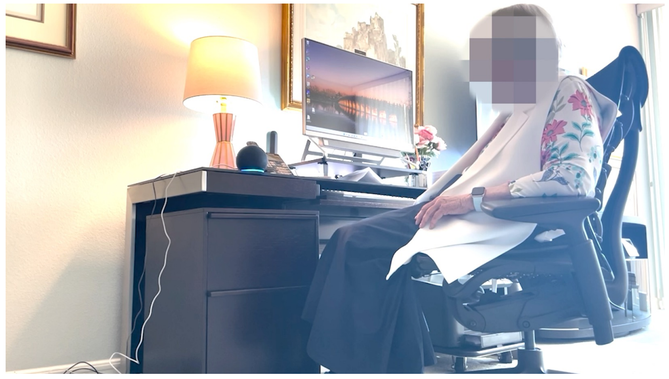
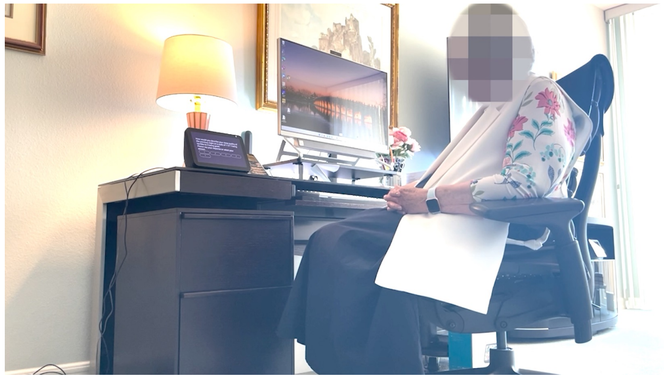
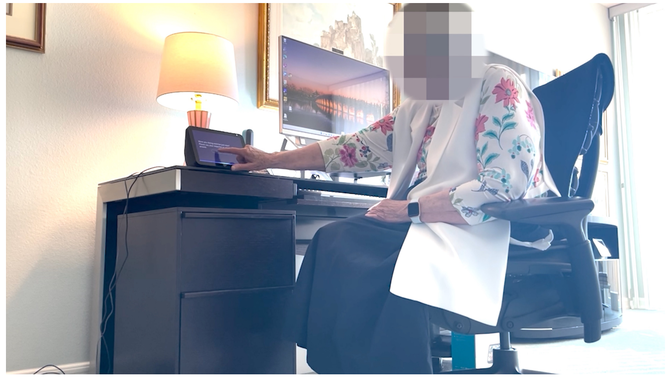

Screen or No Screen?

Lessons Learned from a Real-World Deployment Study of Using Voice Assistants With and Without Touchscreen for Older Adults








Chen Chen[1] Ella T. Lifset[2] Yichen Han[6] Arkajyoti Roy[3] Michael Hogarth[5] Alison Moore[5] Emilia Farcas[4] Nadir Weibel[1]

[1]Department of Computer Science and Engineering, [2]Department of Biological Sciences, [3]Department of Mathematics, [4]Qualcomm Institute, [5]School of Medicine, **University of California San Diego**

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Project Website: voli.ucsd.edu

Using Voice Assistants could be Challenging for Older Adults

RESEARCH-ARTICLE OPEN ACCESS

Understanding Barriers and Design Opportunities to Improve Healthcare and QOL for Older Adults through Voice Assistants

Authors: Chen Chen, Janet G Johnson, Kemeberly Charles, Alice Lee, Ella T Lifset, Michael Hogarth, Alison A Moore, Emilia Farcas, Nadir Weibel Authors Info & Claims

ASSETS '21: Proceedings of the 23rd International ACM SIGACCESS Conference on Computers and Accessibility • October 2021 • Article No.: 9 • Pages 1–16 • https://doi.org/10.1145/3441852.3471218

Published: 17 October 2021 Publication History

12 1,292

VOLI ASSETS 2021

For healthcare uses

RESEARCH-ARTICLE OPEN ACCESS

How do Older Adults Set Up Voice Assistants? Lessons Learned from a Deployment Experience for Older Adults to Set Up Standalone Voice Assistants

Authors: Chen Chen, Ella T. Lifset, Yichen Han, Arkajyoti Roy, Michael Hogarth, Alison A. Moore, Emilia Farcas, Nadir Weibel Authors Info & Claims

DIS '23 Companion: Companion Publication of the 2023 ACM Designing Interactive Systems Conference • July 2023 • Pages 164–168 • https://doi.org/10.1145/3563703.3596640

Published: 10 July 2023 Publicatic

0 94

VOLI DIS23 rebuilding & resilience

For device setting ups

RESEARCH-ARTICLE

"Alexa is a Toy": Exploring Older Adults' Reasons for Using, Limiting, and Abandoning Echo

Authors: Milka Trajkova, Aqueasha Martin-Hammond Authors Info & Claims

CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems • April 2020 • Pages 1–13 • https://doi.org/10.1145/3313831.3376760

Published: 23 April 2020 Publication History

Check for updates

68 2,036

CHI 2020

For generic uses

RESEARCH-ARTICLE PUBLIC ACCESS

"Phantom Friend" or "Just a Box with Information": Personification and Ontological Categorization of Smart Speaker-based Voice Assistants by Older Adults

Authors: Alisha Pradhan, Leah Findlater, Amanda Lazar Authors Info & Claims

Proceedings of the ACM on Human-Computer Interaction, Volume 3, Issue CSCW • Article No.: 214, pp 1–21 • https://doi.org/10.1145/3359316

Published: 07 November 2019 Publication History

Check for updates

88 3,554

CSCW 2020

For companionships


Taylor

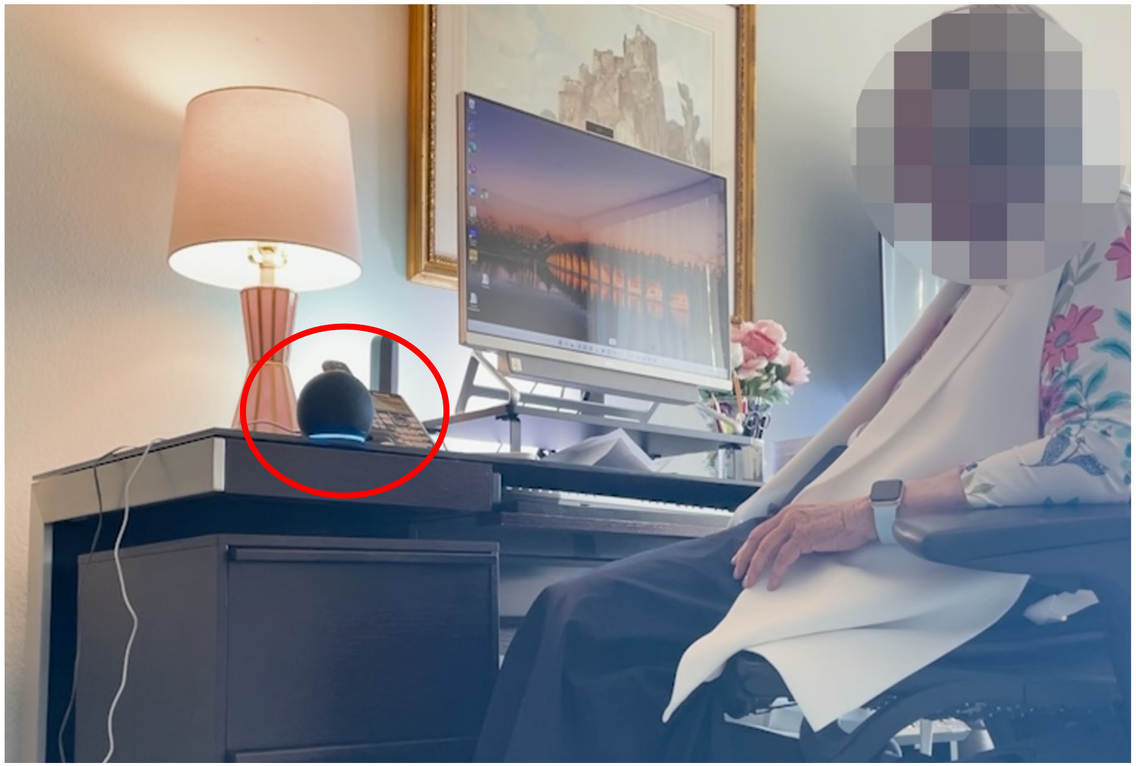
Additional Touchscreen Allows **Visual Output** 👁

Example Device: Amazon Echo Show, 2nd Gen, 8’’ Smart Display, White

Additional Touchscreen Allows **Touch Input** 👉

Example Device: Amazon Echo Show, 2nd Gen, 8’’ Smart Display, White

For Older Adults  , **Screen or No Screen**?



