AI-Powered Assistive Technologies

05-499/899 Fall 2024

Celebrating Accessibility

https://cmu-05-499.github.io

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Administrivia

- HW3 due Thursday, Sept 24, 11:59pm
- Thanks for all the feedback!

Course Changes

1. Canvas will only be used for grades.

2. All course communication will now be on Slack.

3. We will post the metadata for readings on the course website.
    - They will include links to publicly available papers.
    - Privately available papers will still be linked from the website but the PDFs themselves will live in Canvas.

4. We will include citations on our slides.

More Course Changes

1. Participation Activities will now be allocated 15-20 minutes.

2. Reading Discussions will now be allocated 20 minutes.

3. In general, we'll talk in more depth about fewer things.

Cognitive Impairments

Conversational Agents

Maps

Pill Dispensers

Security sensors

Plumbing sensors

Conversational Agents

- Can perform one-instruction commands with minimal error correction.
- 3rd Party ecosystem of pluggable language modules.

Maps

Pill Reminders

Medic Alert Bracelet

Security Sensors

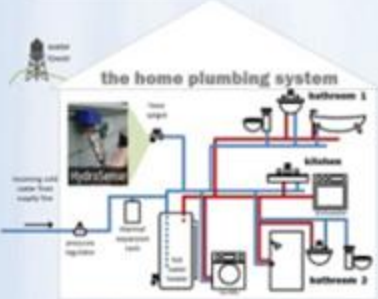Door sensor detects people on walk-about

GPS tracking watch + cellphone

Plumbing Sensors

- "Did my loved one use the toilet today?"

Cognitive Differences

Social Robots

LLMs for Social Advice

Social Robots

Provide assistance to people through social interaction

Using social mechanisms like forming relationships, expressing emotion, recognizing nonverbal behaviors, and conveying personality

Humanoid, Socially Assistive Robot
19 Degrees of Freedom /
Expressive Features & Gestures

Social Robots

How can robots facilitate social-emotional interactions with autistic children?

- Goals are to improve engagement, attention, joint attention, spontaneous imitation, turn-taking, empathy, initiation of physical contact

Pleo for Prosody
Interact with robot who expresses emotion through movement and non-verbal sounds.

Keepon
Exchanges encourage joint attention and demonstrate autistic kids' motivation to share mental states with others.
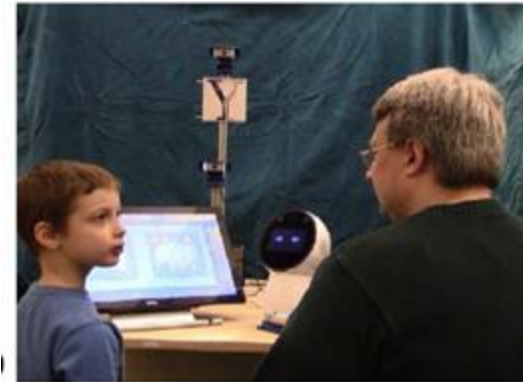
Jibo Social robot
Emotional storytelling with caregiver and robot. Focus on perspective-taking and sequencing.

Study of LLMs for Social Advice

Study by PhD student JiWoong Jang

JiWoong Jang, Sanika Moharana, Patrick Carrington, and Andrew Begel. **"It's the only thing I can trust": Envisioning Large Language Model Use by Autistic Workers for Communication Assistance**. In the *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems*. Honolulu, Hawaii. May 2024. [pdf]

Autism @ Work

Autistic Employees Need Resources

Support Options: job coaching, speech and language pathologists (SLPs)

Important to have advocate / champion(s)

Limitations: affordability, availability

→ Unlikely most will have access

Relevant Citations

Leven, D. (2020). Invisible Social Identity in the Workplace. (Doctoral dissertation, Northeastern University).

David B. Nicholas, Darren Hedley, Jena K. Randolph, Dora M. Raymaker, Scott M. Robertson, & Jonathan Vincent (2019). An Expert Discussion on Employment in Autism. Autism in Adulthood, 1(3), 162–169.

Carlton J. Fong, Joshua Taylor, Aynura Berdyyeva, Amanda M. McClelland, Kathleen M. Murphy, & John D. Westbrook (2021). Interventions for improving employment outcomes for persons with autism spectrum disorders: A systematic review update. Campbell Systematic Reviews, 17(3).

Autistic people are turning to ChatGPT

Our Research Questions

1. What are the reasons for autistic workers to turn to LLMs for social communicative advice?

2. What is the advice like?

3. How is it versus human advice?

Results: Attitudes towards LLMs

- Liked
  - Formatting, clarity, willingness to explain in detail, convenience, non-judgmental
  - Assumed context - didn't question user intentions
  - Supported Neurotypical "worldbuilding"
- Disliked
  - Potential for privacy concerns
  - Assumption of Neurotypicality

Overall

- Critical Lack of Available Resources
  - Few received at work, some consulting friends/family, many with none

- Strong Preferences for LLMs
  - vs Human & in general (Qual & Quant)
  - 9/11 (≈ 81%) would continue use

- Conversational Niceties a Huge Plus
  - Structured output, politeness well received

Evaluating LLM Advice

- A specialized job coach (NPP, LPC) evaluated transcripts of LLM advice.
  - Substantial commonalities with advice in practice
  - LLM Advice defaulted to Neurotypical assumptions (even after correction)
  - Blurring of employer and user-centric advice
  - Optimistic attitude, failure to plan for contingencies
- Stressed the value of a near real-time outlet for advice, given availability concerns.
- Biggest concern from assumption of context

Participation Activity

- Partner with a neighbor.
- Take out a piece of paper and write your names on it.
- We have two viewpoints here.
  - **Whose experience should an LLM privilege, autistic people or service providers?**
- Write down one positive and one negative reason for each option.
- Each pair should then pair up with another pair (4 people)
  - Discuss your thoughts. Do you agree or disagree?
- Share with the class. Turn in your paper at the end.

No Readings Today!