VOX Research Report

AUDIO TEST
MAY 2015


FINE
POINT

VOX RESEARCH REPORT

AUDIO TEST

MAY 5, 2015. V3.1.4. PROTOTYPE 5.1.3

Summary

This research session tested the audio voting experience, providing the IDEO team with qualitative and quantitative data to inform our iterative design process. During the previous audio inspiration session, we learned how to develop an audio voting system that was easy to discover, learn, and control. The prototype used in the first session used a live voiceover actor to simulate the audio user interface. For this second session, participants experienced a software user interface prototype that used a synthetic (computer generated) voice. During this session, the IDEO team continued to test and refine keypad (tactile controller) layouts. Voters with visual impairments used the cursor-cross with center-select keypad layout, preferred in the previous session, and compared it to a layout recommended by the TRACE center. The IDEO team gained the following insights, based on the qualitative and quantitative data collected during this session.

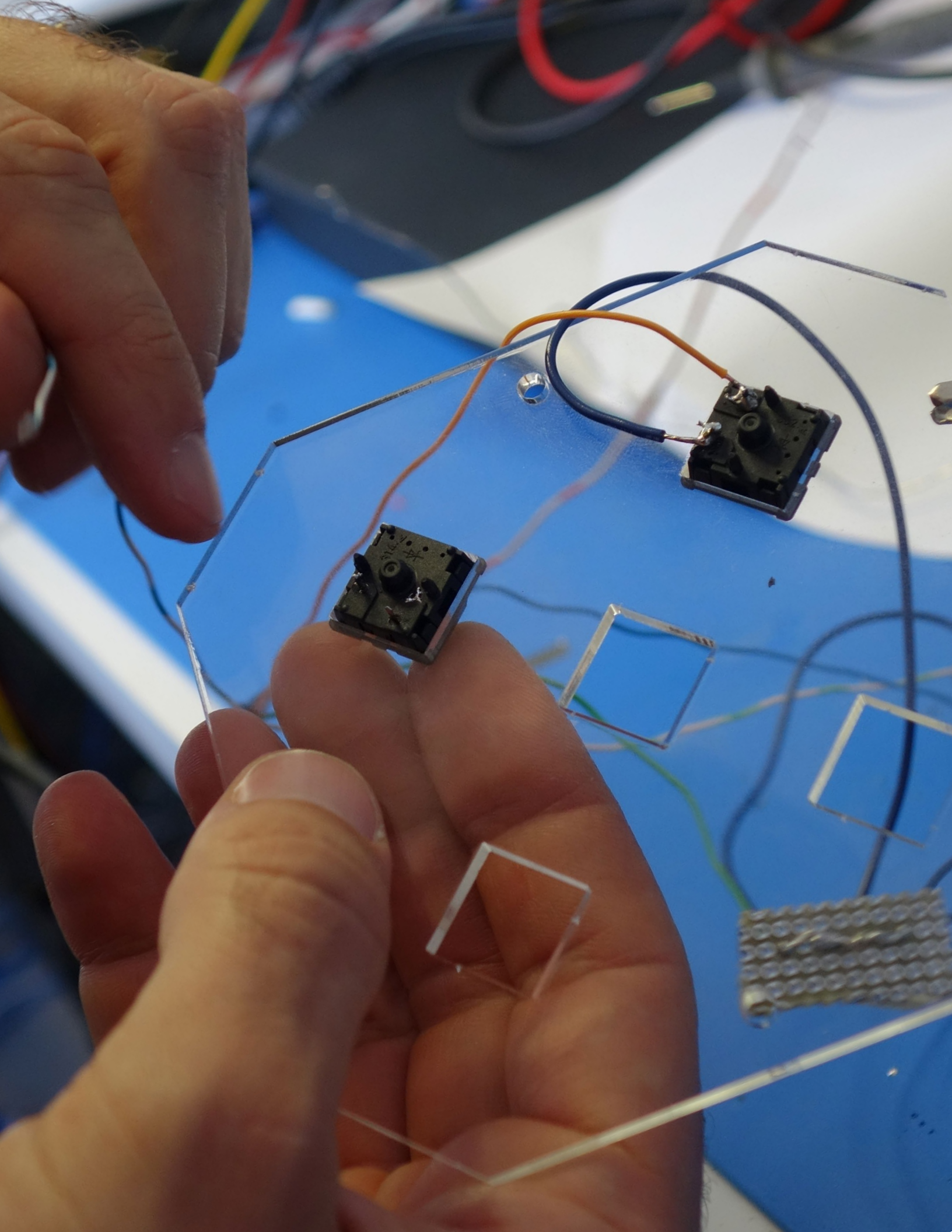
1. Silence can be useful to voters and might be facilitated by building a repeat function.
2. Screen curtain functionality is beneficial for privacy and consented assistance.
3. Cursor-cross with center-select is more usable than Trace layout.
4. Casting flow, from review to verify to cast, can be confusing.