Example Device: Echo Dot

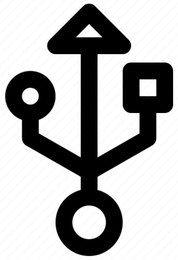
Example Device: Echo Show

Three Key Research Questions (RQs)

RQ1: How does the built-in touchscreen affect older adults' experience on **setting up the devices**?

- Despite the help from caregivers, it is still important for older adults to complete many "last-mile" tasks.

Reading Instructions



Hardware Connections

Finding the Alexa App

Signing In

Hitting Setup Buttons

Connecting to WiFi

RQ2: How does the built-in touchscreen affect older adults' experience on <u>conducting self-report diary surveys</u>?

The following questions are about the timeframe between ..... and .....

1. How many of the following drinks did you have?

	0	1	2	3	4	5 or more
Beer	O	O	O	O	O	O
Wine	O	O	O	O	O	O
Strong/Liquor	O	O	O	O	O	O
Soda/Water	O	O	O	O	O	O

2. In which company have you been?

	0	1	2	3	4	5 or more
Male friends	O	O	O	O	O	O
Female friends	O	O	O	O	O	O
Family	O	O	O	O	O	O
Other	O	O	O	O	O	O
Unkown	O	O	O	O	O	O

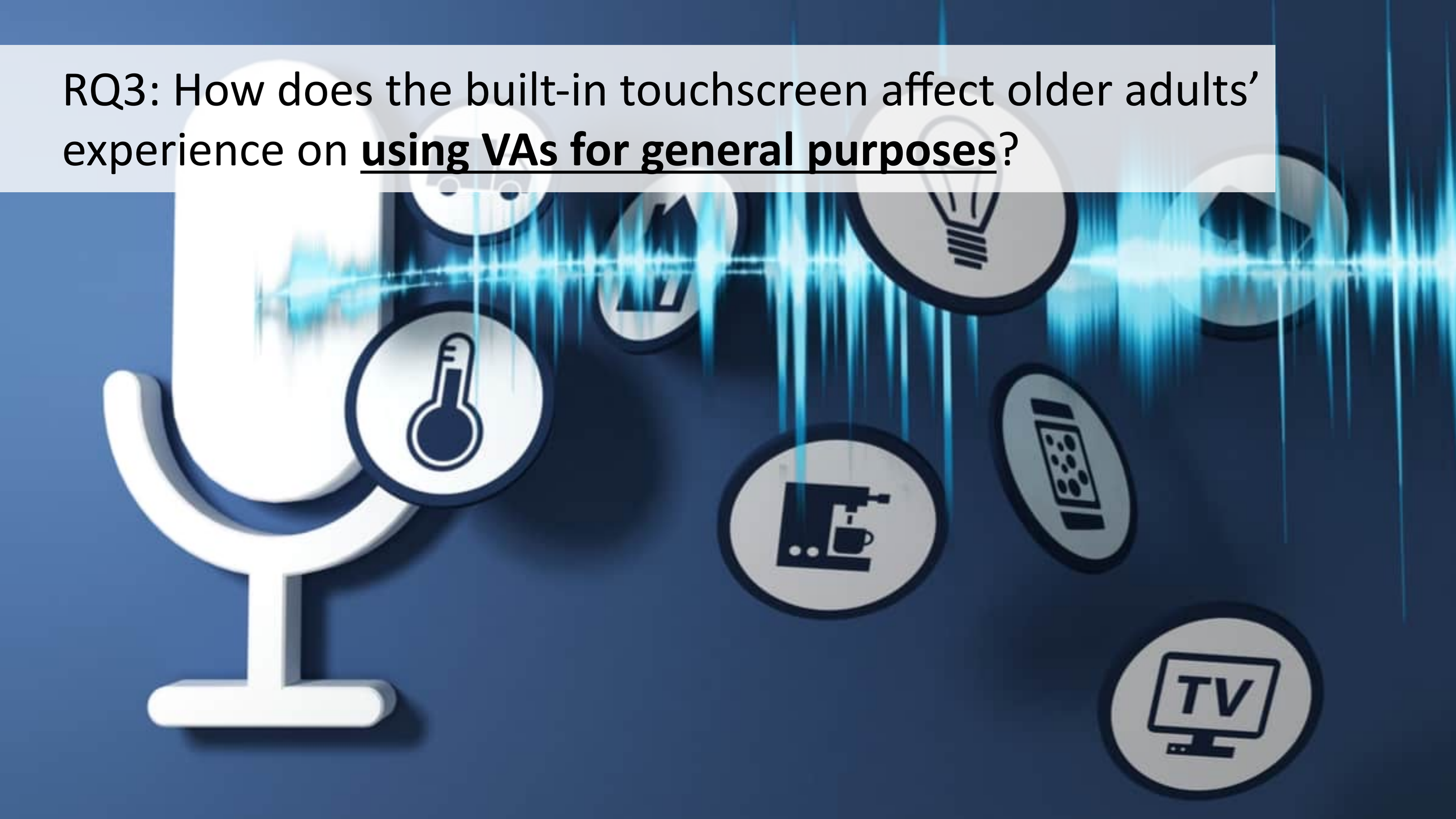
3. Where have you been (in minutes)?

	0	15	30	45	60
At (someones) home	O	O	O	O	O
Out (bar, disco etc)	O	O	O	O	O
At a fraternity	O	O	O	O	O
Other	O	O	O	O	O

4. How were you feeling?

not al all	0	1	2	3	4	5 very much
Happy	O	O	O	O	O	O
Sad	O	O	O	O	O	O

RQ3: How does the built-in touchscreen affect older adults' experience on **using VAs for general purposes**?



