Simple Voice Commands for an Online Learning Environment (Project Proposal)

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***Abstract*—2019 saw the start of a pandemic that left people spending more time on the internet. With online learning becoming more prevalent, a wider variety of people using group meeting platforms would mean that a need for additional accessibility would greatly improve the inclusiveness of the platform as well as the productivity and learning for those that could use the accessibility. The problem that we are trying to solve is the lack of accessibility for those that might have trouble using keyboards and computer mice. Utilizing voice commands that parallels the functionality of keyboards and computer mice on an online learning platform could improve the inclusiveness of that platform along with accessibility. Through analyzing academic sources we can clearly identify the benefits of having an additional method of navigation on an online learning platform which will be explored in depth within this proposal. It could also be said that in this day and age, voice commands are becoming more prevalent in technology and certainly enhance everyday life for certain people thus meaning we can utilize something that people are already familiar with to improve the accessibility of online learning platforms.**

Keywords — Voice command, Accessibility, Online Learning

I. Introduction

A research conducted on the evaluation of voice commands in a virtual reality implanting procedure stated "The use of voice commands in virtual reality environment to replace button presses and other simple actions frees the user's hands and eyes for other tasks." (V-A) They also concluded in their research that "Button presses and the voice commands should be both available and used in parallel. The input methods can be further improved based on the expert comments." Which validates our proposal of introducing voice commands that could be used in tandem with keyboard and mouse or could be a replacement within an online learning platform. The problem is that, nowadays there is a wider variety of people requiring online learning which means that this introduces more people who could potentially have disabilities that hinder their ability to utilize a keyboard and mouse efficiently in a fast paced learning environment. Our solution to this problem is to have voice commands that can be used in tandem with traditional inputs which can aid those who are less proficient or for disability reasons, have trouble utilizing traditional inputs. Some simple functionality that we aim to cover in an online learning platform (see **Fig. 2**) is: muting/unmuting, raising your hand, and turning on/off camera. A research paper written about Combining Gesture and Voice Control for Mid-Air Manipulation of Cad Models in VR Environments, speaks about the uses of voice commands for their use case. "The system uses standard mid-air 3D object manipulation techniques and adds a set of voice commands to help mitigate the deficiencies of current hand gesture recognition techniques." (V-B). It's mentioned that voice commands isn't a direct replacement but rather it makes it easier to complete certain tasks mitigating the inaccuracy of mouse clicks or in an VR environment, fumbling for a mute button. Having more options to perform a task could potentially allow for a more effective learning experience since freeing up your hands to perform a task can also improve efficiency in keeping up with lectures.

II. Methods

Our goal is to create a Wizard of Oz prototype to demonstrate the efficiency and accessibility of voice commands in an online learning environment (see **Fig. 2**) in VR or even regular platforms. To do so we have come up with a Kanban chart that lists all the tasks that need to be done along with due dates attached to each of them. (see **Fig. 1**). We collected data to see whether or not we think that voice commands is relevant and whether or not it could potentially increase inclusivity and accessibility in an online learning platform. Prototyping will allow us to get a better idea of how our idea can be finalized and with that prototype we can test it on peers or willing participants to see whether or not our method works and to fix any problems our idea has. Our prototype will be a Wizard of Oz demonstration of simple tasks such as, raising your hand in class, unmuting/muting, as well as turning on or off your camera or for VR perhaps

there could be functionality like switching to drawing mode or perhaps navigating a slide through voice commands can be a possibility. Once we determine the functionality that we want and insert them into our prototype we can test whether or not this is what people need or use frequently. Perhaps we can keyword the frequently used voice commands into something that won't be accidentally inputted. Some noticeable challenges that we will definitely encounter is that there will be inaccuracy to the voice commands so we will have to think of solutions for that such as using simple one word commands or making it rebindable for users so that it could fit their needs. Another challenge will be accidental inputs by the user while speaking, so we will have to think of solutions to avoid those, perhaps adding a line like "Hey Google" to activate the voice command system or something similar.

