Distributed co-Robots for Strawberry Harvesting

Background and Motivation

- Harvesting is a major cost of production in fruit crops.
- Strawberry product declines due to labor shortage.
- Co-robots will work in a decentralized fashion.
- Small harvesting robots scouting through a field.

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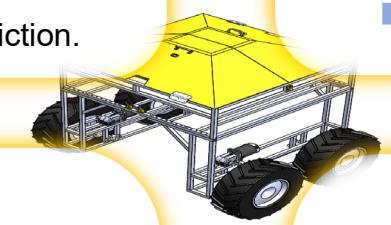
- Project duration: 9/2019 – 9/2023

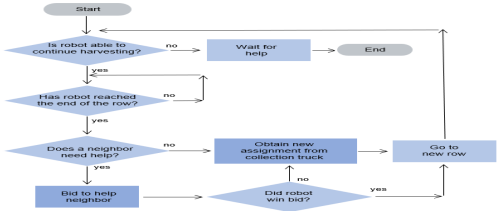
Research Thrust 1: Scheduling and Control of Small Robots (UCF)

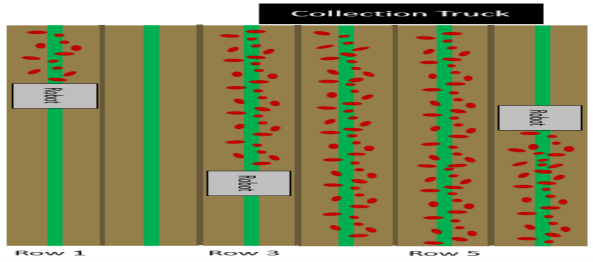
Background and Motivation

- Small harvesting robots scouting through a field.
- Easier to transport
- No single-point-of-failure, very low downtime impact
- Easily adaptive to field variations
- High platform flexibility
- Row allocation algorithm will be scalable, fast, no-confliction.



