Designing Privacy Enhancing Technology for Blind and Low-Vision (BLV) People

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Camera based Assistive Tools

Both **AI-based** and **Human-assisted** tools are offering new opportunities

Announcing 'Be My AI,' Soon Available for Hundreds of Thousands of Be My Eyes Users

Be My Eyes' AI assistant, powered by GPT-4, is rolling out to hundreds of thousands of iOS and Android users over the next several weeks.
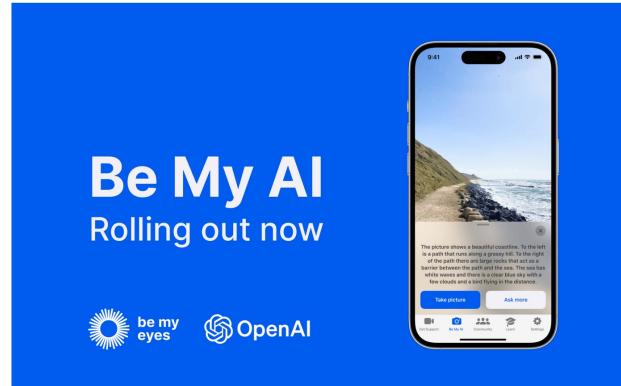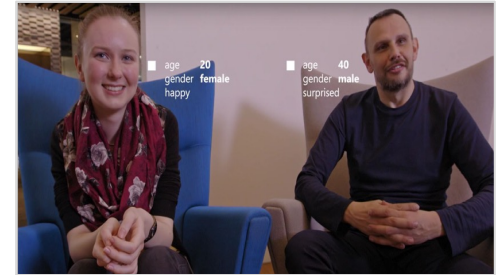

Source: qws.amazon.com
OrCam MyEye helping reading newspaper

Source: https://www.bemyeyes.com/blog/announcing-be-my-ai
Be My AI

Source: seeingai.com
Microsoft's Seeing AI describing people

Fallibility of AI

AI-based tools can not always **infer** human-intent
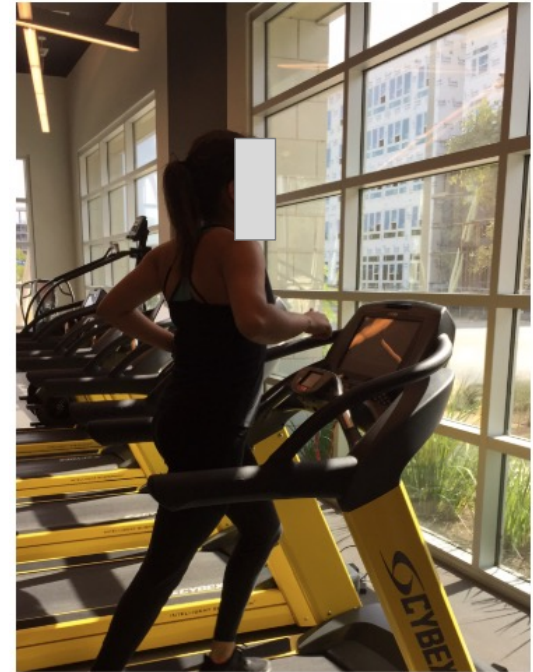
Inaccurate and **insufficient** responses by Microsoft's Seeing AI

Reliability of Human-assisted Technologies

More than **600,000** BLV users are using different forms of human assisted technology

Privacy Risks with Assistive Tools

Sensitive information can be shared either **intentionally** or **unintentionally**

Bigham et al., "Vizwiz: nearly real-time answers to visual questions." Proceedings of the 23nd annual ACM symposium on User interface software and technology. 2010.

Financial information

Medical information
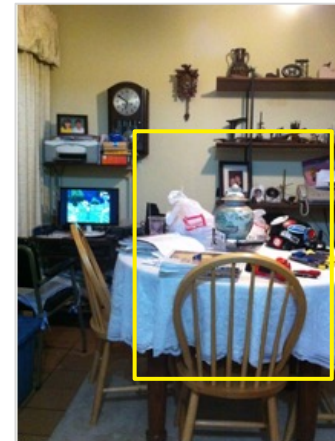
Messy area

Self Reflection

Bystanders

Digital Screen

Bystander Privacy Concerns

Camera-based assistive tools provide **demographic** and **activity** information of people

age 20
gender female
happy

28 year old female wearing glasses looking happy.
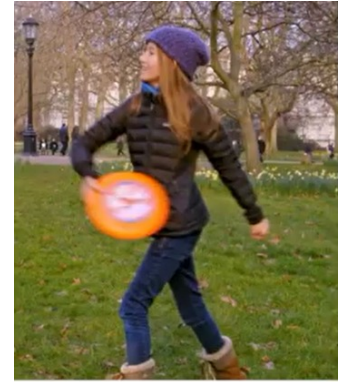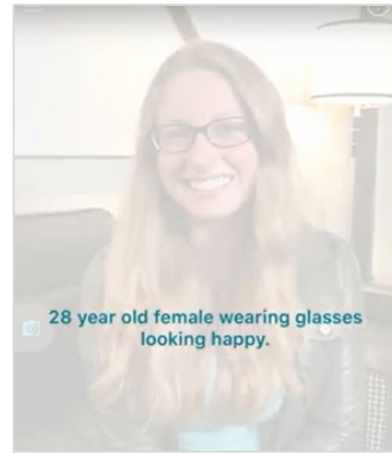
A young girl throwing a Frisbee in the park.