Designing Voice-First Voice Assistants

Alexa App on Phone & Watch

Echo Show

Screen-Based
Voice First

User Attached

User Detached/Standalone

Voice Only

Alexa Enabled
Headphone

Echo Dot

Need to take care of maintenance related tasks

Set up once & run and operate continuously

Participants

- 16 Participants (8 Females and 8 Males)
- Age: M = 82.5, SD = 7.77, min. = 70, max. = 97
- Recruited through UCSD Health & The Vi @La Jolla
- 5 Participants self-reported the significant health issues:
  - Hand Tremors
  - Hearing Impairment
  - Chronic Back Pain
  - Speech Impairment
  - Mobility Impairment

Study Design

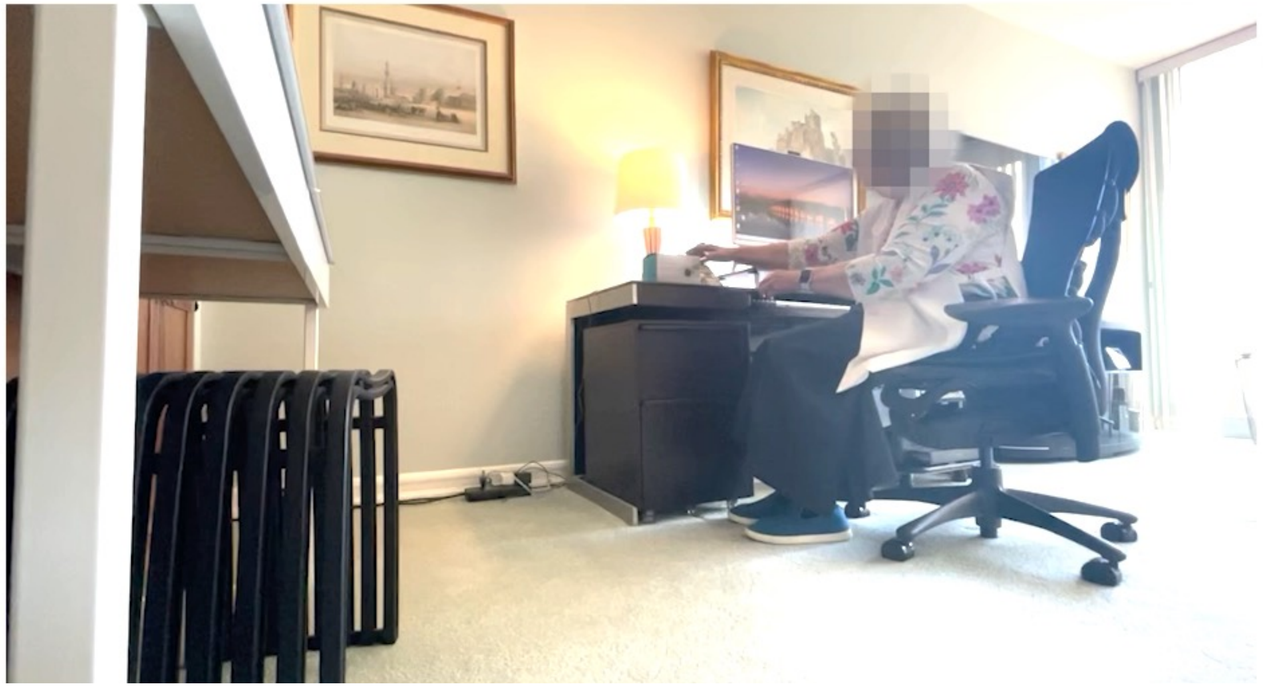
- **Phase 1**: Pre-Study Questionnaires;
- **Phase 2**: Device Setup;
- **Phase 3**: Investigating VAs Uses for Conducting Self-Report Diary Surveys & General Uses;
- **Phase 4**: Focus Group;

Phase 1: Pre-Study Questionnaires

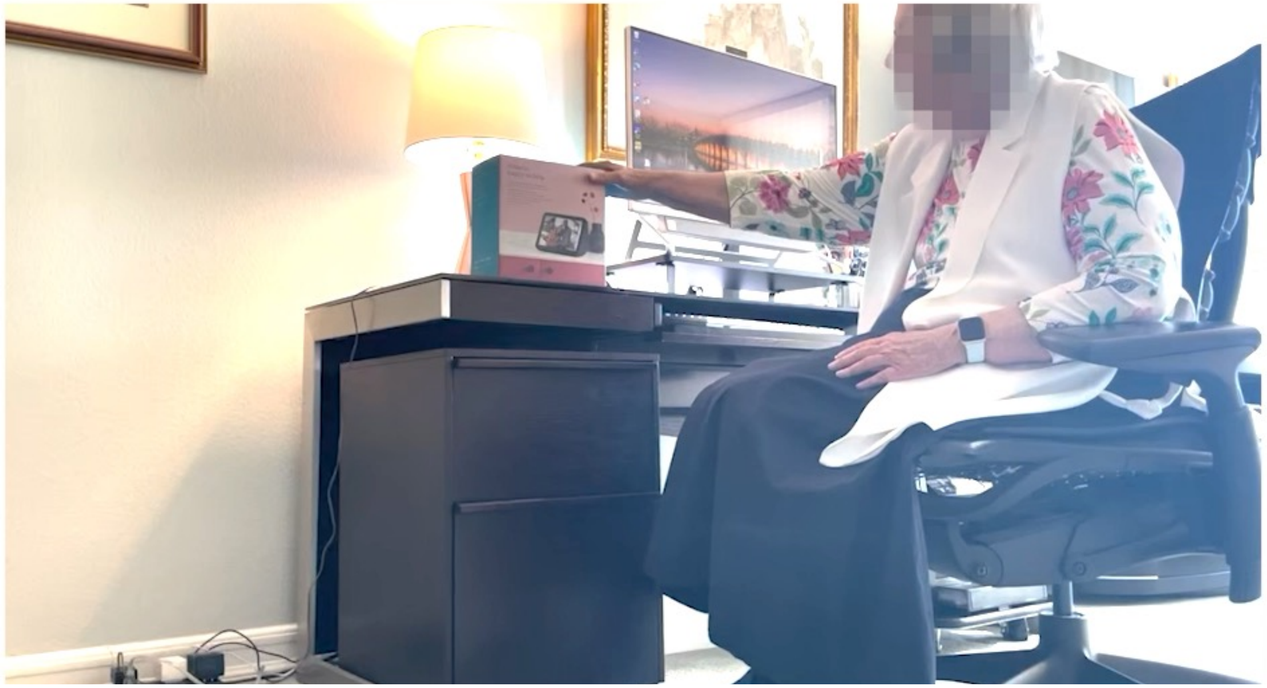
- TechPH (Technophilia): Attitudes toward technologies
- MDPQ (Mobile Device Proficiency Questionnaires): Proficiencies toward smartphone devices
- CPQ (Computer Proficiency Questionnaires): Proficiencies toward desktop computer devices

Phase 2: Device Setups (In-Person Within-Subject, N = 16)

Echo Dot (Voice Only)



Echo Show (Screen-Based Voice-First)



X 15

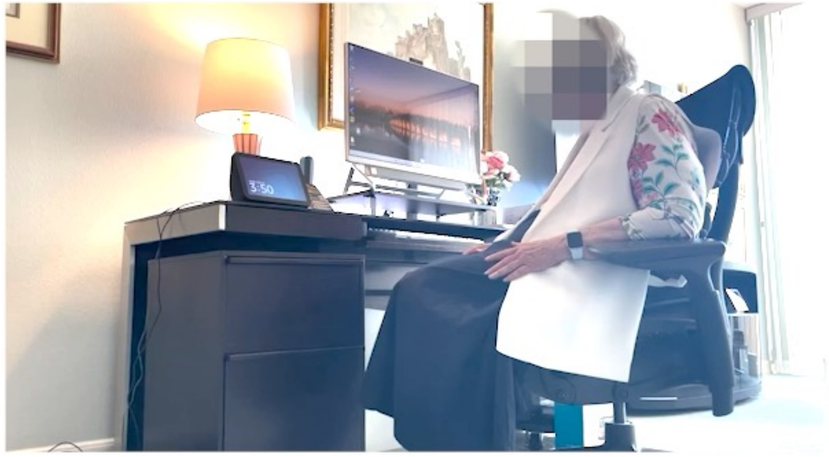
Phase 3: Diary Journaling and Generic Uses (Within-Subject, N = 16)

- 15 days of using Echo Dot and Echo Show to complete:
  - A diary survey
  - And generic uses that could help with daily needs

