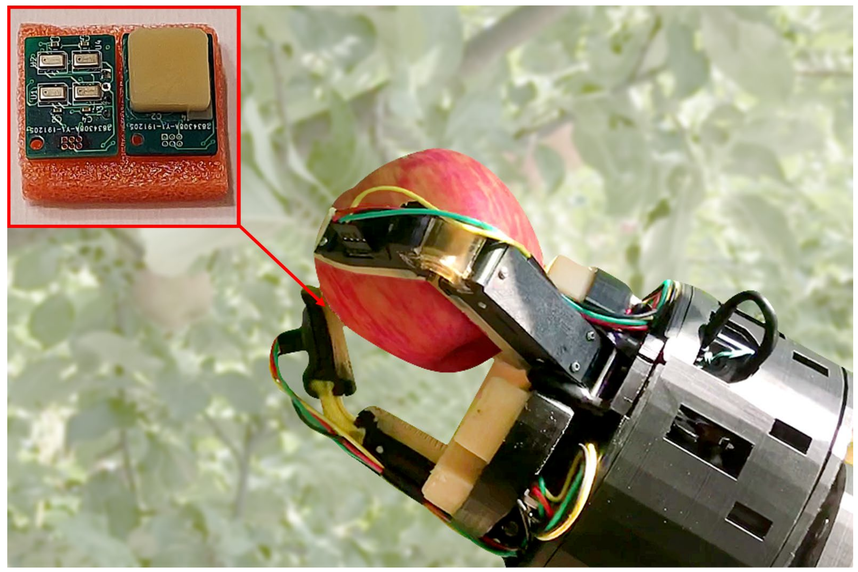

Figure 1. Our robotic system executes an apple pick using a prototype gripper with fingertip tactile sensors (*inset*). The sensors include an inertial measurement unit and four pressure sensors cast in a soft silicone pad.

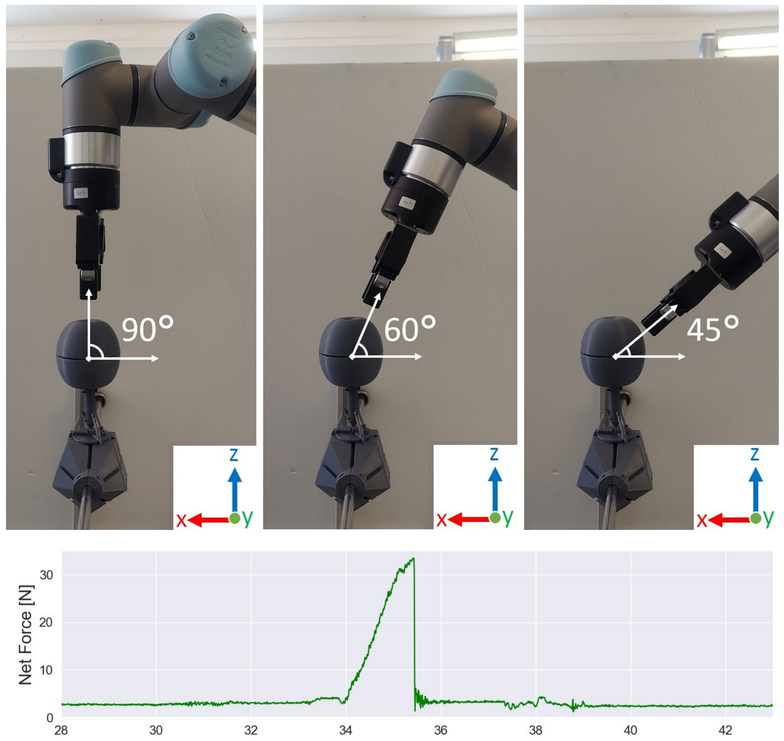

Figure 2. Preliminary picking trials with the synthetic apple proxy indicate that it replicates the mechanics of apple picking.

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