Participants

A total of 5 people participated. Participants were recruited purposefully, meaning that the IDEO team selected participants according to traits that might most inform audio system design decisions. For this study, participant recruitment was limited to people with severe visual impairments. Within this recruitment category, we selected for diverse participants within the following characteristics: 1. Diverse experiences with vision loss and 2. Varying levels of proficiency with new technology. Although several were multilingual, all participants preferred to vote in English. These same participants tested the early audio voting prototype; this allowed the IDEO team to benefit from a more engaged and informed group of users.

Participants

Participants were diverse in terms of years of experience, race/ethnicity, and gender.



Methods

This study assessed the accessibility and usability of the audio voting prototype. Findings from this study provide further inspiration and evidence for the design of the immersive audio voting system. Participants were recruited purposefully for diversity within the following categories: degree of blindness (legally blind to completely blind) and experience with technology.

During in-depth user assessments, five participants completed the following tasks:

1. Approaching the booth, discovering, and accessing the BMD, ballot slot, keypad, and headphones.
2. Starting a vote session.
3. Voting on 4 contests with different selection types.
4. Reviewing, changing, and confirming votes.
5. Verifying ballot.
6. Casting ballot into an integrated ballot box.
7. Comparing alternative two keypads (tactile controllers): (A) cursor-cross with center-select and (B) Trace Center EZAccess.

During each step of the experience, participants used the talk-aloud method of describing their actions and thoughts. Research sessions included three facilitators, who used a semi-structured guide to prompt tasks and ask specific questions. Facilitators observed and documented user sessions using qualitative field notes and a quantitative structured observation form. Each session lasted 45-60 minutes.

Limitations and biases include Hawthorne effect[1], social desirability bias[2], and sampling bias[3]. These biases were mitigated by using neutral or negative probes, for example "How awkward or hard was that?", and our plan to triangulate across future studies with less obtrusive observation methods.

1 People tend to act differently when they know that they are being watched.
2 People tend toward social acceptable behavior and statements in a new social environment, often avoiding giving negative critique.
3 This is not a random or strictly representative sample of individuals, so their experience and feedback might not be representative of others'.

Prototypes

Hardware prototypes (Version 5.1.3) and software prototype (Version 3.1.4 with Audio User Interface Version 2) were used to facilitate activity and discussion.

“Looping can be helpful, but sometimes I am just trying to think… I just want to tell it to *shut up*.”

INSIGHTS & FINDINGS

TOPIC: Audio navigation
BIG QUESTION: How might we design an audio voting system that facilitates intuitive navigation and a comfortable pace for voters with visual impairments?
WHAT WE'VE LEARNED: Silence can be useful to voters and might be facilitated by building a repeat function.
DESIGN DECISION: Use the controller's up button to enable repeat.
PRINCIPLES: Easy

Background

During earlier audio testing, we discovered that voters wanted to drive the audio session, as opposed to the computer determining the pace of advancement. The IDEO team needed to learn more about how users preferred to control the experience. A primary decision was whether to include automatic audio looping or allow for extended silences. We tested an audio system without automatic audio looping.