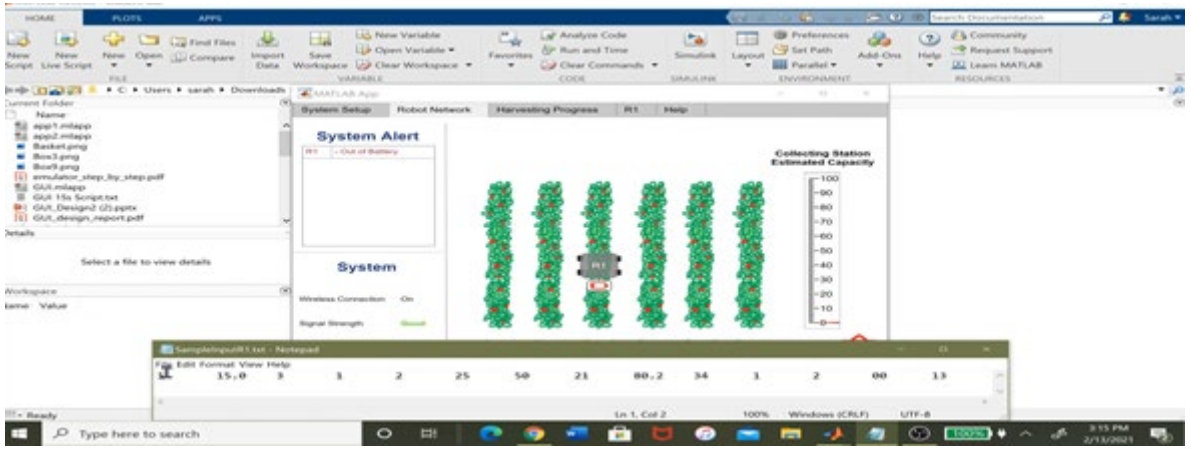
Row Scheduling





Motion Control

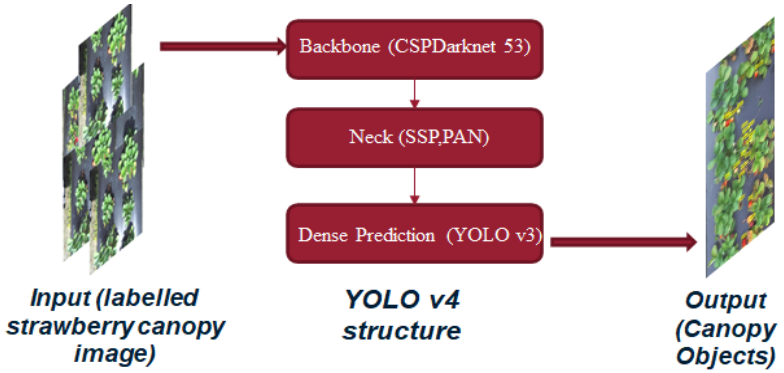
GUI

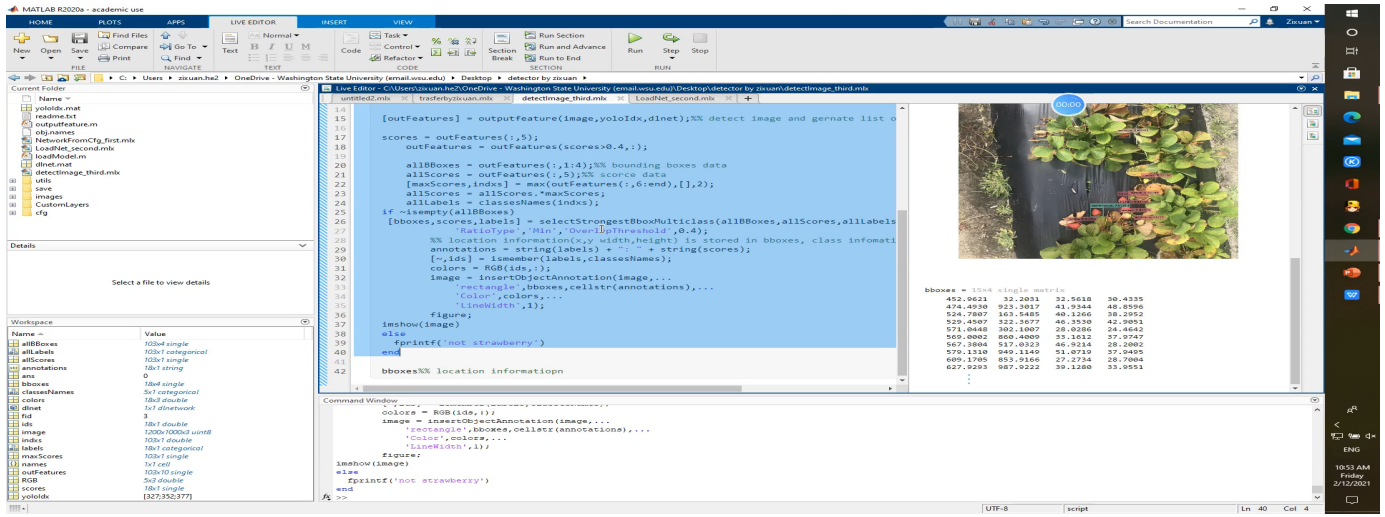


Research Thrust 2: Strawberry Canopy Object Detection and Localization (Washington State University)

Highlights

- Detected five classes of canopy objects and provided accurate strawberry locations.
- Varying lighting conditions and field environment were accounted for
- Model is fast and shows a potential for real-time application in robot picking

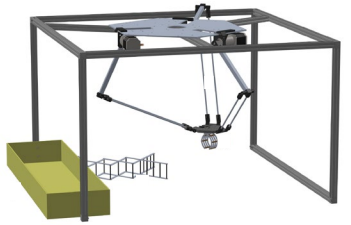




Research Thrust 3: Picking and Transport Mechanism (UC Merced)

Highlights

- Parallel-arm design.
- End-effector
- Kinematic analysis
- Energy saving



Picking and Transport Mechanism:

- Task 1 - Parallel-arm design
- Task 2 - End-effector
- Task 3 - Kinematic analysis
- Task 4 - Energy saving