

MULTIPURPOSE DEXTEROUS AND CONTINUUM ARMS FOR COMPACT AGBOTS (20-21)



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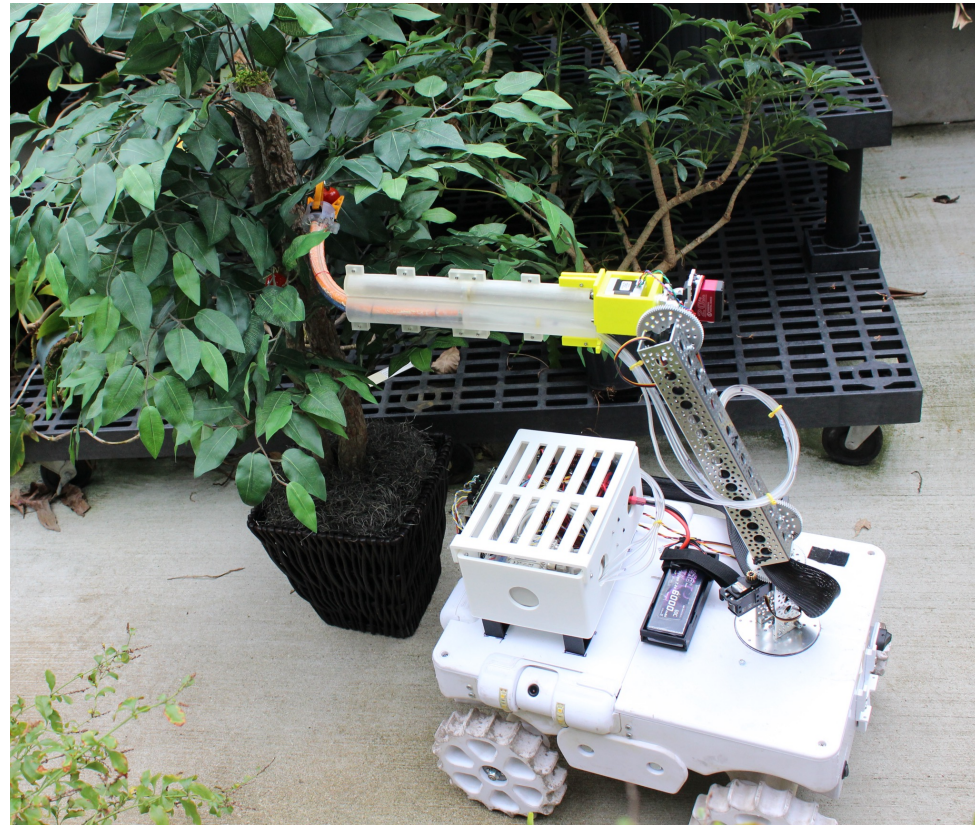
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Challenge

- Agricultural robots requires dexterity and reach

Solution

- New Soft+Hard: Hybrid robots
- New design tools with coserat rod models
- Control of continuum arms with reinforcement learning



