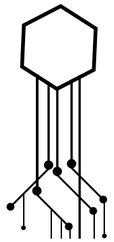
OntarioTech UNIVERSITY

Smart Talk

Eon Industrial Design



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Abstract

Preface

Because of the events of the covid-19 pandemic more and more careers have begun remote access work. This remote access has increased the usage of conferencing software has become larger and larger.

Importance

Currently there are a number of tools to aid in interacting with virtual conferencing software. But its important that these tools provide support for their users.

Solution

We wanted to create a device that would provide a global interface for visually impaired users that would allow them to have consistent interactions across all platforms.

Introduction

Problem

Unfortunately most current video conferencing software is unable to meet the aforementioned accessibility problems of its users in our case those who are visually impaired.

Methods

We went through different design phases during the development process in order to conduct research into potential solutions and conducting testing on different versions.

Solution

The Smart talk is a device that we created in order to allow users to automatically control components of video conferencing through a physical control scheme.

Methods

Literature Review

Conducted preliminary research into different sources in order to study our problem statement as well as gather data on developing techniques for users with visual impairment.

Bodystorming

Generated a use case and created a persona in order to test versions and produce potential issues with current solution as well as identify common problems associated with use case.

User feedback

Conducted live testing and recorded data through questionnaire in order to create metrics to measure success of current volumes.

Bodystorming Information

Tasks

- Interact with a video call application
- Traditionally done by clicking a on screen button or entering a key shortcut

Persona

- Any user of any age who may experience impaired vision or blindness and be required to make frequent use of conferencing software in their day to day lives either for interaction or their profession.

Situation

Somebody who is visually impaired trying to interact with conferencing software (Google meet, Discord, Zoom, Skype, Teams) and needs to be able to interface with the software, via controls i.e raising hands, muting/unmuting, share their screen, turning on and off camera, and take questions.

Scenarios

1. Mute audio and disable video to talk to someone in your physical room
2. Giving a group presentation where you need to mute repeatedly
   (Scenarios are applied to both observer and actor in order to highlight differences)

Actions are traditionally done by clicking a on screen button or entering a key shortcut

Samuel (limited vision actor):

Potential Issues

Scenario 1:

1. User may not be able to easily identify buttons on screen for muting or unmuting
2. User may have multiple windows open causing the streaming software to not register keybinds
3. User may not be familiar enough with specific conferencing software layouts
4. Using screen reader software may result in other call participants hearing narration
5. Speed of muting is reduced

Scenario 2:

1. Can be difficult to detect when different slides change
2. Screen reader would be slow and could result in other participants hearing it
3. Could simply forget that you're muted due to subtle indicator

Harry (Observer):

Potential Issues

Scenario 1:

1. May have window covering conferencing software causing software not to register inputs or cause you to forget to press the mute button or disable the camera

Scenario 2:

1. Displaying incorrect window / tab.
2. Delayed transmission

Post-VR Prototype

The prototyped interaction works properly in VR. It detects when the user is seated and when they stand up. Accordingly, the program shows a graphic of a muted or unmuted video call. This interaction feels useful and natural and demonstrates that we can progress with utilizing the same premise for other options. However, during our bodystorming we were able to identify that our initial use cases for our tool were still valid and instead we needed to focus on how exactly the user would reach the use cases which is the reason the use case diagram is not updated.





