



Distributed co-Robots for Strawberry Harvesting



Background and Motivation

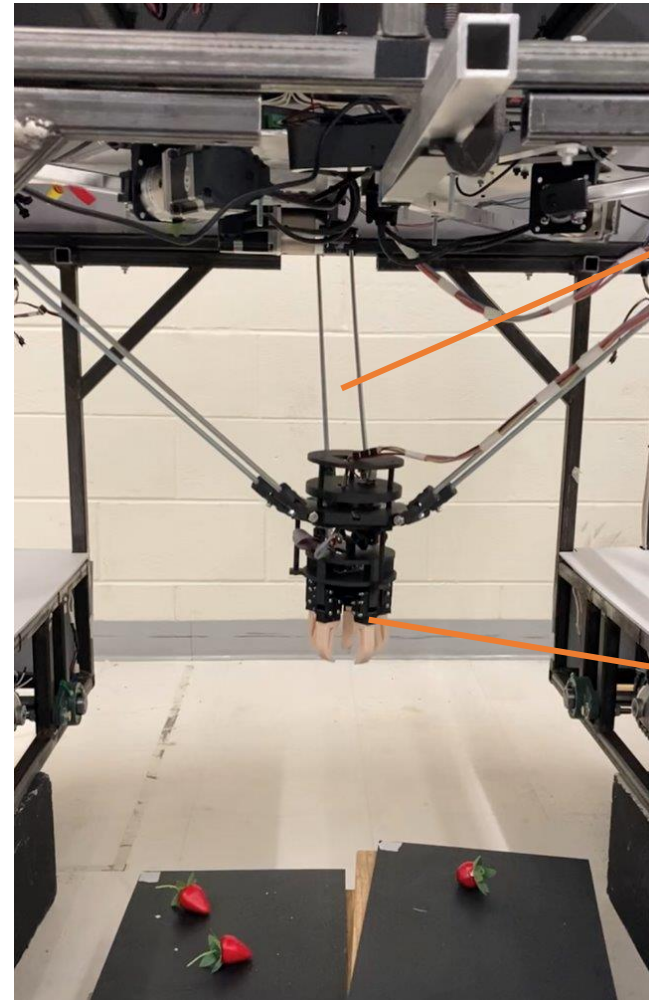
- Harvesting is a major cost of production in fruit crops.
- Strawberry product declines due to labor shortage.
- Co-robots will work in a decentralized fashion.
- Small harvesting robots scouting through a field.

NSF #1924662

- Dr. Xu, University of Central Florida, Orlando FL
- **Dr. Ehsani, University of California, Merced, CA**
- Dr. Karkee, Washington State University, Spokane, WA
- Project duration: 9/2019 – 9/2023

Picking and Transport Mechanism:

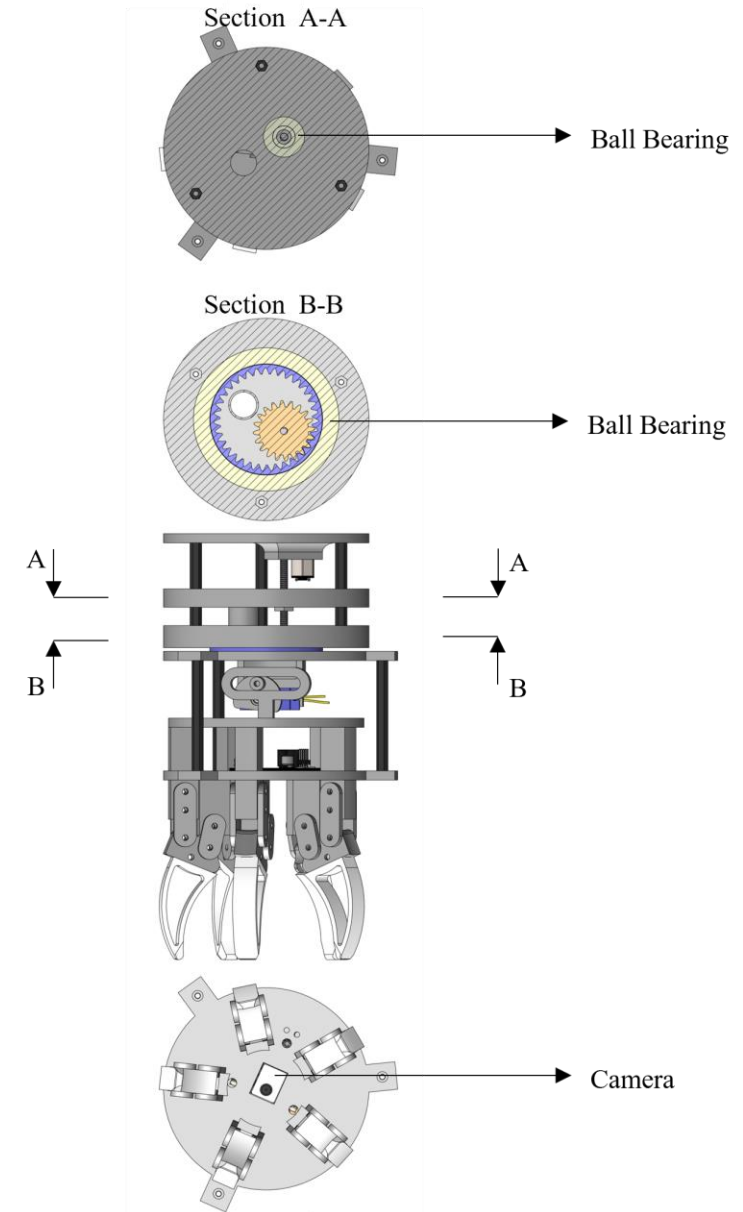
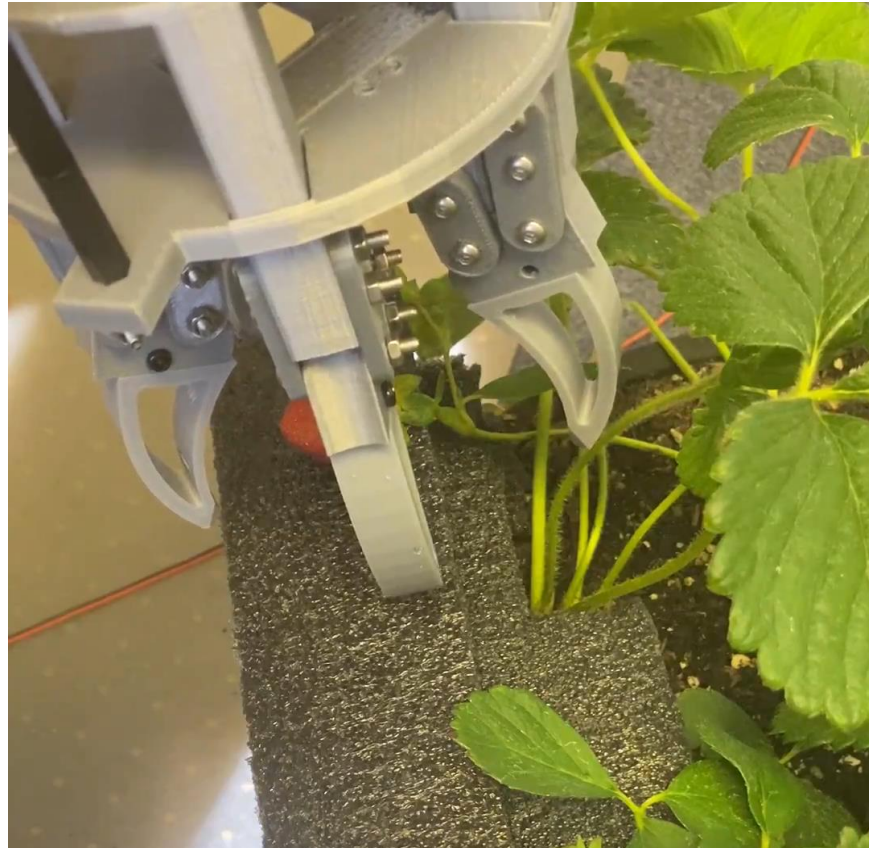
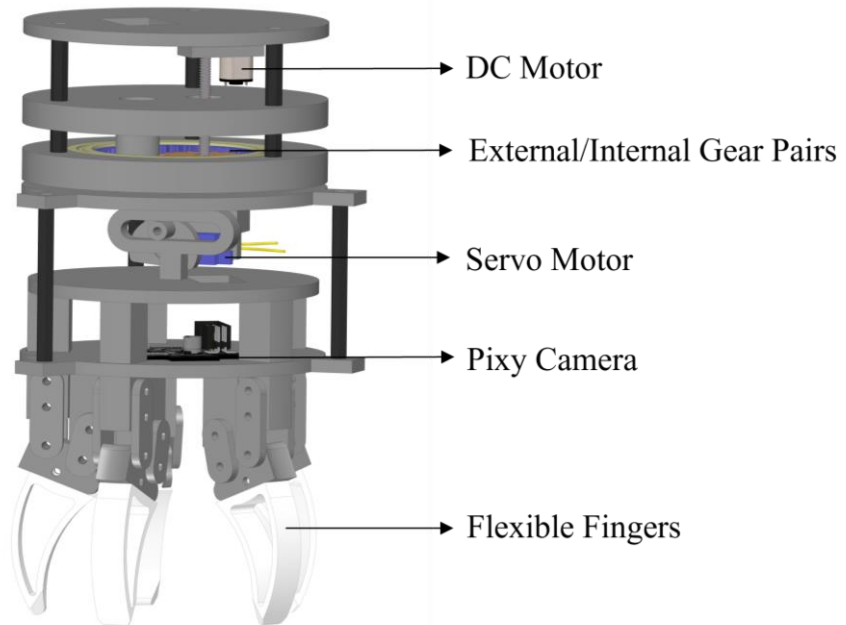
- Task 1 - Delta robot design
- Task 2 - End-effector
- Task 3 - Kinematic analysis
- Task 4 - Energy saving