III. Results

A noticeable gap in the literature is the fact that all of the literature that we've researched utilize voice commands in different settings but none of them address voice commands within an online learning environment. An example being this research paper on the use of voice commands within an autonomous vehicle and the accuracy the system as well as efficiency (V-E). Stage 1 of the design thinking process we discovered, through another academic research (V-A), that utilizing voice commands in tandem with traditional inputs for a virtual reality implanting procedure is useful so using that same thought process we think using voice commands in an online learning platform can improve inclusivity, as well as accessibility for a relatively new platform with little to no support due to how new they are. Without even having to conduct the research ourselves, a research conducted on how people prefer to interact with desktop based virtual environments. "Results showed that voice command provided the best performance and was most preferred by participants, based on the analysis of both objective and subjective data." (V-D). Basically they concluded in their research that people prefer voice commands over other forms of interactions in a VR space like gestures. Stage 2, We think that users can benefit from having additional support with voice commands due to online learning platforms being a new thing that's currently exploded in usage due to the pandemic, accessibility which was once possibly on the backlogs is now of importance. Stage 3 we've picked some ideas that we thought we could potentially work with. Haptic feedback for VR online learning platforms was something that we considered along with voice commands but in an effort to reduce the scope we decided to only do voice commands. The goal is to increase inclusivity and accessibility with haptic feedback perhaps being useless for those that rely on voice commands, the thought process being that someone with limb trauma probably has no use for haptic feedback thus leading back to voice commands being the focus. Stage 4 of the process is where we are supposed to prototype, which we have not done yet but definitely have a good idea in the direction this project is going in terms of wizard of Oz prototyping within unity. Stage 5 sees the testing process of the prototype which we have not gotten to yet as of now. We've also conducted some literature review to come up with the idea of utilizing voice commands.

IV. Conclusion

We discovered that there is a lack of accessibility and inclusivity in online learning platforms due to the sudden explosion of usage because of the pandemic. Since this is relatively recent there is not many resources that speak on the topic of adding voice commands to these platforms. All of the academic sources that we researched were the use of voice commands implemented in similar scenarios but none of them have anything to do with online learning. Due to the lack of support and accessibility we believe that voice commands is the solution to this lack of accessibility in online learning environments. Our approach of creating a Wizard of Oz prototype to put our idea to the test by having participants see if they find voice commands a possible alternative to physical inputs or if voice commands are better. There currently does not seem like there are other solutions at the moment perhaps gestures would be the other solution but from a research paper we looked at, it seems that people prefer voice command over gestures as mentioned before (V-B). Of course gestures and haptic feedback could be an alternative if voice command is not a possibility (if the user is unable to speak) but we believe that voice command would be the better option as voice command would not only be more inclusive to the people using the platform but it could used by everyone even for efficiency purposes and it would not be limited to VR. Our next step is to begin our prototyping process first by brain storming all of the functionality that we want included. After that we can begin creating that prototype and testing it utilizing the design thinking process.

V. Bibliography

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VI. Appendices (All Images in Github)

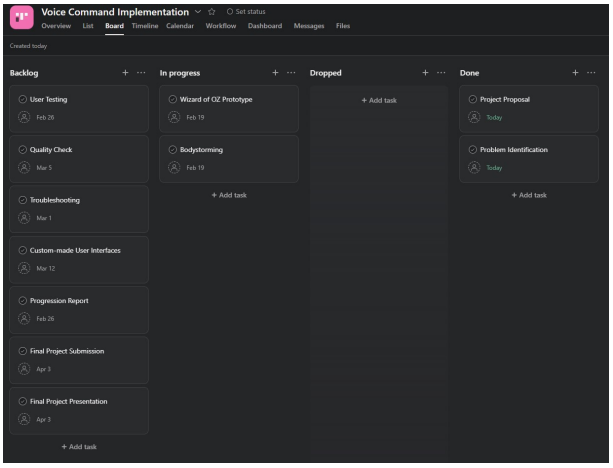

Fig. 1. Kanban Chart

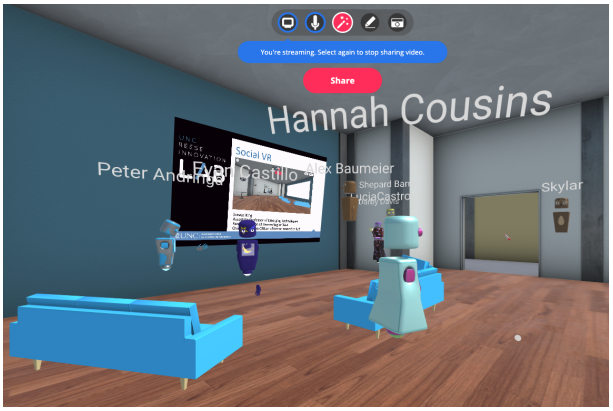

Fig. 2. Mozilla Hubs Classroom