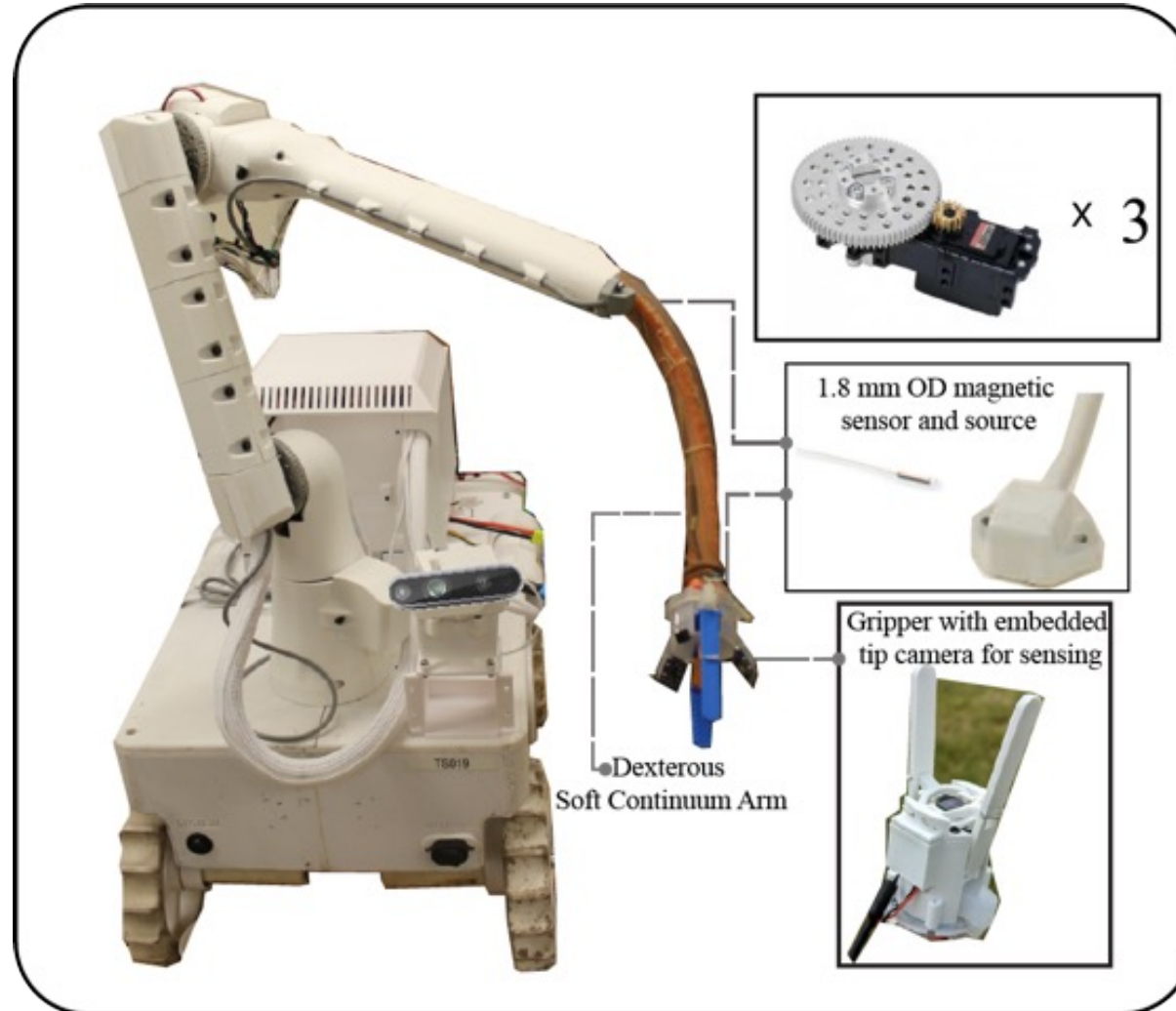
Scientific Impact

- Advancing the science of dexterous robotics
- Advancing control and modeling

Broader Impact

- Solutions for the agricultural labor crisis!
- Far cheaper soft-arms for the same level of reach and dexterity
- K-12 outreach through Not Your Old McDonald's Farm

