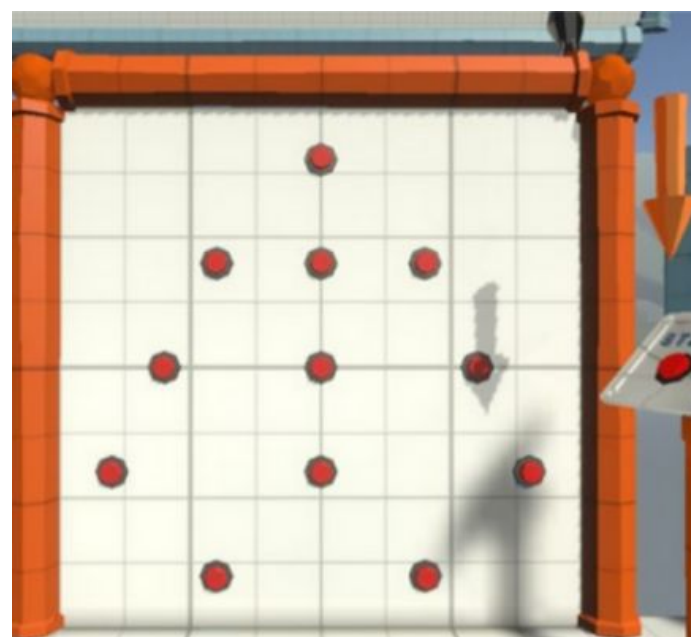


COMPARING REALITY



BATAK Lightboard

Physical Version of the Game

- The user has two options, a “high” setting and a “low” setting.
 - The “low” setting limits the number of buttons you have to press by removing the top level of buttons
 - The “high” setting uses all of the buttons on the board
- The user has to press as many buttons as possible within a timespan of 30 seconds

Virtual Version of the Game

- The user has three different game modes to choose from, which are shown in the dot points below.
 - Accumulator
 - Sequence
 - Reaction
- We have opted to focus on the “Accumulator” mode for our testing because it was the most similar to the physical BATAK board
- Layout of buttons in the virtual version of the game is different to the physical version of the game.



Top: Questacon's BATAK lightboard. Bottom: VHB's VR application.



Resources

Digital Resources:

- Google Forms
- Google Sheets
- Google Docs
- Google Drive

Human Resources:

- Main sponsor, Dr. Ram Subramanian,
- Co-sponsor, Dr. Blooma John
- University of Canberra's IT manager Mr. Jason Weber.

Equipment

- 2x Meta (Oculus) Quest
- 2x Camera tripods
- 2x DSLR Camera
- 2x Laptop computers



The Meta Quest

Future Recommendations

We have several different recommendations for groups who choose to continue this project.

Improving upon the current VHB application allows some issues regarding the application's performance to be resolved. An example of this would be fixing the collision hitboxes where the hand collides with a button.

We also received feedback from the users, which can be implemented in the future to improve the overall quality of the application. Some of the features include:

- An instructional “how-to” video before the test,
- Game enhancements, such as making the buttons easier to press, having smoother controls and a more appealing user interface
- A “low” and a “high” setting, which emulates the physical board's settings.

There were also responses from users with conditions:

- Being able to select a dominant hand
- An alternate mode which allows people in wheelchairs to play

Improving the efficiency of the testing period. We encountered many different technical issues with the headsets during the testing period. By borrowing a laptop capable of mirroring what the user sees on the headset, we can troubleshoot any issues and give the user better guidance when needed.

Comparing Reality - VR and Real Life

Using the Virtual Human Benchmark (VHB) application developed by Team VHB, lead by Ryan Young, our team was to utilise their Virtual Reality (VR) application to receive feedback and collect data from consensual test subjects. The objective of our project was to compare the VR version with the real-life ‘physical’ version of the game. We encountered many challenges throughout the semester as we devised our plans and corresponded with our sponsors, yet we were able to eventually organise a visit to Questacon, which took place on the 10th of October. This day at Questacon allowed us to gather the data we needed from both versions of the game, as Questacon staff allowed us to set up a station with which we could test our participants, allowing us the freedom to conduct tests on the virtual and physical versions of the game, simultaneously. With the test data we received, we were able to examine it to find similarities, differences, and the preferences of users through their experience.

Introduction

This project was completed by students attending the University of Canberra under the direction of Information & Communication Technology Project, 9785 sponsored by Dr. Ram Subramanian and Dr. Blooma John.