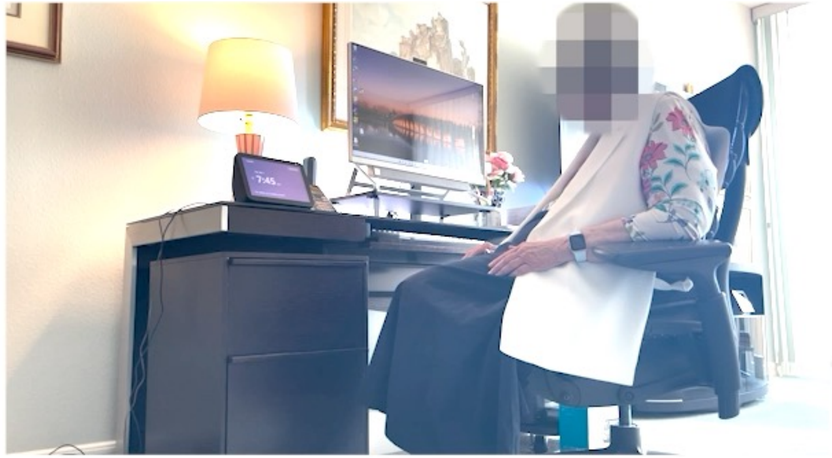
For Conducting Self-Report Diary

For Generic Uses with Echo Show

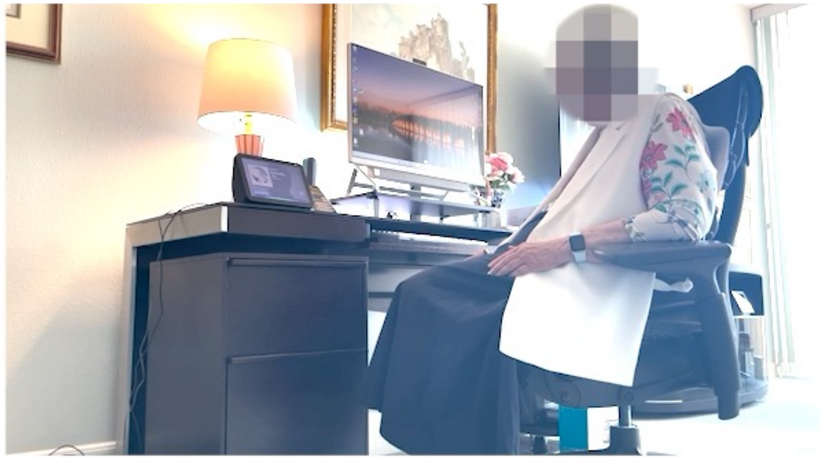
Querying Weather



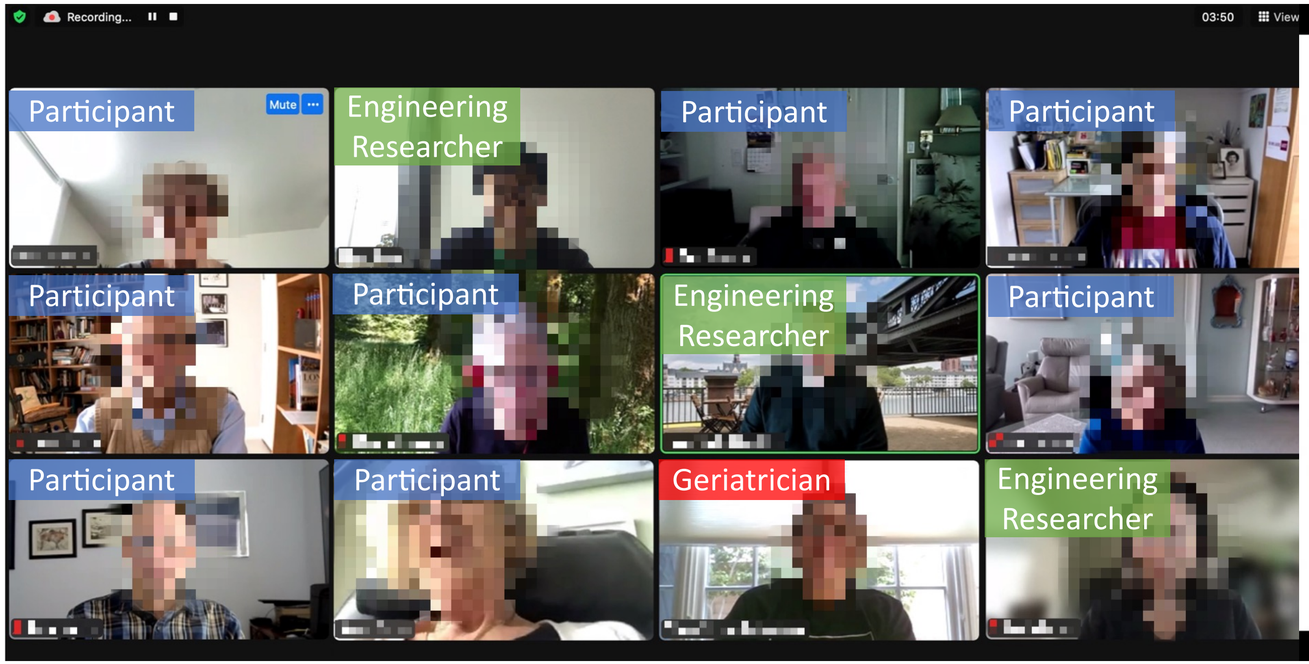
Enjoying Music

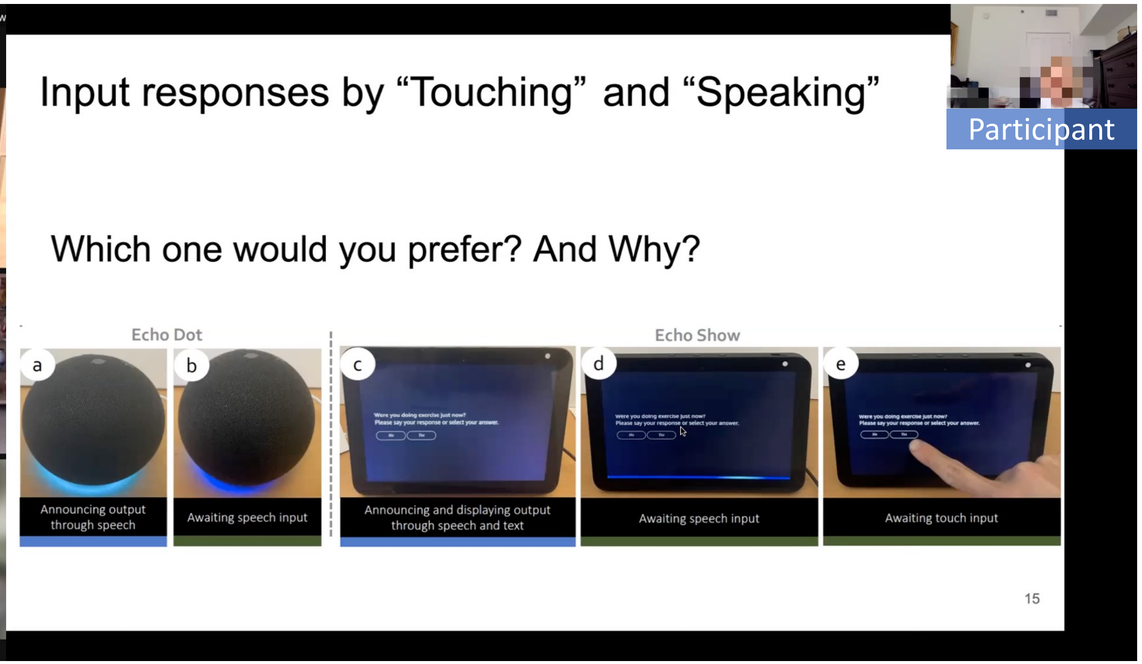


Listening to News



Phase 4: Online Focus Groups



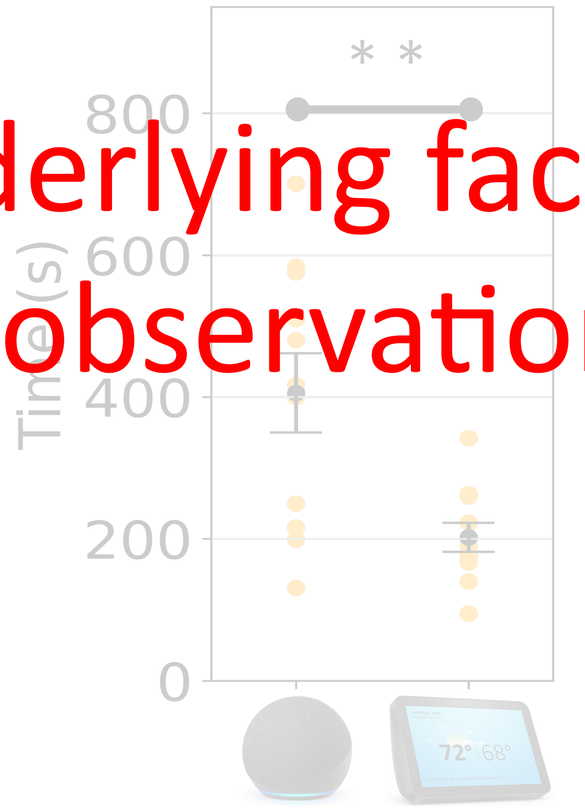


Key Findings

RQ1: How does the touchscreen affect the older adults’ experience of setting up devices?

The built-in touchscreen enables a faster standalone VA setups

Overall Task Completion Time



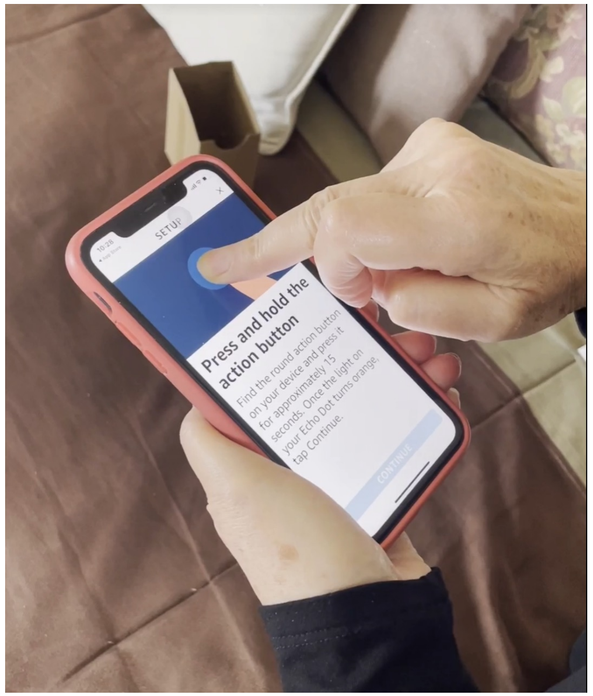
What are underlying factors driving this observation?

