Developing Tests for Used Virtual-Reality Equipment

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Abstract

In this project, our focus was to make used virtual-reality equipment accessible to a wide and diverse audience. We first began our process by filling out an Instituitional Review Board Application due to our intended use of human subjects. We wanted to use human subjects to test out the used virtual-reality equipment through a series of tests we planned to design. With these tests, we sought to find a method to evaluate a used piece of equipment and see if it can be used for student and faculty usage. We ended up finding inspiration for testing but were not able to due to time constraints. We also were able to sort through the equipment in storage.

Motivation

Reusing used equipment such as virtual-reality equipment contribute to the overall movement of sustainability. In addition, the University of Minnesota is a large academic Institution that possesses a large amount of technology. The students of the university tend to not have the financial resources to access equipment like virtual reality. By reusing the virtual reality equipment, it helps the wide and diverse background of the university to access such equipment.

Previous Research Relation

While researching on the topic of reusing old virtual-reality equipment, there were no available academic papers in our extent of research. There are likely resources and papers to that which we were unable to find. Despite not being able to reference academic papers that cover this, we concentrated on papers that focused on software and hardware that could be added to virtual-reality equipment. Through our research we uncovered that accessibility is an important aspect when considering virtual-reality equipment. The papers we looked into are a direct response to issues of accessibility in this equipment.

Challenges Presented

The first challenge we encountered was trying to find a previous academic paper that covered using used virtual-reality equipment for current day use. To our extent, we were unable to find such a source. The other challenge we faced was trying to sort what was and wasn't usable in the Digital Design Center storage room. The equipment had to be found through a multitude of other items in the room.

Research Question

While researching into the topic of reusing virtual-reality equipment we soon realized that accessibility is a critical aspect to reusing this equipment. As a research team we realized that we are commited to identifying opportunies for equipment re-use that respect differences among equipment-user mobility, hearing and vision abilities, as well as opportunities for re-use that accomadate purposes that may differ from an equipment's originally intended purpose. With this we came up with the question:

What are the most effective simple tests for gauging the continued viability of used virtual-reality equipment that also takes into consideration serving a wide and diverse audience?

Methods

In order to catagorize and sort the different academic papers relating to virtual-reality software and hardware, a table using a spreadsheet showned below. There are two different tables, one for papers that talk about specific equipment or software and another table for a hypothesis on a certain ability. For both tables, the links included in the table are linked to the original academic paper and are linked to a google doc that has detailed and further research into the specific equipment. For the catagory of inclusion column, the type of ability such as vision, physical and mental were indicated depending on what each paper covered. The column named methods provided indicate if tests experimented in the papers were explained and provided in depth. In addition to sorting out other academic papers relating to our question, we sorted through equipment in the Digital Design Center storage room and created a spreadsheet for what equipment was usable and what wasn't.

Name of Equipment	Article Link	Summary Doc	Overview	Catagory of Inclusion	Methods Provided
Microsoft Research's SeeingVR toolkit	Link	Link	Software that can be added to VR for sight	Low Vision	X
Microsoft's Research Canetroller	Link	Link	A physical cane that is used to process VR world	Visual	X
Xbox Adaptive Controller	Link	Link	Game controller that can be added to Xbox	Visual, physical, mental	
SteamVR Input	Link	Link	Input system that allows users to adapt controllers	Visual, physical, mental	
Article Exploring Hypotheses	**Article Link**	**Summary Doc**	**Overview**	**Catagory of Inclusion**	**Methods provided**
Architectural Spaces by Blind People	Link	Link	Experiments on auditory levels of blind people	Visual	X

Figure 1

Results

The results of looking through different academic papers that cover virtual-reality software and hardware that can be added to existing equipment had led us to begin developing methods of tests that can be used to gauge the viability of used virtual-reaility equipment available in the Digital Design Center. Also by looking and sorting through the equipment shown in figure 2, we were able to understand the extent to which equipment avilable are usable. It has allowed for once abandoned forgotten equipment to start to be used once again either in it's intended purpose or a new purpose.

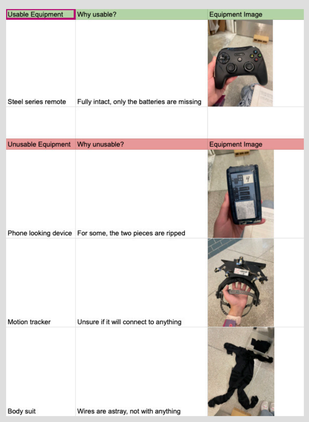

Figure 2

Conclusion & Future Implications

By looking at a multitude of academic papers convering software and hardware for virtual-reality equipment that covered issues of inclusion, we soon realized that accessiblity is critical when adapting and reusing used virtual-reality equipment. We also realized that by sorting through this equipment, we are allowing them to potentially have a greater lifespan and purpose towards the students and facuilty at the University of Minnesota. We hope to go further into our research and actually implement tests for testing the viability of the equipment that we've sorted and looked through. We would like to have a checkout system in which students and facility can check out the used virtual-reality equipment. As well as offering the equipment that no longer works for re-use for those who wish to use it.

References

Figure 1: Joy Quach
Figure 2: Joy Quach

Related Readings

M. Mott et al., "Accessible by Design: An Opportunity for Virtual Reality," 2019 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct), Beijing, China, 2019, pp. 451-454, doi: 10.1109/ISMAR-Adjunct.2019.00122.

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