The result of this project delivered is a report that compared a physical BATAK board to a VR BATAK board, designed by another capstone group, Team VHB.

The project intended to measure both mental and physical acuity of users, with the aim of assisting in helping the users increase those capabilities.

Executive Summary

This poster details the semester-long study that team Comparing Reality had conducted into the benefits of virtual reality within the industry of health and fitness. Following off the efforts of team VHB, with their VR application being used in preliminary testing. Our aim primarily was to help improve the application with attempts to gain as much valuable feedback from users as possible.

The initial stage involved designing a suitable survey to use in our testing to enable us to find the feedback we were after. The survey went through multiple iterations after consulting similar academic papers and relevant stakeholders. After parsing the survey through quality assurance, it was time to test users. 21 participants of different backgrounds were gathered and gave their consent for testing at Questacon on the 10th of October. Tests at the UCX e-sports gaming lounge occurred on the 13th of October, where a further 5 users tested the VR application, without comparing to the physical version of the game, by request of the sponsor.

From the data collected, the team was able to decipher reasons why users would prefer VR over the real life version, and vice-versa. Our research will prove useful to the development of the application, as well as furthering advancements in the realms of both mental health and physical health, considering the augmentation of virtual reality.

Discussion

Although Virtual Reality hardware has come a long way, user experience during our testing showed that users found the VR hardware was more uncomfortable to use than the physical board.

A few users mentioned experiencing cyber sickness symptoms like disorientation. Due to not only having to learn how to use the VR BATAK board, but also how to control the application, the Virtual Reality application did not help to result in a better average score from users. Most likely due to collision detection issues in the application as well as a majority of users having little to no experience in using VR technology as found in their VR evaluation survey.

Users' evaluations ranked the Virtual Reality version as being more enjoyable to play and less distracting overall. Users also mentioned feeling more confident in their ability to play the game without the distractions of the outside environment. Some users stated that they felt more immersed and competitive when they could focus solely on the board and this was an advantage provided by the VR hardware.

Due to time constraints in and out of the team's control, and final testing being conducted in the final month of the project, there was not enough time to make use of the video recordings taken of each test. These recordings are currently a purely referential point.



What Data is Collected?

For the physical test, we collected each user's score, and the time that the user pressed each button.

For the virtual test, the data is stored within the oculus device as a JSON file. The contents of the JSON file include the user's Score, Speed between targets, order of buttons pressed and more.

We have also collected survey data from the users, which are anonymous. The surveys contained questions such as which BATAK board they preferred, and to provide feedback on the VHB application

Meaning of Findings

- Participants had a preference for the physical version when considering comfortability.
- They preferred the VR version as they found it more immersive and less distracting, without being aware of onlookers.
- Shorter individuals had an advantage in the test as their vision was more aligned with the centre of the board, and had less surface area to cover to activate the buttons.
- Most of the findings allowed us to suggest improvements to the application, which is covered under “Future Recommendations”.

Physical BATAK Board Test Experience

Your Experience of the Physical BATAK Board Test.