The built-in touchscreen enables a faster standalone VA setups

- Immediate and In-Situ Visual Feedback on Built-In Touchscreen is Helpful and Indispensable

This is Correct 😊

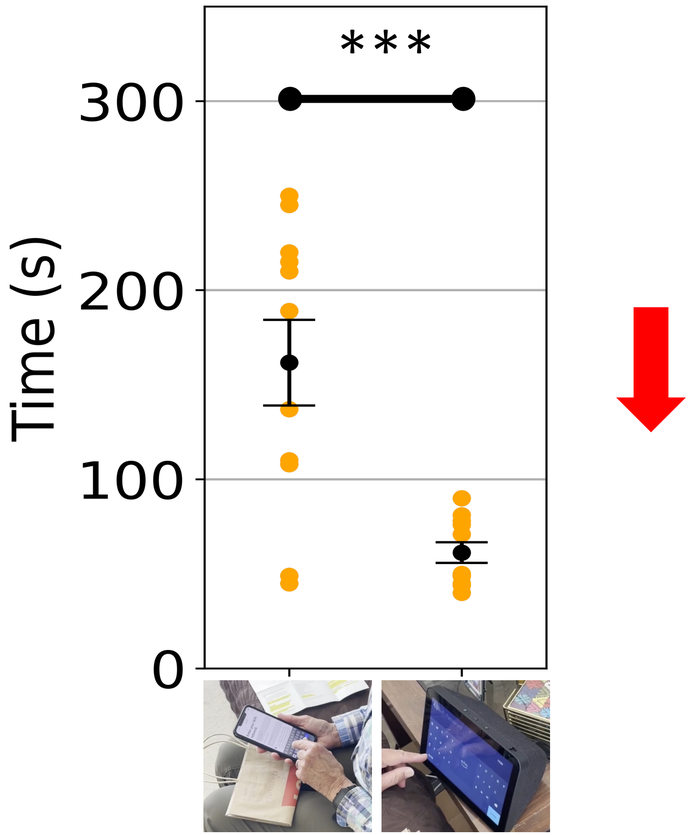
This is Incorrect ☹️



This is Incorrect ☹️

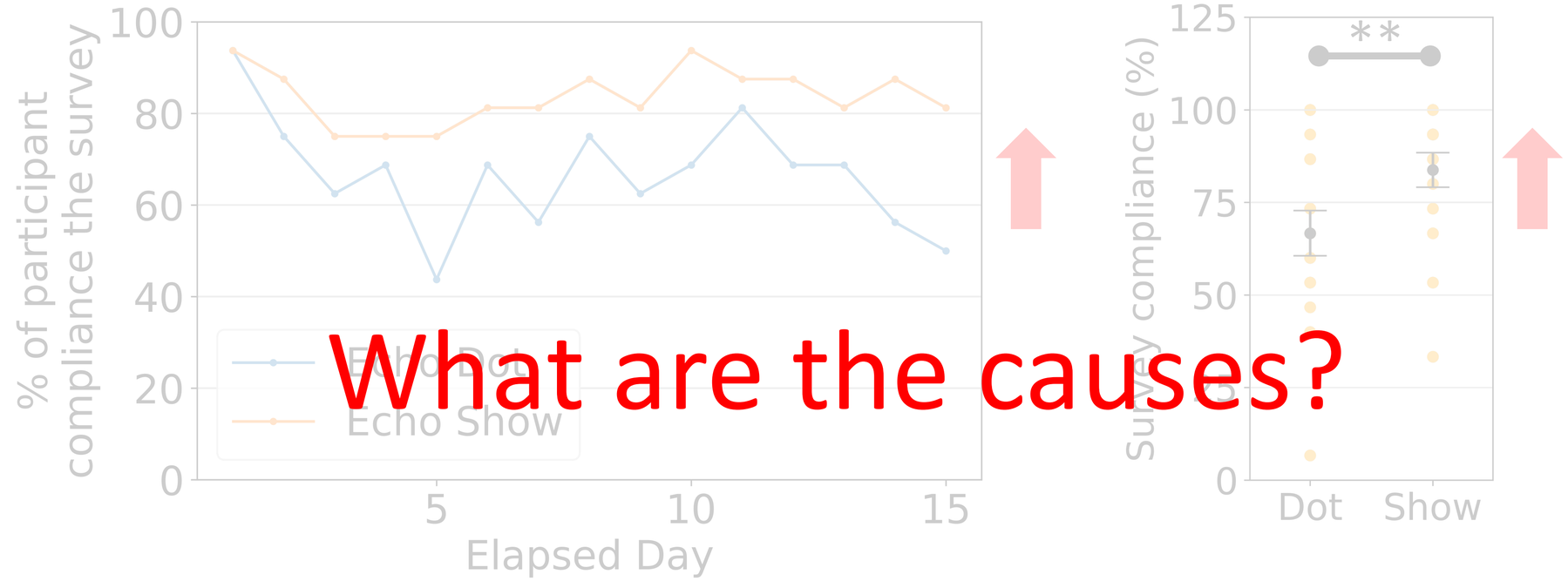
The built-in touchscreen enables a faster standalone VA setups

- Immediate and In-Situ Visual Feedback on Built-In Touchscreen is Helpful and Indispensable
- Typing login credentials on built-in touchscreen is faster than smartphone



RQ2: How does the touchscreen affect the older adults' experience while conducting self-report diary survey?