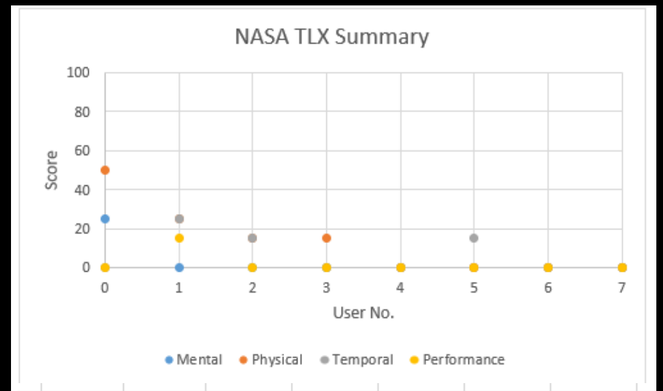

Results

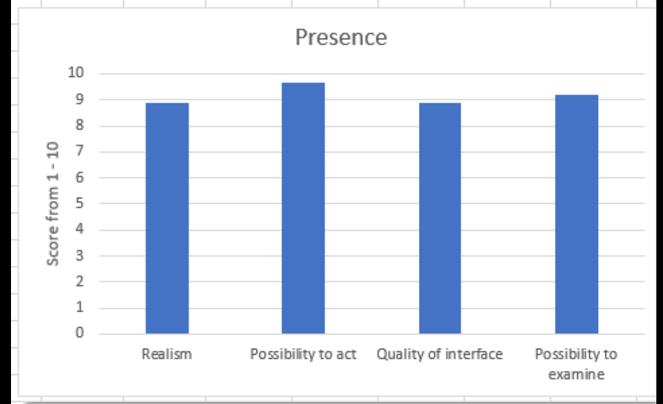
Bodystorming

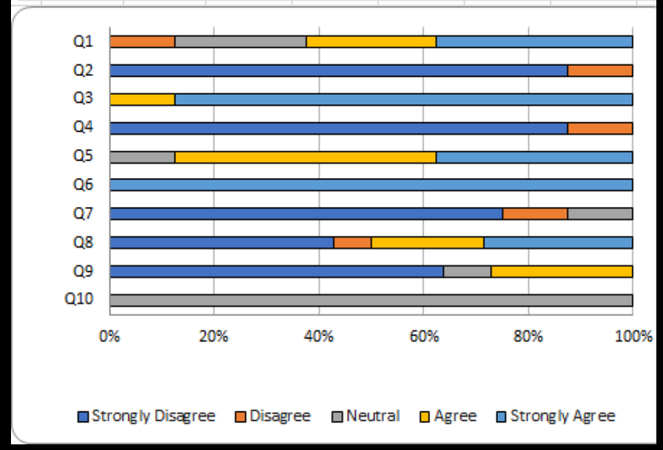
- Issues with screen reader software
- Inconsistencies in layout

User Feedback

- **NASA TLX**
  - Similar scores
  - Physical showed deviation
  -
- **SUS**
  - Scored 80.625
  - Good scores overall
  - Device might be too cumbersome
- **Presence Questions**
  - Good scores
  - Indicated issues with physical components







Product

Components

- Arduino Pro Micro
- Force Sensor
- Passive Buzzer
- Push Buttons

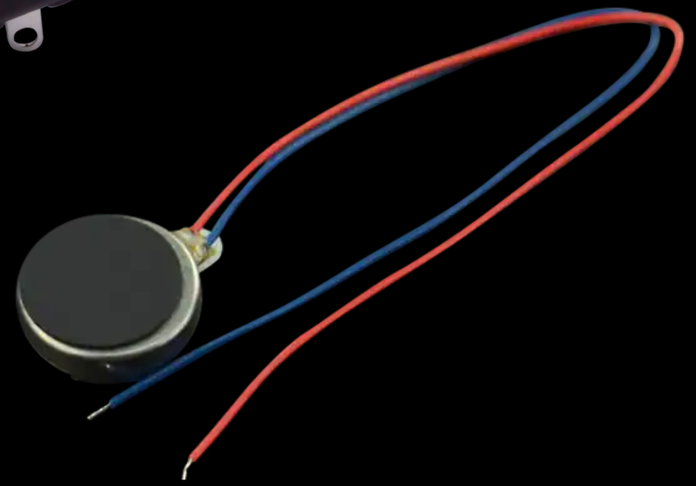
Features

- Automatic muting when unseated
- Interfaces with PowerToys Mute
- Buttons provide manual overrides
- Buzzer provides audible feedback from actions
- Easily user-detachable force sensor for ease of transportation

Discussion/Conclusions

The final version of our product is very usable and works well in standard usage. The buzzer provides good feedback and makes it very clear what is happening.

The force sensor does need a better method of distributing weight. The device would be easier to use if it were wireless. The buttons could also be better as toggle switches. A different method of feedback could be useful, such as haptic feedback.



Thank You