How Engaging Did You Find the Physical BATAK Test? *

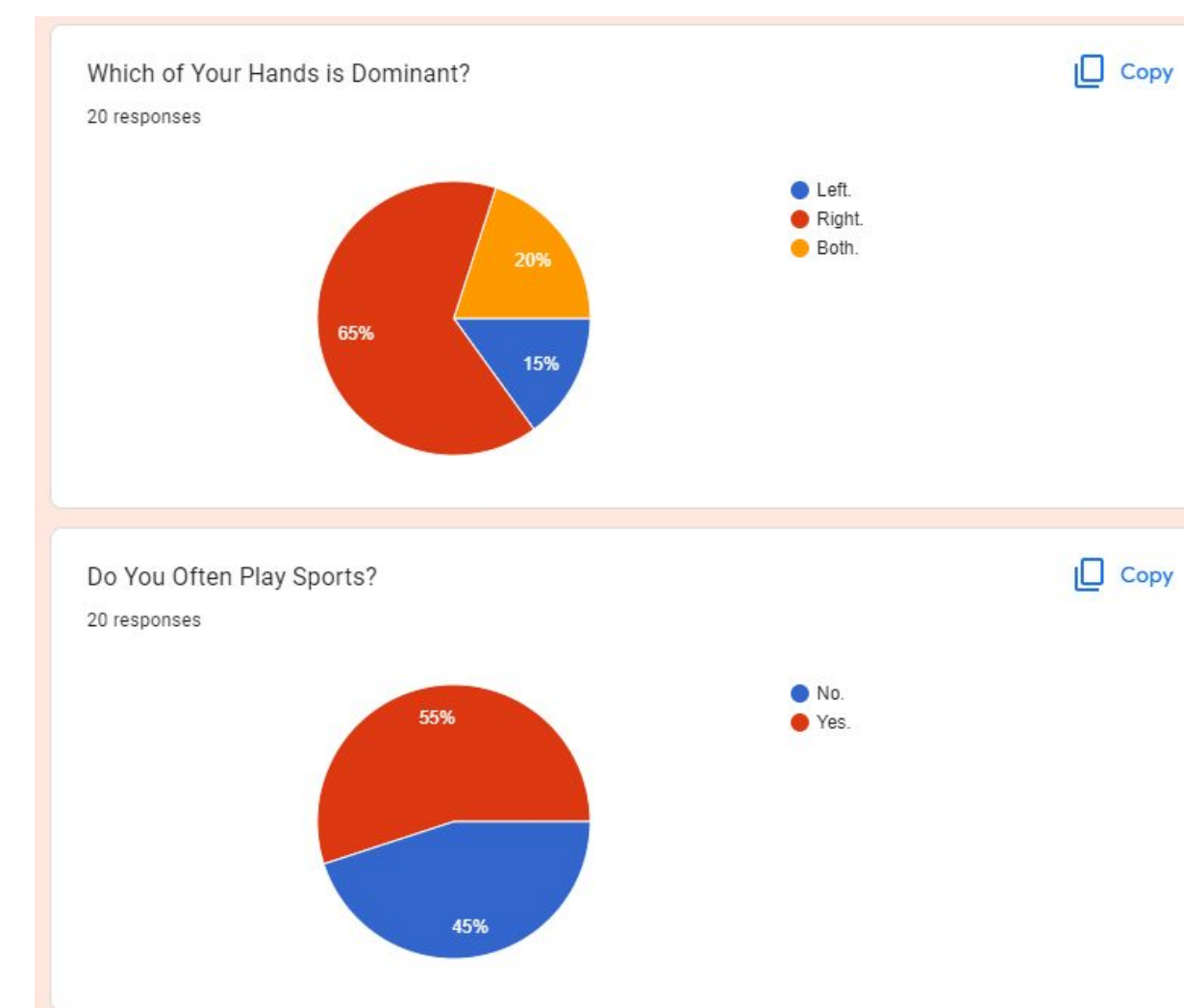
1 2 3 4 5

Boring. ○ ○ ○ ○ ○ Exciting.

Please Describe Your Overall Experience. *

Your answer

Images from our surveys, hosted with Google Forms



Ethical Considerations

We maintained ethical considerations by providing all information about the research details, information about ourselves, answering all participation questions, and about our expectations from our participants before we proceeded with testing. We ensured that the participants' right to privacy was maintained while still maintaining an acceptable level of confidentiality. We never stopped making sure that no one was hurt in any way, shape, or form.

All our testers were recruited from our own family, close friends, and neighbourhood. We also guaranteed that the privacy of the individuals and organisations participating in the research was protected. We made certain that all participant information was kept secure and transmitted directly to our sponsors. We expressed our appreciation to each user by giving them a great experience as well as UCX vouchers. Because of the way we treated participants, they won't suffer any damage to their sense of pride or dignity.



Conclusion

The project's reliance on collaborating with third parties made it challenging to deal with situations where there was a lack of communication or coordination. Since we only received approval to conduct tests at the very last moment, we did not have much time to prepare for the test. It was hard to find participants to test with, and we had some technical problems during testing that slowed things down. After a lot of hard work and patience, we were finally able to complete one of the most important components of the project: testing with users at Questacon and UCX.

After testing, we found that the physical board was more comfortable for users than the VR hardware during testing at UCX and Questacon. The virtual reality version was preferred by users because it provided a more immersive experience. Users also mentioned feeling more confident in their ability to play the game without the distractions of the outside environment. Some users said that the VR hardware helped them feel more immersed and competitive when they could only focus on the board.

We are glad that we were able to finish everything on time by meeting the project's scope and requirements, and we think the feedback we got will be useful for future research.

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