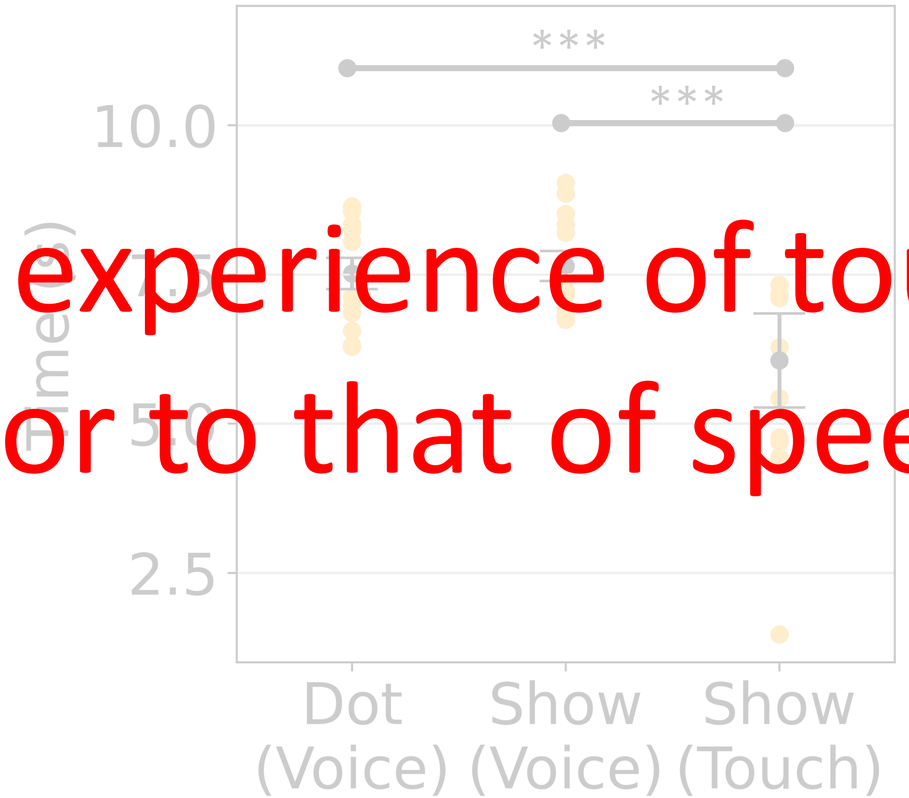
The built-in touchscreen increase the survey compliances



What are the causes?

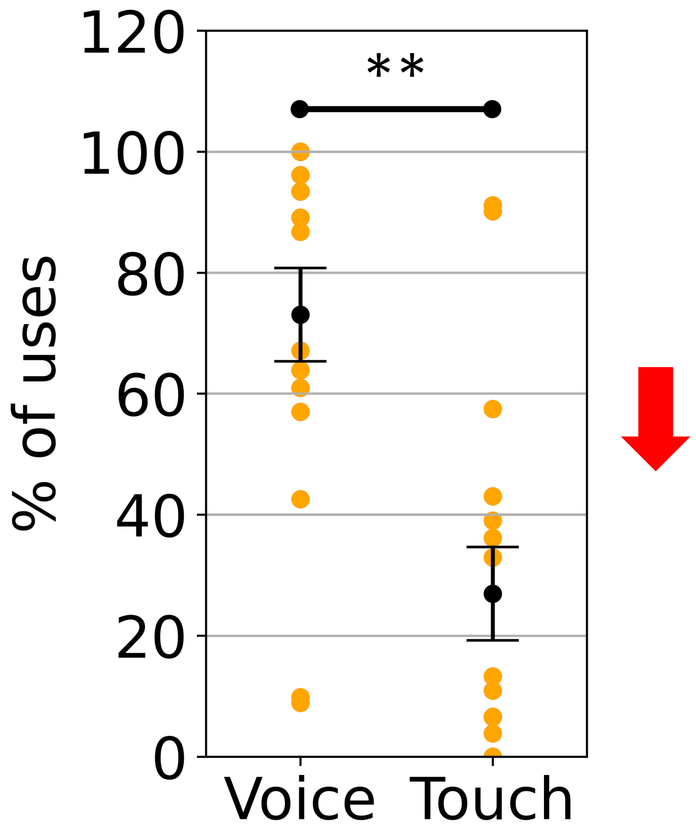
"I just put my [Echo Show] on the desk and I usually [completed the daily diaries] as long as I saw it. But there were couple of days missing when my desk was super messy and had my Echo Dot covered up by papers" (P13)

Touch input is faster than speech input



Is the user experience of touch input truly superior to that of speech input?

Voice input was still preferred than touch

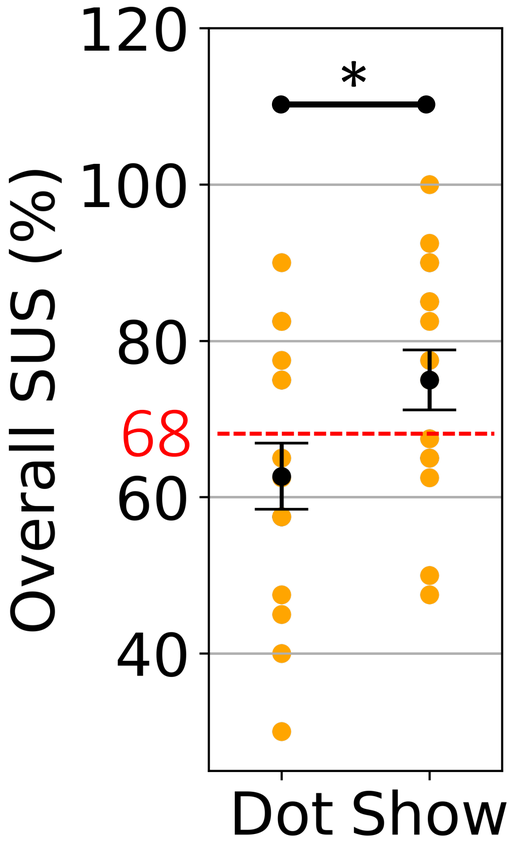


- Out of arms' reach & inconveniences caused by mobility impairment
- Unpleasant visual experience caused by discernable splotches with touch

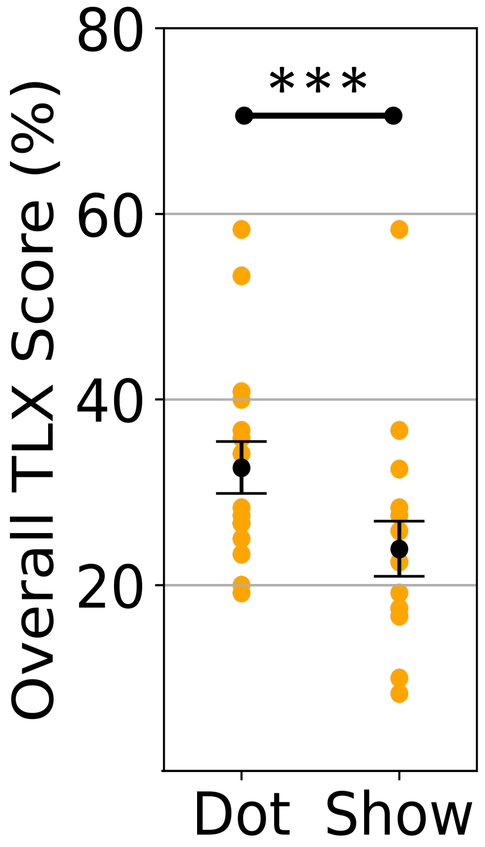
RQ3: How does the touchscreen affect the older adults’ experience of general uses?