Ethical concerns of receiving information about **bystanders**. (Hoyle et al., 2014)

Bystanders have **privacy concerns** of augmented reality glasses. (Denning et al., 2014; Profita et al., 2017; Ahmed et al., 2018)

What are the visual privacy preferences of BLV people about sharing information unintentionally with human assistants?

Human Assistants:
- Family members
- Friends
- Agent or Volunteers

Background Objects:
- Credit cards
- Medicine
- People
- Messy area
- Foods
- Laptop screen

Taslima Akter, Bryan Dosono, Tousif Ahmed, Apu Kapadia, and Bryan Semaan, **"I am uncomfortable sharing what I can't see": Privacy Concerns of the Visually Impaired with Camera Based Assistive Applications** (*Usenix Security 2020*).

Bystander Privacy Concerns
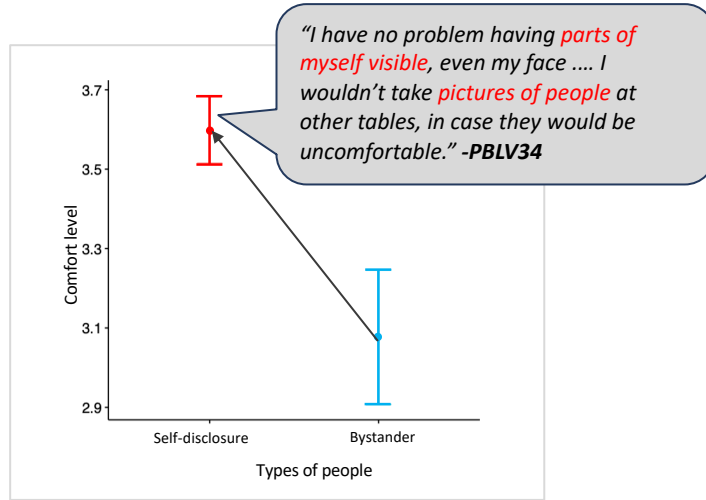
Comfort levels for self and bystander

"I have no problem having *parts of myself visible*, even my face .... I wouldn't take *pictures of people* at other tables, in case they would be uncomfortable." *-PBLV34*
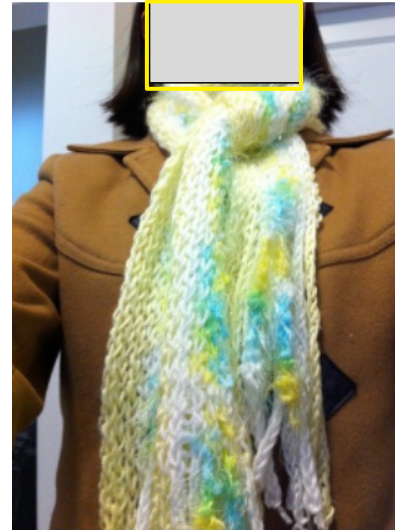
Body part

Bystanders

Concerns of Identity Theft

Interaction between objects and human assistants

"I would feel extremely uncomfortable with the visibility of all the items which are personal to me or to a coworker because they could be potentially *misused* by the stranger who is looking at the picture." **- PBLV100**
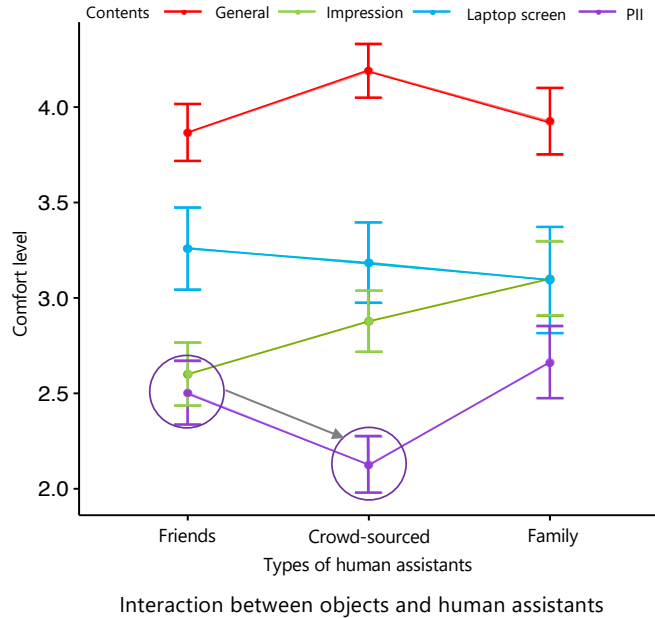
Reasons for selective audience disclosure

