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Dr. Francisco Ortega

CS465-801

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Project Proposal

GROUP MEMBERS

The members of the group are Isabella Barnard, John Maksuta, Jaden Mascarehas, and Rose Ordway. It is the responsibility of all team members to find 14 research papers and provide help with the coding in this project. The group lacks experience with Unity, therefore, each member will spend time familiarizing themselves with the fundamentals of Unity VR. Each team member has been tasked with making sure that each component of the project works correctly, these components being speech, hand gestures, controllers, and markers. Jaden will focus on controller inputs, Rose will work on speech recognition, John will do gesture-based interactions, and Isabella will work on pen-based interactions. The game and its systems will be tested with participants found by Rose, who will assist the group in gathering data for the research paper. This data will be compiled into an Excel spreadsheet by Isabella to be used effectively in the research paper. Jaden will make the final edits to ensure that the paper has a single voice. The group will use LaTeX to create the final written research paper. The goal is the successful completion of the project and its ease of workflow by breaking it into manageable parts for each member to complete.

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| Isabella Barnard | John Maksuta  Senior  Computer Science  Colorado State University | Jaden Mascarenhas | Rose Ordway |

1. INTRODUCTION
2. MOTIVATION
3. BACKGROUND
4. PROJECT DESCRIPTION

We are creating a 3d virtual reality environment, with a tutorial and small game/tasks that we will use to conduct a human-subject experiment to evaluate different input methods paired with speech. We are comparing input methods using speech and various gestures to cast a magic spell or several types of spells in the virtual environment. To cast the spell the user will have to perform 2 component actions at nearly the same time, the first action is a speech component and the second action is a gesture/drawing symbol component. The user will speak the vocal component of the spell by reciting a magic word or phrase, and performing the gesture/symbol which when both are performed correctly will cause the spell to manifest. Incorrect input causes a spell “fizzle” where the spell fails to be cast. The second component will be slightly different for each input method. We will be testing the input methods of speech with Gesture, Controller, and Pen. The gesture will use some hand symbols or positions, the controller will perform some movement with or without button combinations, and the pen will perform some drawn symbols.

We will be evaluating the quantitative and qualitative attributes of the modalities with a small user base of test participants sourced from our team members’ available human resources, (friends, and family). Each participant will use the hardware to enter the virtual environment and perform a tutorial that teaches them how to cast the spell. Then, they will perform a small challenge or game level where they will perform the spell tasks in a simulated game environment. Our quantitative analysis will evaluate various aspects of the time and efficacy of the input methods. We will also ask the participants for qualitative data, such as how they felt with each method, ease of use, and other data points.

1. TECHNOLOGY USED

The hardware devices we will be using are the Meta Quest 2 or 3 headset, and the Logitech pen. These are used for testing the environment and the input methods. The Logitech pen is used specifically for the pen input, drawing the symbol with the pen, and pointing/direction of the action. For our software platform, we will write our code using Unity. We are creating a 3d environment and a small tutorial and game/challenge. We will be utilizing freely sourced royalty-free 3d models to use in the game. For the input methods, we use the native speech sensor on the Meta Quest device, the native controllers, the gesture sensing ability of the Meta Quest, and the Logitech pen. Of course, each team member is required to have access to a computer capable of running the unity platform, both for development and the testing and analysis. Our survey will use traditional paper, post evaluation, or if we are able to create it, will be part of the game at the end where the user can record their responses via the virtual reality interfaces.

1. DELIVERABLES

The group's deliverables at the end of the semester will consist of a game with a tutorial level and a level one, an Excel sheet that contains the information obtained from research testing, and the final research paper that summarizes all of the findings, and possibly more components if necessary to demonstrate the success of the project. The first deliverable of the project will be the tutorial and first levels of the game. The GitHub source code will be attached to this for others to test or see functionality. The goal of this tutorial level is to introduce users to the game's controls and capabilities. The goal of the first level is to test how well the user is able to use the different mechanics taught in the tutorial. This is the location where the game's variability will happen in order to evaluate the usage of speech, hand gestures, controllers, and pen controls. The data from this will track specific statistics, such as the time required to complete tasks or levels, control accuracy, and user experience. This participant data will be organized into an Excel file for use in the final research paper. To demonstrate the work over the course of the semester, presentations or videos may be created to emphasize the project's progress, results, and overall successes.

1. CONTRIBUTION

# **References**

There are no sources in the current document**.**