Overall, the built-in touchscreen was preferred for general uses

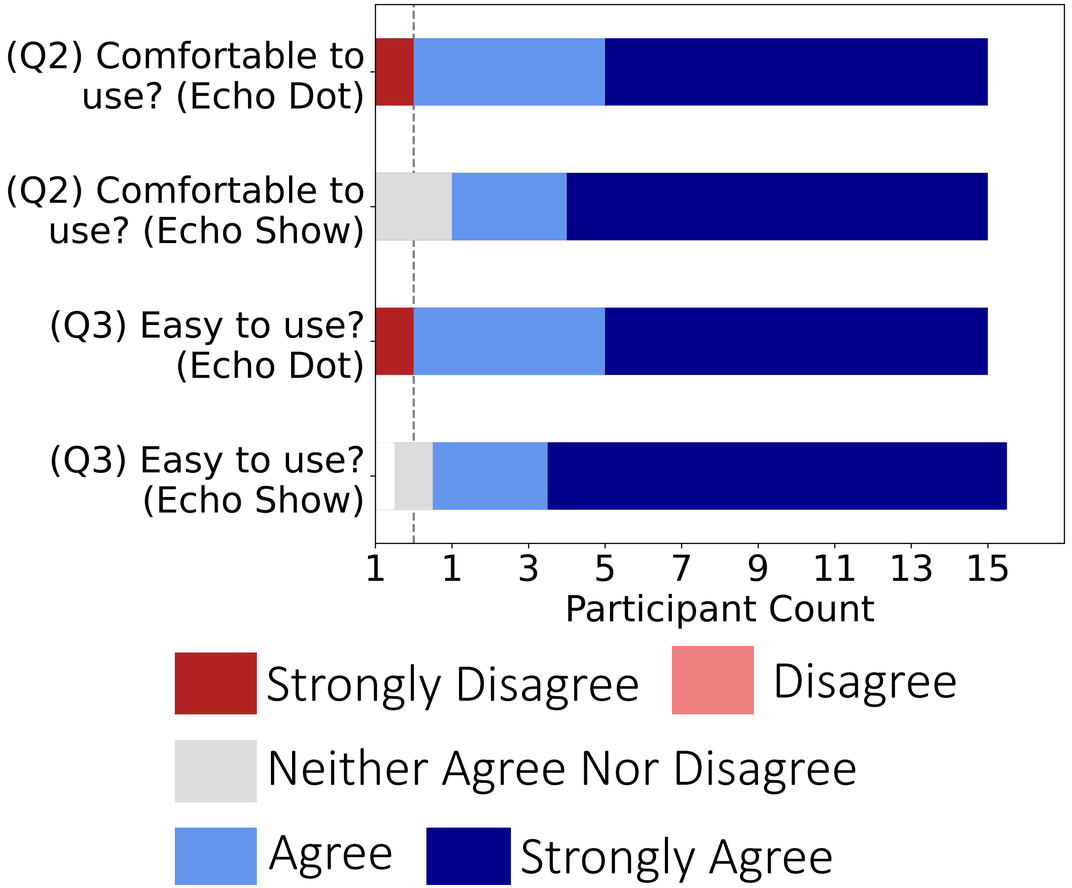
System Usability



Cognitive Workload



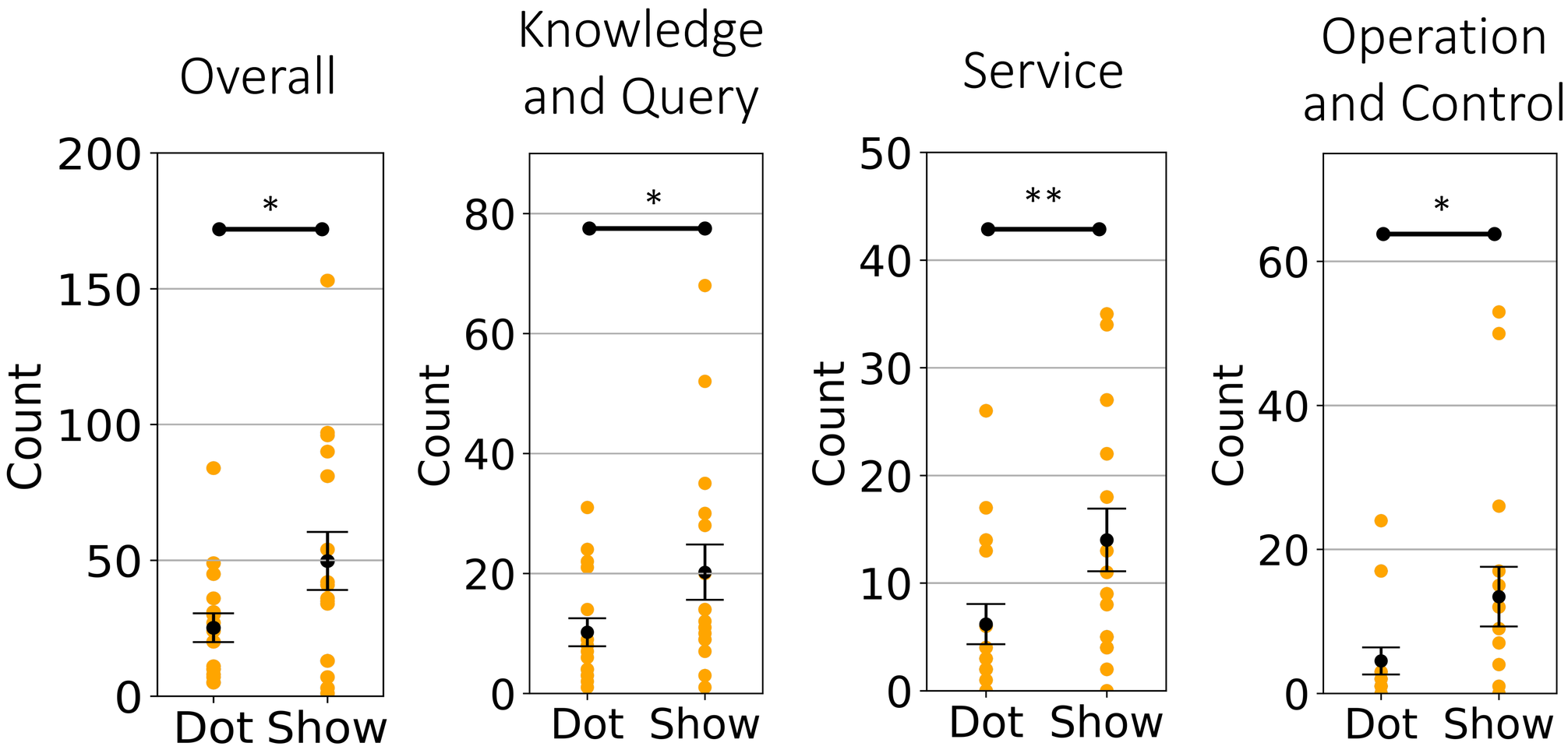
Comfortability and Ease of Use



Touchscreens foster a greater inclination among older adults to explore and utilize voice assistants more frequently