Concerns about Impression Management
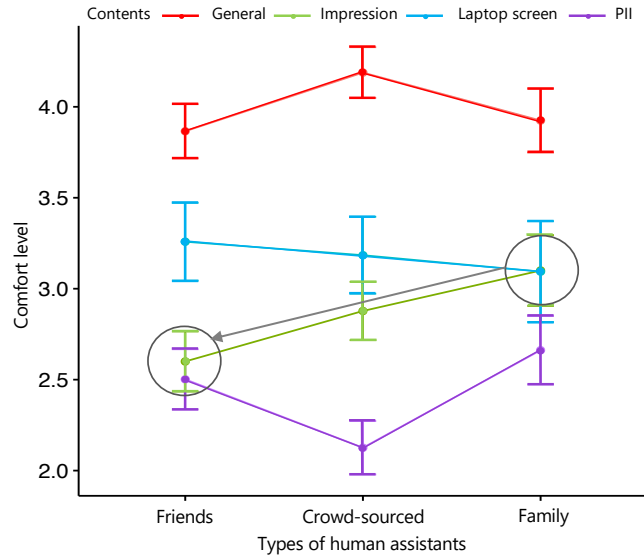
Interaction between objects and human assistants

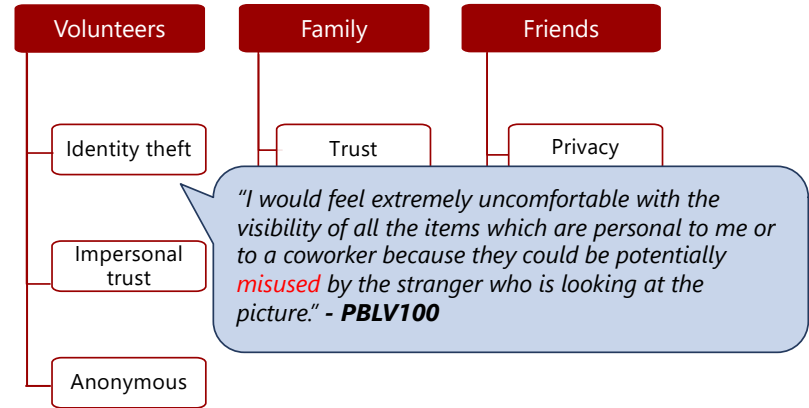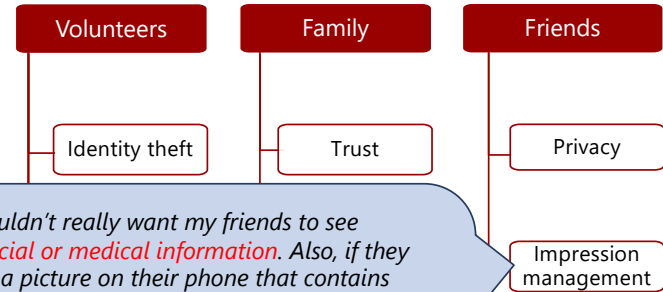"I wouldn't really want my friends to see *financial or medical information*. Also, if they have a picture on their phone that contains personal info about me, this creates an opportunity for someone *other than my friend* to see the picture on my friend's phone (e.g., friend's family members, romantic partner), which would jeopardize the privacy and security of the information." **- PBLV30**

Reasons for selective audience disclosure

What are the shared privacy and ethical concerns of BLV people and bystanders with AI-based assistive tools?

Taslima Akter, Tousif Ahmed, Apu Kapadia, and Manohar Swaminathan, **Privacy Considerations of the Visually Impaired with Camera Based Assistive Technologies: Misrepresentation, Impropriety, and Fairness** (*ASSETS 2020*).

Taslima Akter, Tousif Ahmed, Apu Kapadia, and Manohar Swaminathan, **Shared Privacy Concerns of the Visually Impaired and Sighted Bystanders with Camera Based Assistive Technologies,** (*TACCESS 2022*)**.**

Impropriety and Social Stigma

> " I might fall into traps of judging people by their appearance, just as sometimes sighted people do, particularly about ethnicity, weight, gender and expression. **-PBLV48**

Misrepresentation of Bystanders

> " I'd be less comfortable with being told a person's weight and gender because the algorithm's likelihood of being accurate varies…Even more humiliating would be to talk to a person using a pronoun they're uncomfortable. **-PBLV26**

I'm uncomfortable with the gender, cause I'm trans and the glasses would get it wrong at some point, which would give people more reasons to misgender me. **-PSB17**

Findings

Summary of Contributions

- Identified BLV users' **information-disclosing** concerns and preferences (e.g., identity theft, impression management, and bystander privacy).

- Investigated the **shared privacy and ethical** concerns of BLV people and bystanders with assistive technologies (e.g., impropriety, and misrepresentation).

- Implications for designing **privacy-enhancing, trustworthy, and responsible** assistive technologies for BLV people.

Thank You!

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