

Bodystorming for Motion Controls in a Virtual Learning Environment

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Abstract—The current state of virtual classrooms lacks user participation and doesn't utilize natural motion controls. Our goal is to have students be able to interact and feel immersed in the virtual classroom so that learning becomes the priority. We conducted a bodystorming process to further learn and create strategies so we can effectively implement motion controls into a Virtual Reality (VR) classroom and incorporate student participation. We found that incorporating a hand raise and head leaning functions improve the student's immersion and simplifies the controls. We also recorded feedback on displaying responses, handling events and the classroom setting that will need further improvements.

Index Terms—Motion Controls, Bodystorming, Virtual Classroom

I. INTRODUCTION

During the bodystorming process, we discovered a methodology that we believe will work seamlessly to make our product increase immersion in the VR student space. Our goal was to bodystorm key interactions and ideas that we believed would help immerse and keep students more engaged in the VR classroom. The main idea that we tested around was a hand-raising function that would allow the student to physically raise their hand. This would toggle and let the teacher know that they have a question or a response. We also worked with the idea of a simple head-leaning answering system allowing kids to respond with head movement. Our method highlights our design process and we later discuss our positive and negative findings.

II. METHODS

The first thing that was worked on was creating a use case diagram (Fig. 1). and a target persona. With these two tasks completed, we have a better idea of what our needs and wants are for the completion of the project. The next step in our bodystorming process was figuring out and writing down how virtual classrooms were previously handled. We did this by watching how a typical virtual classroom is run and creating potential situations that may arise due to the task. The first situation has a student that is expected to learn and participate in a virtual classroom. Answering questions, nodding, shaking their head, and raising their hand to stay involved in the proceedings. Our first actor Emma was tasked with creating two possible scenarios that could come from participation in a

virtual learning environment with Roy in charge of observing. Emma decided on engaging the student and having the student be in a presentation. The second situation was created by the actor Roy and was observed by Trey. This was a situation based on if a student was writing a quiz or test in a VR classroom setting. Roy saw two potential scenarios, one being that the student needs to use motion controls to signal the teacher for clarification. The other scenario is that the student has gotten an answer incorrect and would like to discuss the answer with the teacher. Actor behaviour was based on the target persona (Fig. 2). Both situations are made up of things like a mock desk/classroom setting, toilet paper rolls as controllers, and sticky notes representing pop-up action confirmations (Fig. 3). The observer sitting across from the actor simulates the teacher. The mock students would simulate the content and interactions that they would be viewed by participating in a VR quiz, raising hands to discuss, and asking questions. We finally made a VR prototype of the project to put some of our findings to the test and address some of our issues. We created a simple scene involving the hand raise functions and questions answering functions. We then got both actors to test out our scene.

III. RESULTS AND DISCUSSION

When determining what results we received from the bodystorming process, we found that after students initially join the meet, student involvement rapidly declines. In the example of the online class we viewed, students only had to say "Here" to gain their attendance check at the beginning of the lecture and for many, that was the only interaction they had in the entire class. Students are not required to use microphones or cameras and this gave the feeling of distance between the students and the professor. As for the professor, presenting while monitoring the text chat was difficult and unnatural from the standard in-class learning experience. This was due to the fact that even if they stop for a moment to ask the class if they understand, the text chat questions may be obsolete due to being minutes old or students just may not say anything due to the uncomfortable nature of online learning.

When we conducted our first two phases of bodystorming we received feedback that the hand raise was found to be very natural and easy to do and the head shake component was

very engaging. In terms of issues, we needed a way to toggle the hand being raised to avoid fatigue, there was some worry about shaking off the headset when answering questions, and some worry about potential headset fatigue. We designed our prototype with this feedback in mind and found that the hand toggle system helps avoid fatigue while keeping engagement. It was found that the head lean system is just as simple but it avoids the ability to shake off the headset. In terms of further refining and improving our prototype we need to create a better classroom setting with other "classmates" and work on a better way of displaying responses for the student. We plan to refine and iterate on our prototype for future assignments.