Findings

During this session, we found that built-in pauses with silence were useful to voters. During the voting process, users needed to think through election decisions, come to understand this new voting technology, and request or receive assistance. Silence was useful to voters. When we probed about these moments of silence and demonstrated what they system would be like with an auto-looping function, users agreed that the silence was important. One typical statement was:

> "Looping can be helpful but sometimes I am just trying to think. A pollworker or someone might be talking to me and it just keeps repeating over and over in my ear. I could take off the headphones but I just want to tell it to shut up."

With no automatic looping, designers needed to create a mechanism for repeating important information, particularly in cases when no response is detected from the user. As such, we examined buttons and functions that were being under-utilized and might be a cognitive match for repeat function. We found that voters rarely used the up-button to repeat previous selection option. Instead, they tended to continue forward to loop back through the contest and selection options.

Recommendations

We recommend against immediate audio looping and, instead, advise creating a repeat function. Automatic looping might be advisable after an extended pause of at least ten seconds. In order to reduce the potential cognitive overload of adding additional buttons, we recommend re-purposing the up-button as a consistent repeat function. These recommendations are in agreement with our previous findings about putting audio users in the "driver's seat."

“At the bank, the ATM asks if you want to blackout the screen. I always do.”

INSIGHTS & FINDINGS

TOPIC: Audio privacy
BIG QUESTION: How might we design an audio voting system that is private and yet allows sighted assistants to help?
WHAT WE'VE LEARNED: Screen curtain functionality is beneficial for privacy and consented assistance.
DESIGN DECISION: Create a screen curtain functionality, with "on" as the default mode.
PRINCIPLES: Easy. Private & independent.

Background

Voting rights and access laws require us to design a voting system that people with disabilities can use privately and independently. However, people with disabilities have the right to request assitance, when they choose. The IDEO team looked for opportunities to protect the privacy of voters with visual impairments while also enabling them to get assitance from sighted helpers. The team designated two audio inputs to allow two people to listen into a voting session. During our user research session with people with visual impairments, voters discussed additional functionality that might further enhance their experience along these lines.

Findings

During this session, voters brought up the desire to maintain privacy of their session by ensuring that the screen was turned off. Several voters referred to this as a "screen curtain", a functionality that exists for some mobile devices in accessibility mode. However, they also advised allowing users to turn off this functionality, or "pull back the screen curtain" if a voter wanted assitance from a sighted helper.

> "It's like my phone," one user told us. "I turn the screen curtain on if I am on the bus or another public place where I want to keep what I am doing private. But if I am at home or I want to share something with my husband, then I turn the curtain off."

Voters agreed that the default preference should be to protect the privacy of their selections by turning the screen curtain on at the beginning of the session. Then, the screen curtain can be turned off during the session with their permission.

Recommendations

We recommend creating a screen curtain functionality, with a blank screen or "on curtain" as the default mode. Voters with visual impairments should be provided with audio instructions about how to turn the screen curtain off.

“I like that it’s a pattern, so you start expecting it. If you did it once, you know how it will be next.”

INSIGHTS & FINDINGS

TOPIC: Keypad.
BIG QUESTION: How do we design an accessible and usable keypad (tactile controller) for the audio voting experience?
LEARNED: Cursor-cross with center-select is more usable than Trace layout.
DESIGN DECISION: Continue to develop the cursor-cross with center-select keypad.
PRINCIPLES: Easy. Private & independent.

Background

Voting systems across the United States use tactile controllers as the primary means of input for people facing access challenges. For the InkaVote system, a large and simple tactile controller allows users to make selections on the ABB. Controllers for the InkaVote and other systems are designed with the assumption that all users with access challenges, whatever the reason for these challenges, will use this one input system.

