

NRI: Collaborative Research: Robot-Assisted Feeding: Towards Efficient, Safe, and Personalized Caregiving Robots

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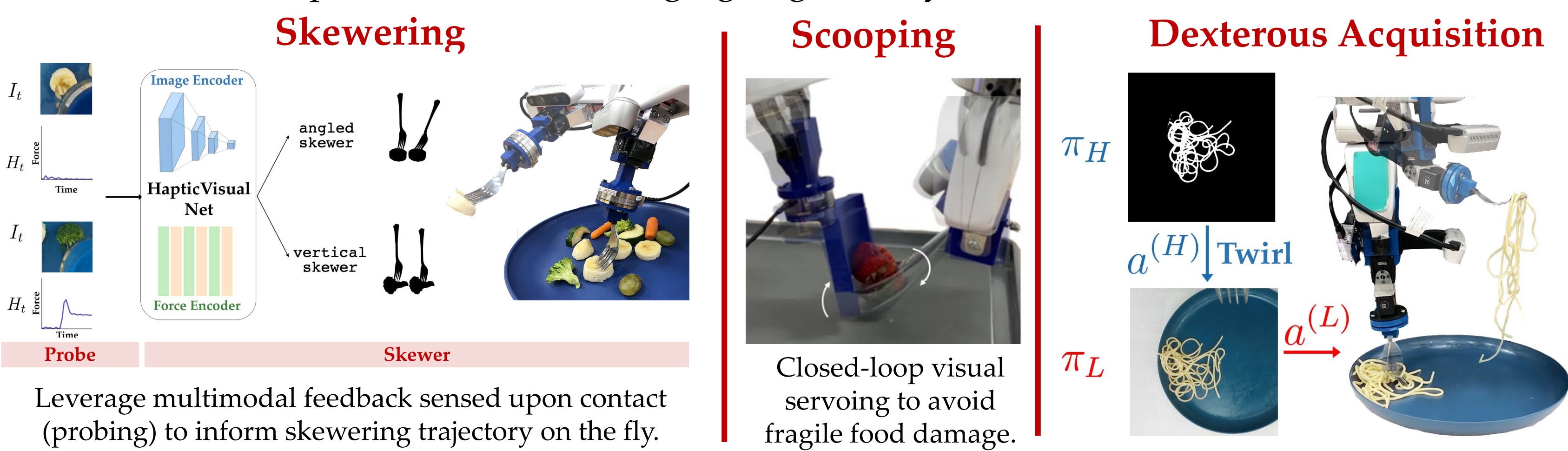
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Motivation and Research Questions

24 million people in US with motor impairments need assistance with *activities of daily living* like eating. Autonomous robot-assisted feeding systems have the potential to enhance their independence, while also reducing caregiver burden. Building such a system presents three key questions: (i) how to acquire various food items with different physical properties, (ii) how to utilize social cues from co-diners to infer appropriate bite-timing to feed a user, and (iii) how to leverage contacts to perform safe and efficient in-mouth bite transfer.

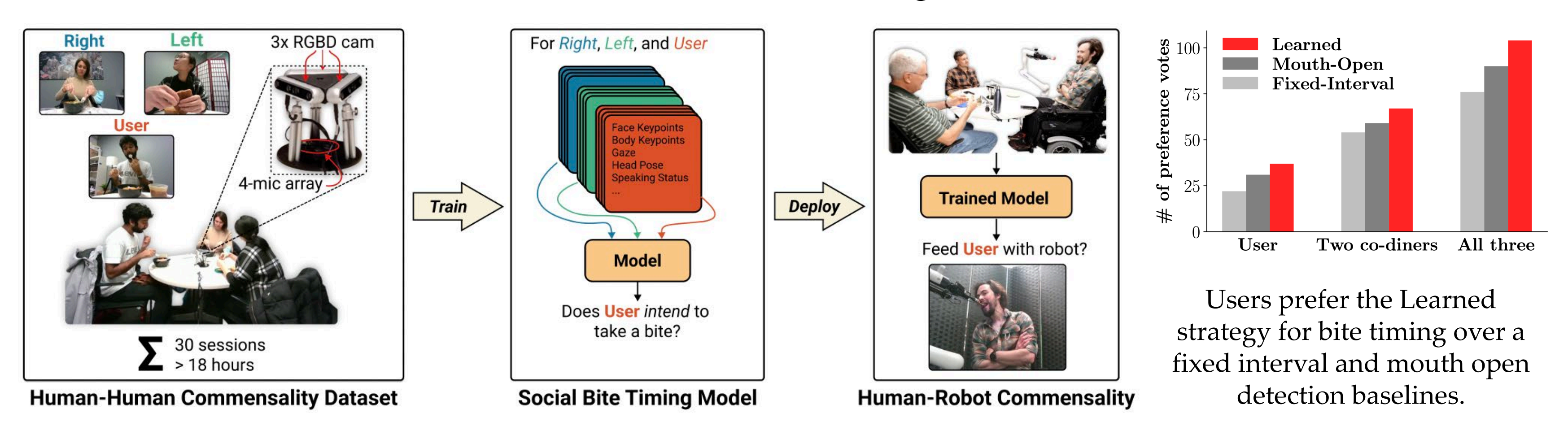
Multimodal Policies for Bite Acquisition

Goal: Learn to acquire bites of food ranging in geometry, size, and deformation.



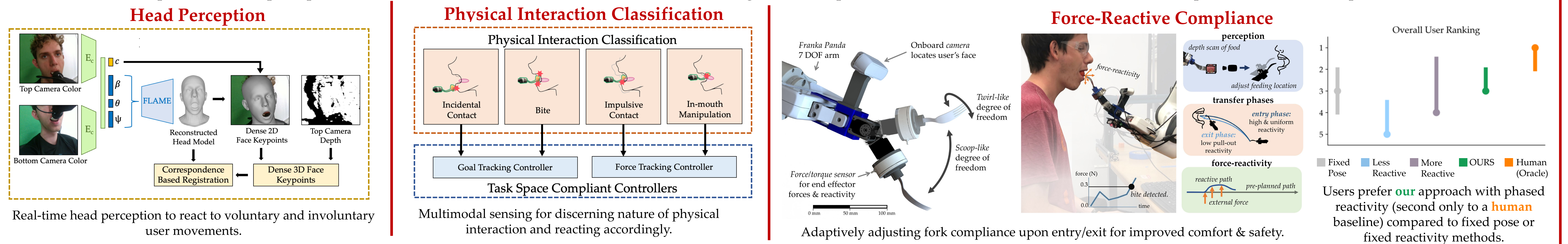
Social Bite Timing: Human-Robot Commensality

Goal: Learn when to feed an individual in a social setting.



Inside-Mouth Bite Transfer

Goal: Feed care recipients who require placement of food items inside their mouths, and who might have impulsive motion and medical conditions that require in-mouth manipulation.



Scientific Impact

Robust autonomous acquisition of deformable hard-to-model food items with varying physical properties.
 Data-driven models to predict when a robot should feed during social dining scenarios.
 Safe contact-aware methods for inside-mouth bite transfer that can feed care recipients with severe mobility limitations.

Educational Impact

Results presented in:

- SoNIC Workshop at Cornell for under-represented minorities in the US,
- AI mentoring program at Stanford,
- Various demos for middle-school, high-school, and undergraduates at Cornell, Stanford, and UW.

Societal Impact

Quote from a person with CI Quadriplegia:

“...The technology allows me to do more things on my own, of course giving me more independence, making me feel more free ... and gives me something to look forward to.”