End-User Development for Personalized Care Robots

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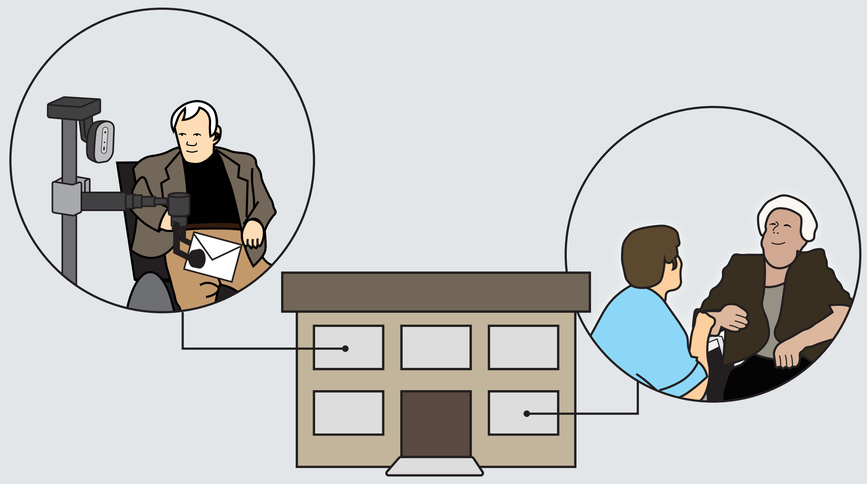

My goal is to design, develop, and evaluate **end-user development (EUD) solutions** that support **personalized robots** in the **care ecosystem.**

Understanding the Care Ecosystem

Working directly with **older adults and caregivers** of a local assisted living facility, we conducted a series of **design studies** [1, 2] to **understand** each stakeholders' needs and **envision** what systems care necessary to successfully integrate a robot into **existing workflows and habits**.

Observations

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Interviews

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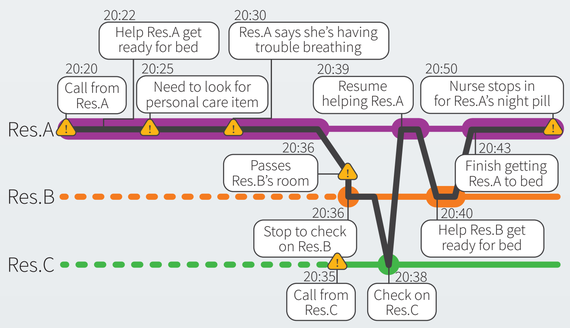
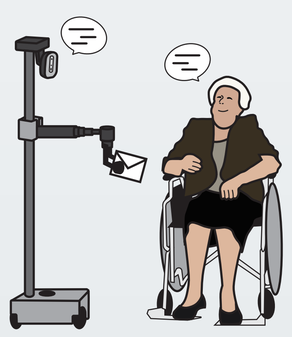
Participatory Design

Key Finding #1: Base on **existing caregiver workflows**, the system should **support quick, on-the-fly inputs** that guarantee safe and appropriate robot actions.

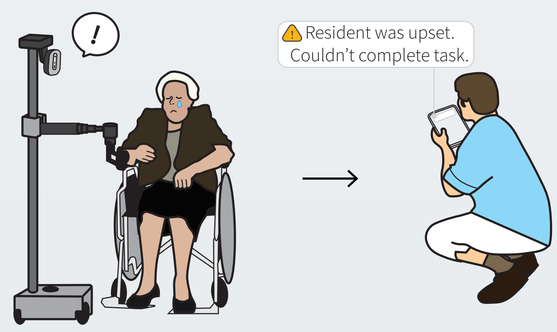


Key Finding #2: The robot should also **incorporate individual preferences**, without requiring repeated specification from the caregiver or older adult.

Key Finding #3: Daily interaction with **older adults** should **support simple, natural inputs** that accommodate a variety of physical and cognative abilities.



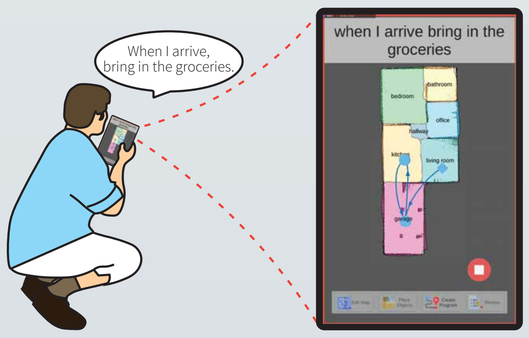
Key Finding #4: The robot must exhibit **context awareness to act appropriately**, even if it causes the robot to deviate from the originally specified task.



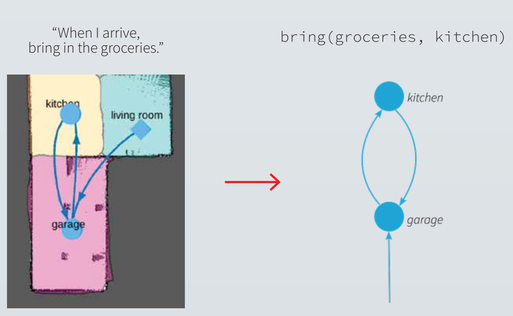
Future Work: Building & Evaluating Solutions

Based on my foundational work, I propose that **end-user development (EUD)** could be a tool to give stakeholders the necessary control to personalize a care robot's behaviors and actions. These tools will use a combination of **interfaces**, **AI**, and **formal methods**. This work builds on our previous research on sketching robot programs [3]:

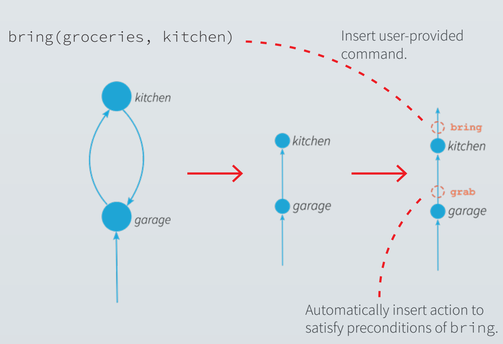
Step #1: Users provide a recording of both **speech and touch input** via a tablet interface.



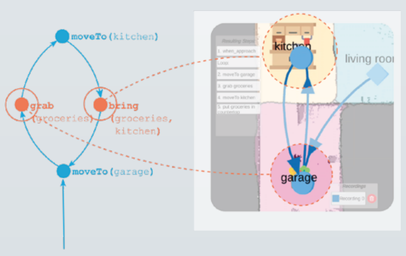
Step #2: The recording is then **processed** into a command and sketch using the robot's domain.



Step #3: A trace is **created** considering one iteration of the loop expressed in the sketch.



Step #4: The trace is **assembled** into a full program and **displayed** on the tablet for the user to see.



References:
[1] **L. Stegner** and B. Mutlu. *Designing for Caregiving: Integrating Robotic Assistance in Senior Living Communities*. DIS '22. https://doi.org/10.1145/3532106.3533536
[2] **L. Stegner**, E. Senft, and B. Mutlu. *Situated Participatory Design: A Method for In Situ Design of Robotic Interaction with Older Adults*. CHI '23. https:/oi.org/10.1145/3544548.3580893
[3] D. Porfrio, **L. Stegner**, M. Cakmak, A. Sauppé, A. Albarghouthi, and B. Mutlu. *Sketching Robot Programs On the Fly*. HRI '23. https://doi.org/10.1145/3568162.3576991

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