Hybrid Hard - Soft arm



TerraSentia 2018 robot

End effector position sensing
With electromagnetic tracking

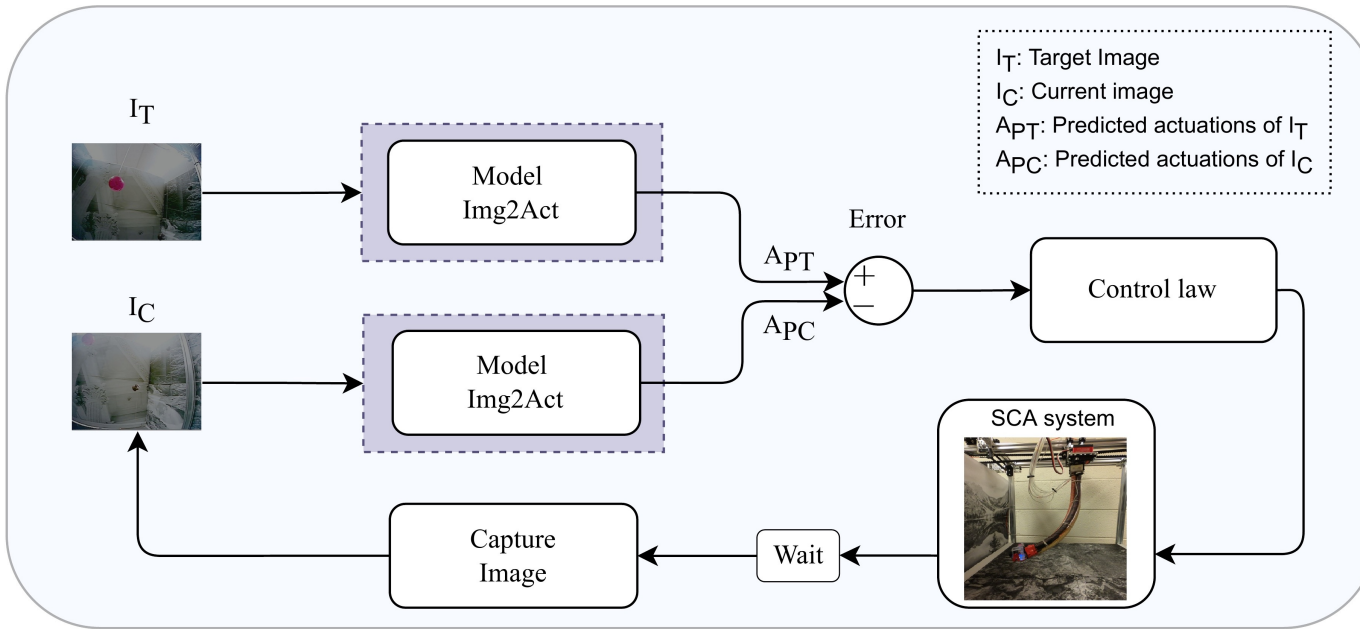
Berry on the periphery



Berry in the interior



Visual servoing for pose control of SCA



(a)

Fig (a): Workflow of our method to reach the target image given current image

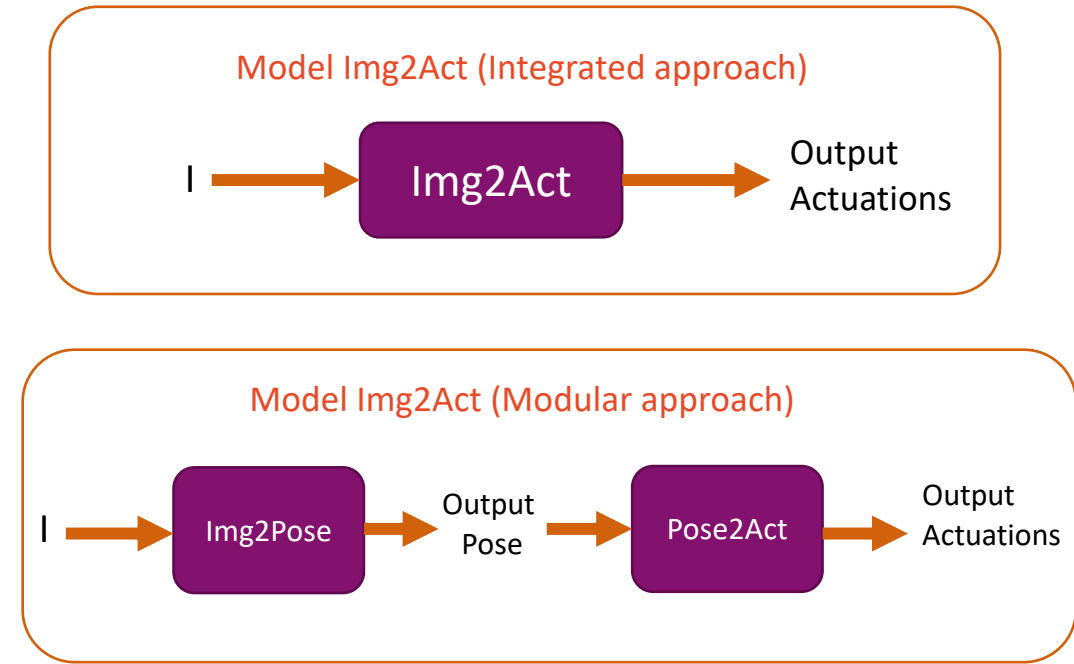


Fig (b): Two different approaches (*modular* and *integrated*) to map image to actuations