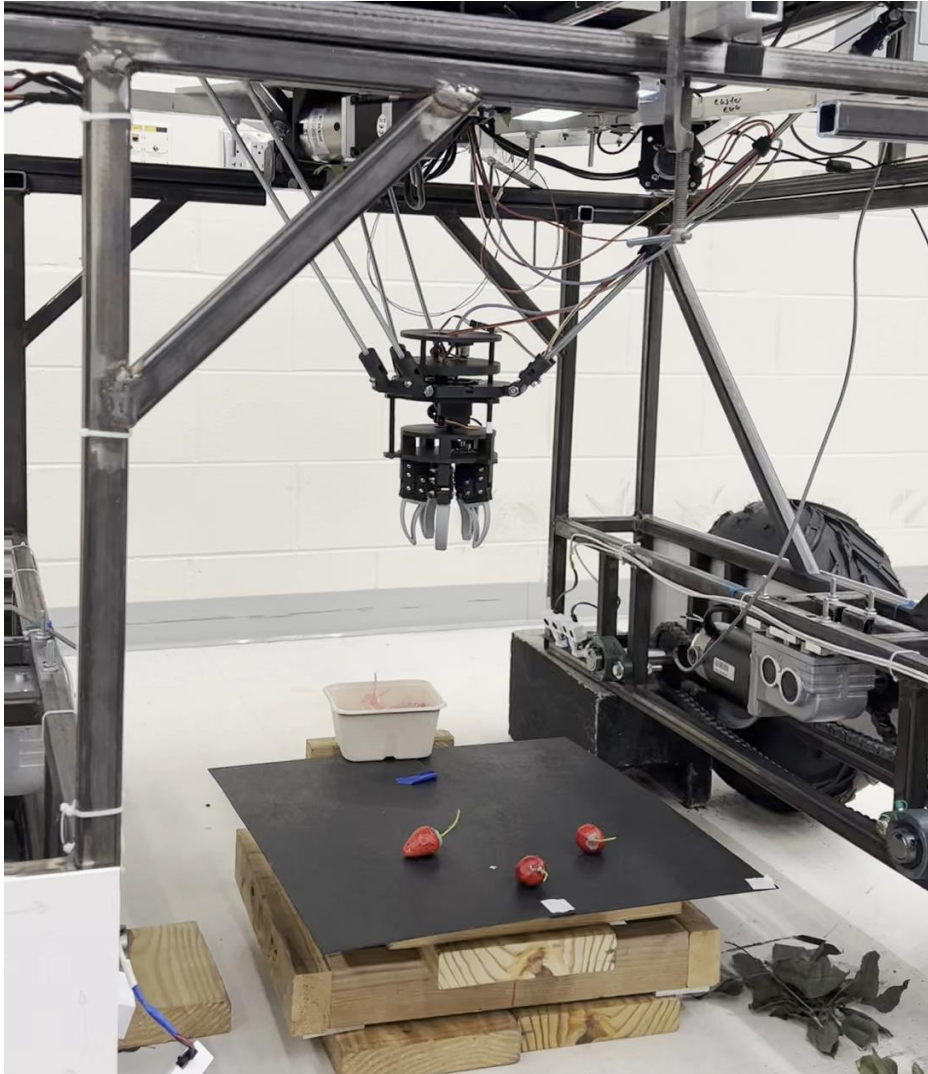
Delta robot

End-effector

End-effector



Laboratory Testing



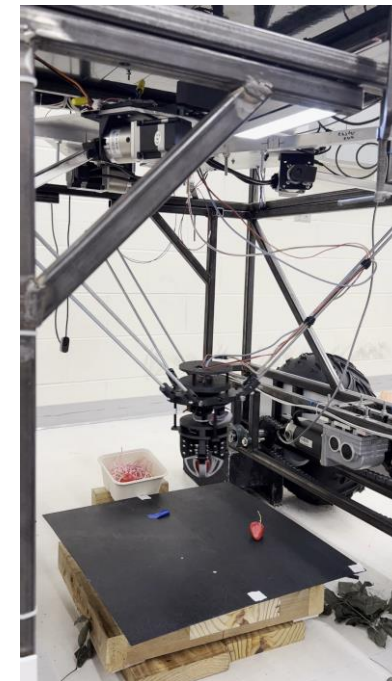
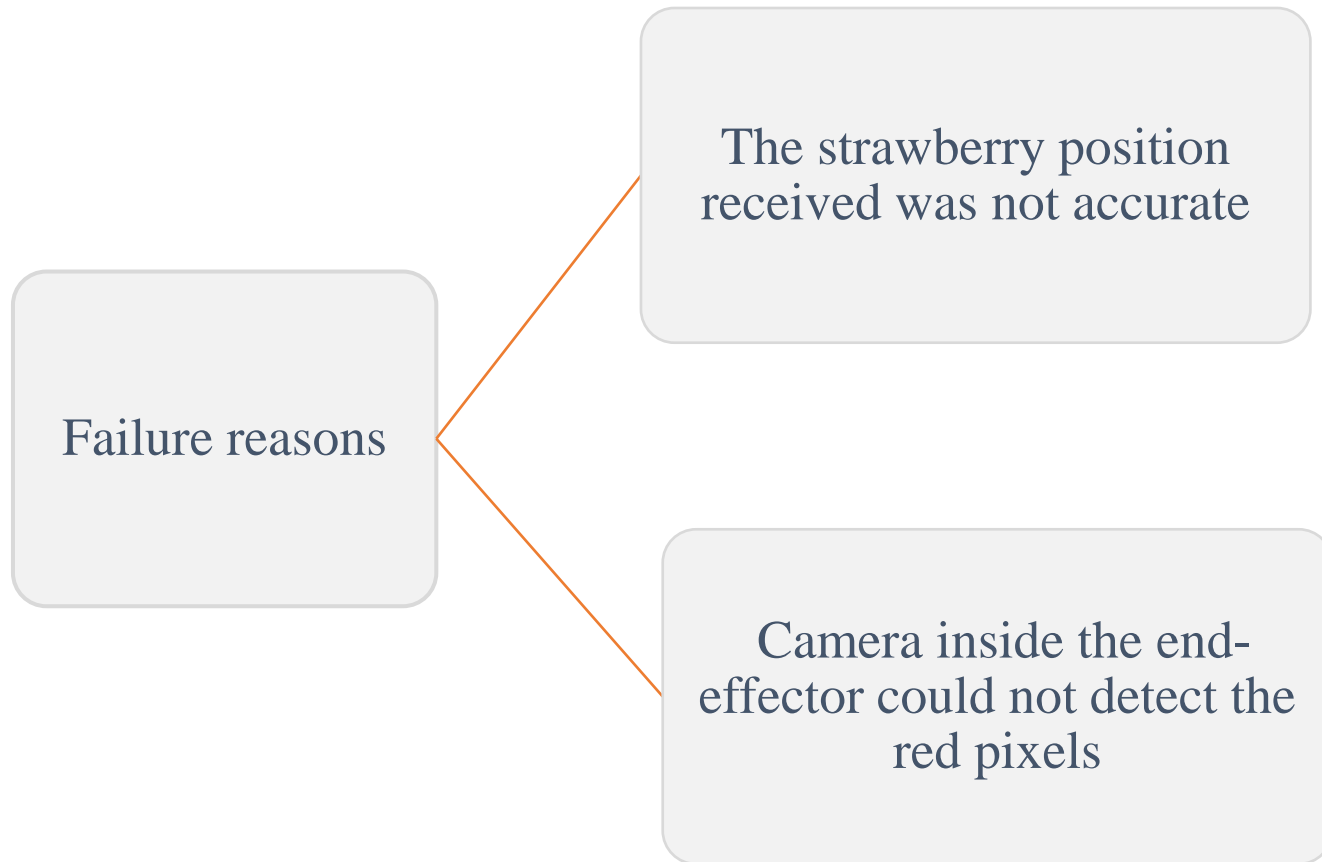
No. Target fruits	Grasp success	Harvest success	Harvest time	Average harvesting attempts
9	100%	77.7%	80(s)	1.3
6	83.3%	83.3%	50(s)	1
5	80%	60%	45(s)	1.4
5	100%	80%	40(s)	1.2
3	100%	100%	27(s)	1
6	100%	100%	55(s)	1
5	80%	80%	40(s)	1.2

Grasp success average \rightarrow 92%

Harvest success average \rightarrow 82%

Harvest time of a single fruit \rightarrow 7 s

Laboratory Testing



Thanks

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