Theme	Code
Chat	Greetings, Jokes and Fun Questions
Knowledge Query	Weather and Temperature, Time and Date, Spelling, Defining Terms, Restaurant, Use of Devices, Sports, Shopping, Travel, Cooking, Books, Stock & Investment, Health Information, City & Public Services, Entertainment Related Questions, Interactive Games, Others
Service	Alarm, Music, Movies and Videos, News, Shopping List, Reminder, Calendar, Timer, Calling
Operation and Control	Device Control, Pinging, Repeat, Other Operation and Control Queries

Touchscreens foster a greater inclination among older adults to explore and utilize voice assistants more frequently



Benefits of visual output enabled by built-in touchscreen

- Auxiliary elements that are not announced by the voice output
- Feature suggestions delivered visually
- Persistent visual information such as time and weather
- Explicit visual output for creating a sense of companionship

Key Takeaways

More Details in Paper

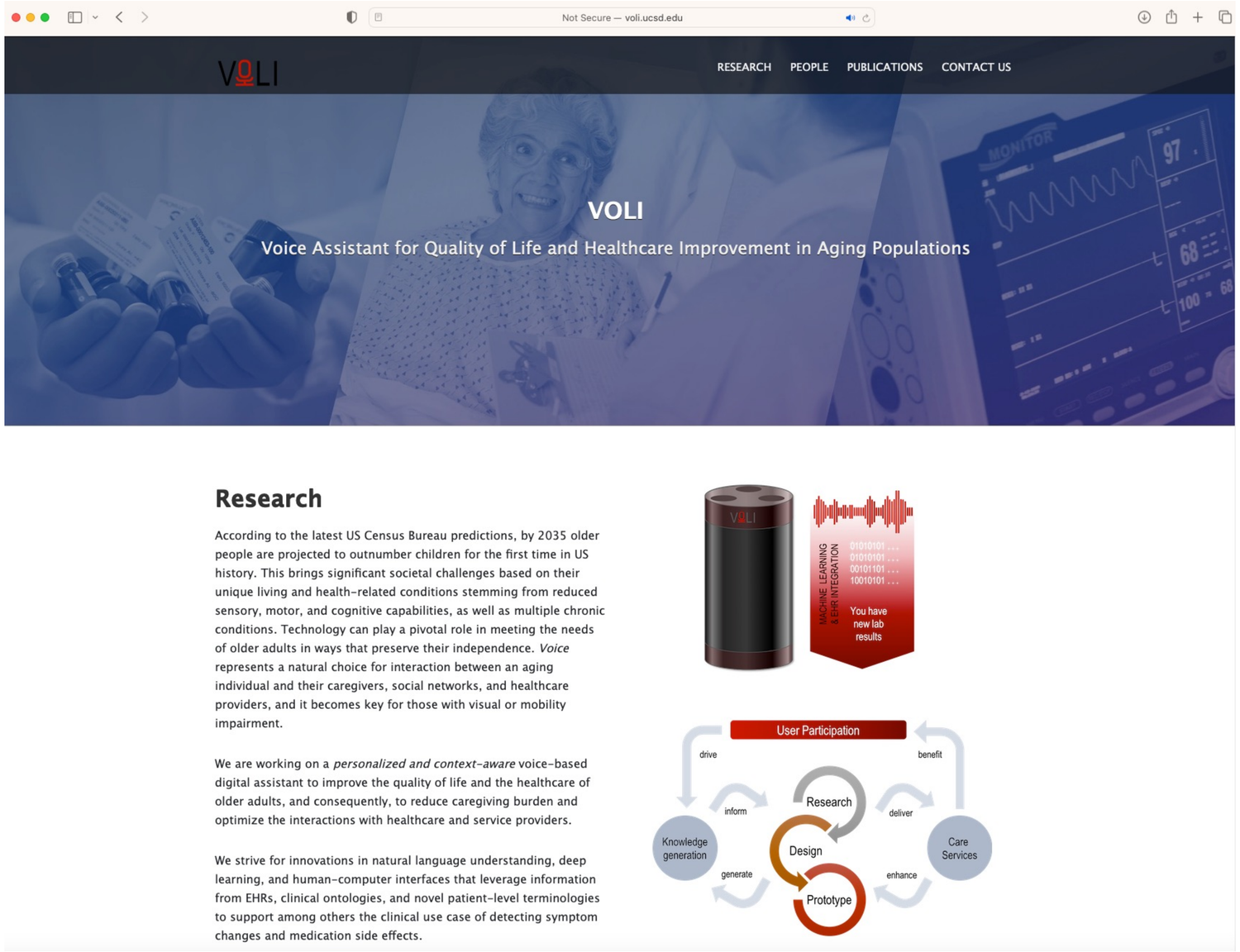
- During device setup, inputting information through built-in touchscreen is favored due to immediate and *in situ* feedback, as well as larger physical size for typing support.
- During long-term uses, although older adults favor visual output, speech input remains the preferred method of interaction.
- While speech input + visual output is promising for supporting older adults to conduct self-report diary surveys, designing integrated reminders are essentials for standalone voice assistants.

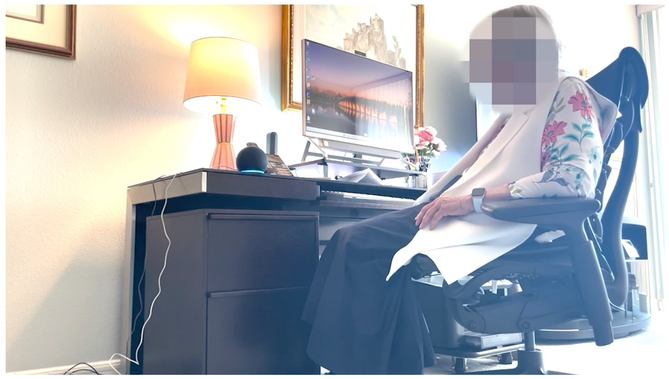
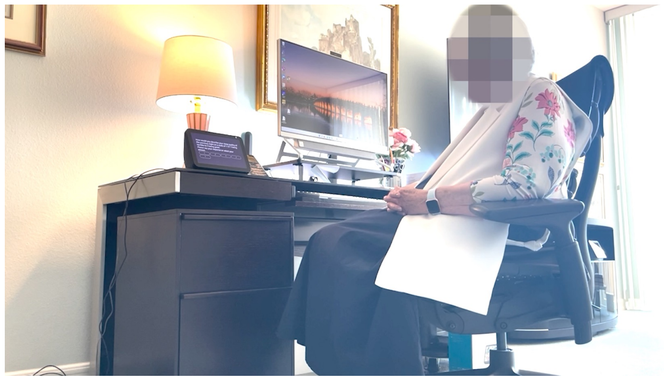
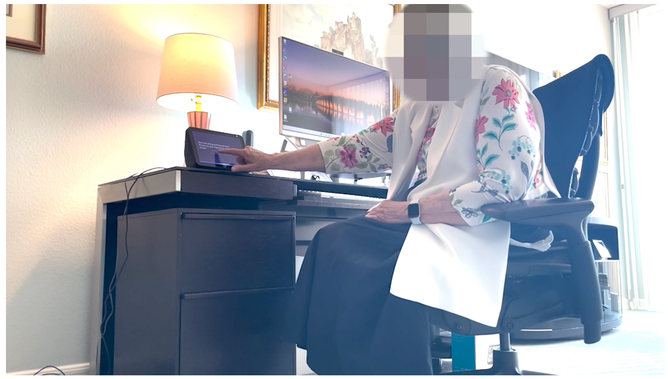
Special Acknowledgement

Mary Draper, MPA

For More Detail, Please Refer to Our Paper!

Project Website: VOLI.UCSD.EDU



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Manuscript 👇

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I will be graduating in Summer ‘25. Feel free let me know for any potential full-time job opportunity!

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