The IDEO team's approach to accessibility is more nuanced. Our earlier findings revealed that people with disabilities have a diverse set of needs and that they benefit from several input options: touchscreen with large and distinct digital buttons, a keypad (tactile controller), and peripherals such as an A/B switch. Learnings from testing at the Cerebral Palsy Center suggest that the touchscreen is accessible to people with less severe motor impairments and the A/B switch is accessible to people with more severe motor impairments. Memorably, the managers of their computer learning center told us, "If I had one wish, it'd be to replace all this [accessibility technology] with touchscreens." In addition to the cerebral palsy community, our testing efforts revealed that other people with traditional access challenges, but with no visual impairment, also tended to prefer the touchscreen interaction. Building on this accumulated knowledge, we understood that the primary user group for the keypad was people with visual impairments.

Findings

Voters with visual impairments used the cursor-cross with center select to complete a vote session. For all participants, this input device was accessible, usable, and intuitive. When facilitators asked why this approach seemed to work, one participant said "I like that it's a pattern, so you start expecting it. If you did it once, you know how it will be next." Another explained, "It's so simple. You can tell what to do with [the keypad] right away and you explain at the beginning which way is up and which way is down."

During the session, participants were given an EZAccess-style keypad and a cursor-cross with center-select keypad one at a time and asked to complete a series of simple tasks. On the EZAccess controller, three out of five users could not identify the up key, three out of five could not identify the select key, and two out of five could not identify the help key. When users were able to identify the correct key, they often expressed being unsure that they had found it, making statements like "I don't know, it seems like it's probably this one. Right?" On the cursor-cross with center-select, all five participants identified each of the keys correctly without pause and with great confidence.

In addition to the cursor-cross with center-select, the keypad included buttons for volume up and down and speed up and down. Users all agreed that these functions were essential. When probed about addition-

al functionality that the keypad might include, users were often hesitant to add keys. As one voter put it,

> "You want to keep it really simple. For me, it's not a big deal to remember what a lot of keys mean, but I think about people like my brother-in-law who is losing his vision. I don't think he could handle something with a lot of junk on it."

When asked about including a help button, the idea was well received in general. Voters with visual impairments explained that they would want it to subtly alert a pollworker that they need assistance. None of the participants were interested in computer-based tutorial, information, or tips.

Recommendations

We recommend continuing to refine the cursor-cross with center-select keypad. Volume and speed control should remain a part of the essential keypad functionality. A help button, or some other subtle means of getting the attention of pollworkers, should be considered. All other additional buttons should be carefully vetted, knowing that more buttons might contribute to cognitive overload.


“Oh, it’s still talking to me.
I thought we were done.”

INSIGHTS & FINDINGS

TOPIC: Verification & casting
BIG QUESTION: How do we design an experience for people with visual impairments, clarifying the new procedures around verification and casting?
LEARNED: Casting flow, from review to verify to cast, can be confusing.
DESIGN DECISION: Refine the casting flow instructions. Before the ballot is printed, and their attention distracted, give voters a preview of the actions that they will take during verification and casting.
PRINCIPLES: Easy.

Background

Verification and casting have been identified as challenges during every research session. These are new procedures and require a higher level of instruction and clarity than the voting processes that people already familiar with.

Findings

During the audio test, making and reviewing selections was easy and intuitive, however verification and casting procedures remained confusing for voters. Although this system provided some instructions about what to do with the printed ballot, voters had their attention distracted or had removed their headphones during what they had assumed was the end of their voting session.

Voters described having no idea what to expect at the end of the session. Many were accustomed to a central ballot box and assumed that the next step involved taking their printed ballot to a pollworker for help with casting. Given their visual impairment, many voters reported that they might not immediately trust that the printed ballot had accurately recorded all of their votes and they wanted an opportunity to verify at this BMD or another. As one put it, “I might not always want to have my ballot read out loud to me, maybe not after I came to trust the system. But at first, I’d want to make sure.”

Recommendations

We recommend refining the print, verify, and cast instructions, carefully considering when to provide voters with a preview of what to expect. Furthermore, the BMD must have functionality to help people with visual impairments verify the ballot. We recommend scanning the tally code and reading these votes aloud, for those who request audio verification.

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