IV. APPENDICES

GitHub Link: [Repo LINK](#)

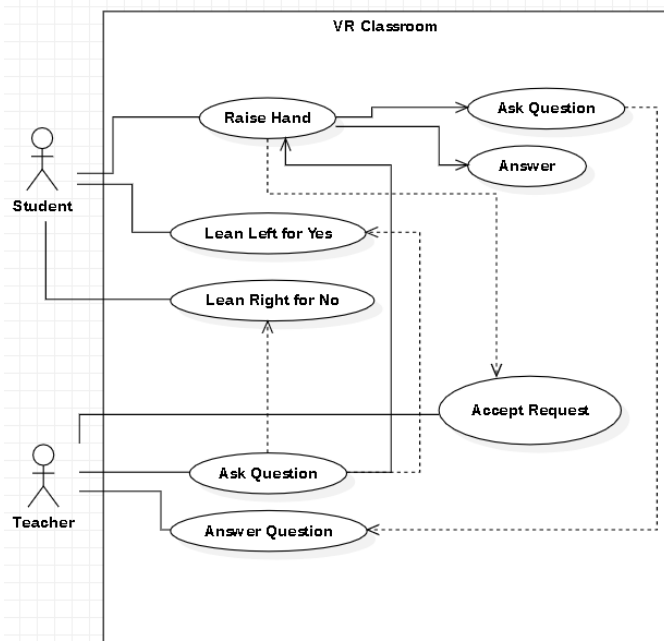


Fig. 1. Use Case Diagram

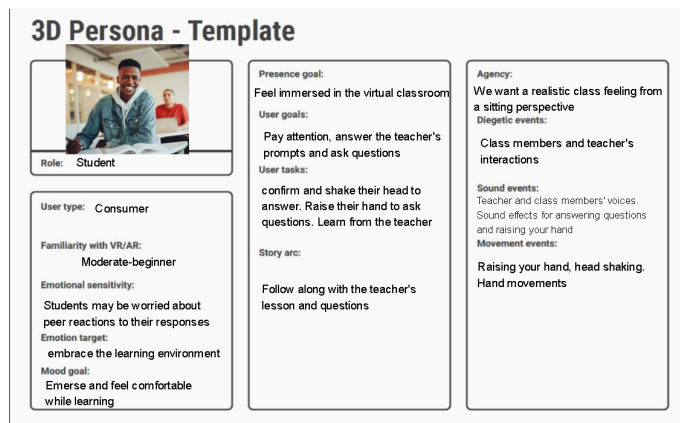


Fig. 2. Target Persona

Video Report link: [Report LINK](#)

Bodystorming Assets:

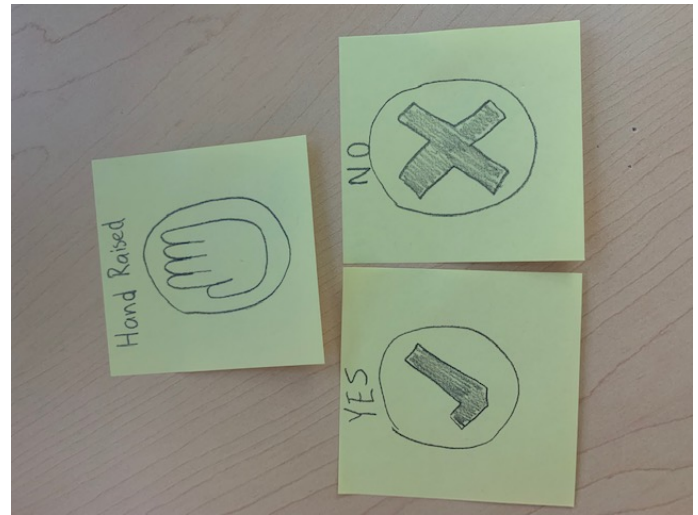


Fig. 3. Pop up assets

Notes from observers and actors during the Bodystorming:
Bodystorming Notes [LINK](#)

Bodystorming Video: [Bodystorming Process LINK](#)

Wizard of OZ Demo: [Demo LINK](#)

VR Wizard of Oz prototype (VR Room): [Repo LINK](#)