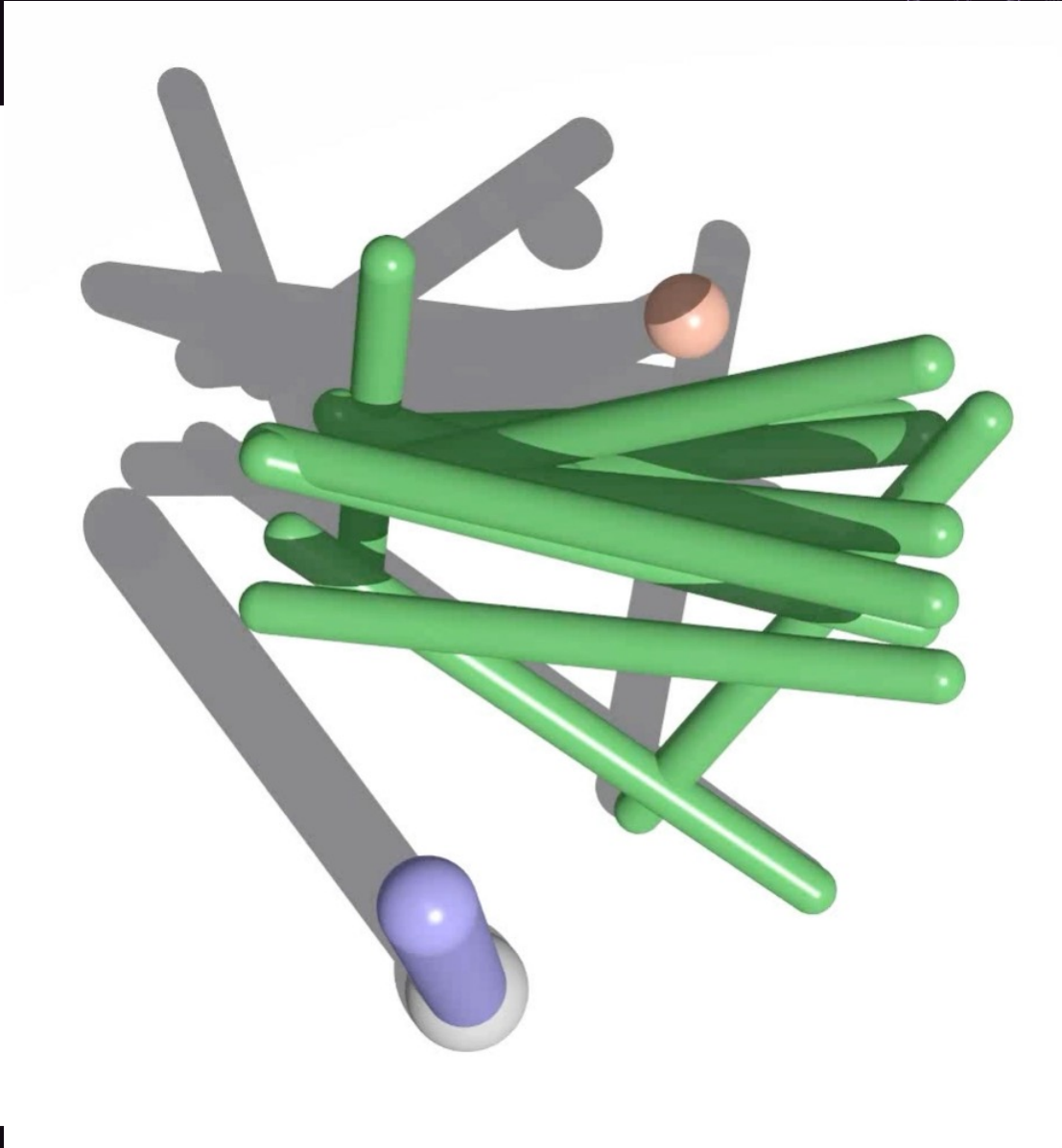
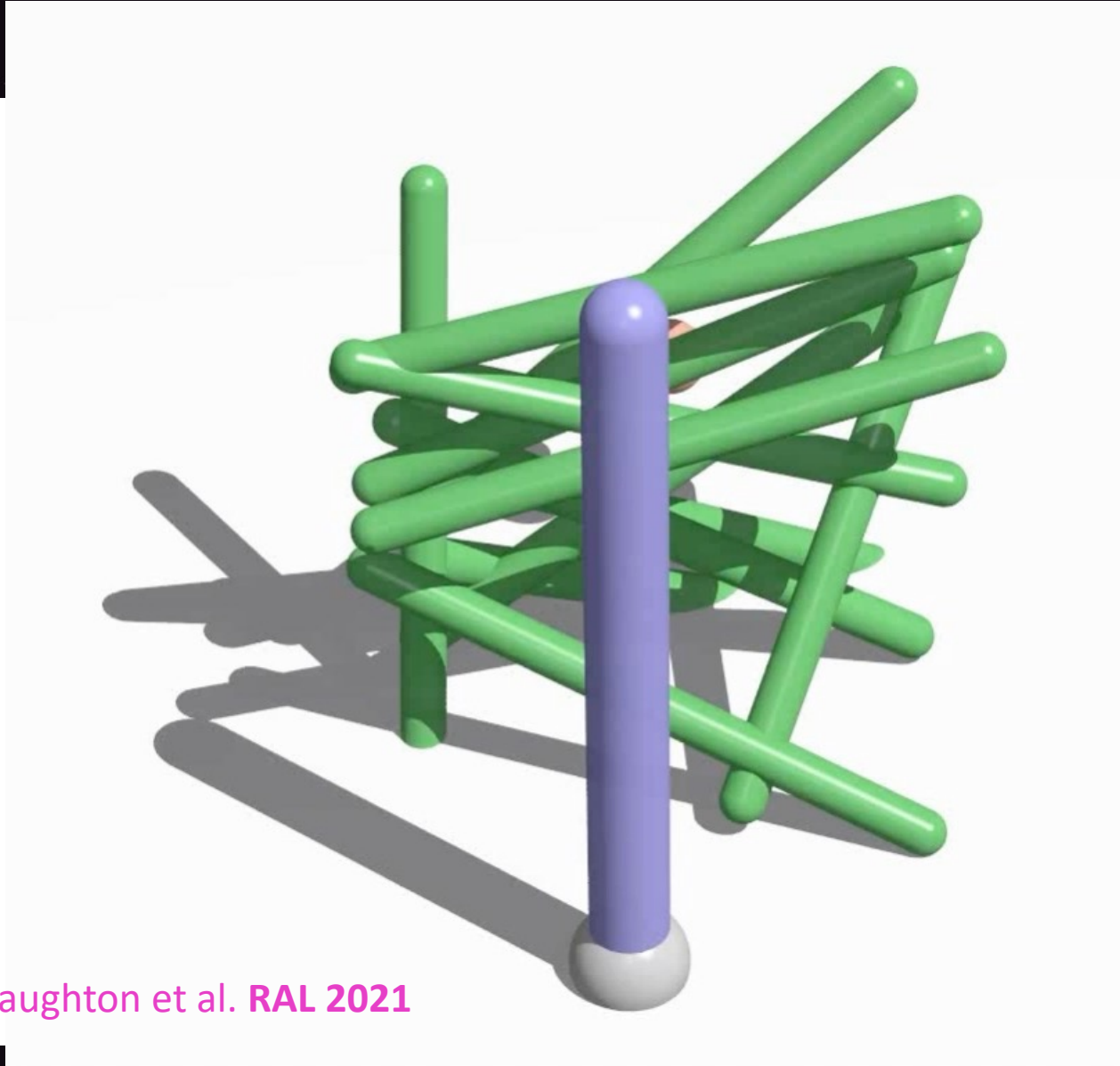
Ability to reach new targets



Vision based reconstruction of deformation modes of BR²



Maneuvering through 3D obstacle nest



Naughton et al. RAL 2021



2019-21

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- 12) Kamtikar, Shivani Kiran, Samhita Marri, Benjamin Thomas Walt, Naveen Kumar Uppalapati, Girish Krishnan, and Girish Chowdhary. "Visual Servoing for Pose Control of Soft Continuum Arm in a Structured Environment." *IEEE Robotics and Automation Letters (RA-L) and RoboSoft* (2022).
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