DESIGNING SUCCESSFUL HUMAN COLLABORATION WITH CYBER-PHYSICAL SYSTEMS

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MY PREVIOUS RESEARCH

Identify Factors for Workplace Adoption Of CPS

I Illuminate organizational and social-psychological factors that lead to successful adoption of novel cyber-physical systems in the workplace.

- People hold different mental models - social agent or utilitrian tool - about the same robotic systems.
- This mental model influences how different individual interacts with the robot, and emerging workplace norms.
- When the robot does not support the differences in the mental model, or when members of a workplace hold different mental models, problems occur - individuals' premature disenagement, conflicts in collaboration.

2-month field experiment of the snackbot, a workplace service robot

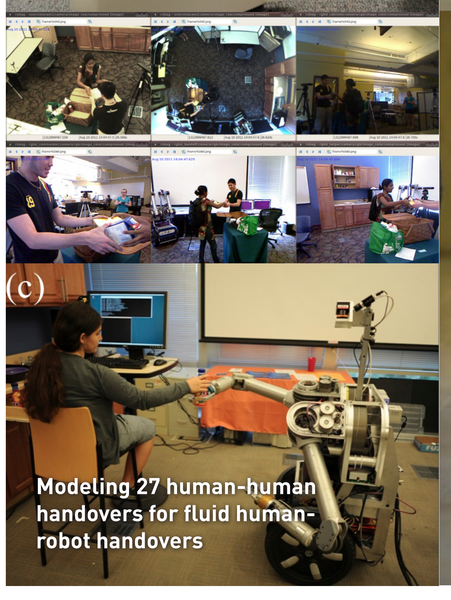
3 month long observation of mobile telepresence systems for distributed teams, deployed in 3 companies

Analysis of one-month long interac-tiong log of a receptionist robot in an office building

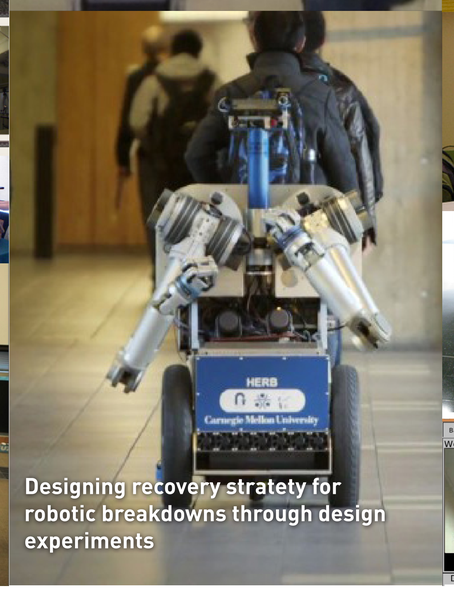
Design CPS Systems & Principles For Collaboration with People

I design complex cyber-physical systems to be able to successfully collaborate with people, improving people's rapport, cooperation, and physical collaboration with the systems

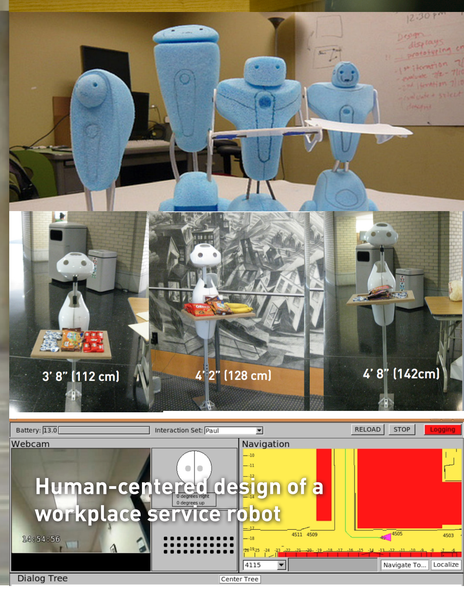
- The robot that utilized human physical collaboration cues worked with people more efficiently.
- Apologizing to users can mitigate the negative impact of breakdowns more effectively (i.e., willingness to return to the service, feeling of control) when compared to providing compensation or giving people a chance to train the robot to fix the error.



Modeling 27 human-human handovers for fluid human-robot handovers



Designing recovery stratety for robotic breakdowns through design experiments



Human-centered design of a workplace service robot

FUTURE CHALLENGES & RESEARCH QUESTIONS

My on-going research explores the following research questions in the context of autonomous cars, algorithms that work with crowd workers, and tele-medicine systems for doctors.

What are the impacts of cyber-physical systems on user decision making?

How can we establish the right level of trust and reduce biases with cyber-physical systems?

How much control should be shared between users and cyber-physical systems?

How can cyber-physical systems support people without overpowering human autonomy and control?

POTENTIAL IMPACT IN CPS

The proposed research will generate theoretical undersgandings on human responses to and decision-making with cyber-physical systems, in particular, in the domains of autonomous cars and assistive robots, and mobile telepresence robots. It will also generate a systematic set of design principles that lead to successful human and cyber-physical system collaboration.

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Best Paper Honorable Mention

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Best Paper Award