

Adam Biele and Alison Sherwood  
HW 2 short report

### Hammy's Adventures! -VR edition: through the mind of the Hamster

Requested tasks (60% of grade) and how we accomplished them:

1. Describe what we will do in a 1-3 page proposal
  - a. In our proposal, we described that we wanted to do a VR game adding on to our ideas from HW1 where we controlled a hamster but this time we wanted to be more immersed and actually be the hamster.
2. The VR application cannot be a VR 360 video
  - a. We decided to create a fun game instead
3. The VR application is open to your imagination but requires the interaction of at least two methods. We implemented Travel, manipulation, and selection.
  - a. Travel was implemented by adding teleportation to our hamster
  - b. Manipulation was implemented by having Hammy need crawl out of his ball to move certain obstacles
  - c. Selection was implemented by having intractable buttons for the main menu and end game screen
4. Welcome to use any assets but not hateful assets
  - a. The main goal of our game is to spread positivity and have a fun time in the VR environment, we made sure to follow the CSU principles of Community and common decency. Any assets we utilized were in line with making our game more fun and positive.
5. Attempt not to cause VR-induced motion sickness
  - a. This element caused us to perform a decent amount of research and decided to change our game to a third person main view due to the fast movement of the ball. Below is our additional research on motion sickness and the changes we made to our game.

Added rubric: (40% of the grade)

Creativity(5%):	We had a lot of fun designing the concept for this game and expanding upon our ideas for HW1, working on how to grow this one and ensuring it was a fun user experience was definitely a creative endeavor.
Transfer of 3rd person game to 1st person VR game(10%):	We began with our HW1 because we wanted the idea to be the same and had to transfer it to VR - this took a lot of work and we had to meticulously look through everything to make

	<p>sure it transferred correctly - most of the time it did not!</p> <p>Additionally, we had to figure out how to change this to a first-person game and get all of the VR controls to work.</p> <p>It was difficult to have to add all of the menus to be able to work in VR.</p>
Motion sickness exploration(5%):	<p>This was something vital to our game in the design and a lot went into considering how we wanted to navigate this. Our main character had a variety of initial ideas - stay in 3rd person, put in the ball so it covers the whole screen, cover part of the screen, etc. We did lots of research and altered each level to ensure that motion sickness was not an issue.</p>
Addition of selection, manipulation, and travel(20%):	<p>The initial rubric required only the interaction of two methods but we implemented all three. Since these three are vital to our game, we think they are worth a big part of our game and the addition of a third is crucial.</p> <p>Selection: digital menu selection In our menus, like at the beginning, the user can select from various options using the controllers</p> <p>Manipulation: grabbable object movement Throughout the levels, there are several times where the player will need to grab objects and move them out of the way in order to continue the level</p> <p>Travel: teleportation Hammy can teleport from one place to another by using the right joystick We didn't want this to be too easy for him so we made it so teleportation and grabbing can only be used to clear obstacles from the level - not to complete the level. The user has to switch back to the movement mode and then they can finish the level by using the joystick.</p>

## Motion Sickness research:

Motion sickness “refers to adverse symptoms and readably available observable signs are associated with exposure to natural and/or apparent motion”. This is one of the most important things to consider when creating a game in a VR headset. Rapid movements and motion of any kind can cause motion sickness and there is a multitude of different things one can do to decrease this and provide a more seamless experience for the user.

Someone with motion sickness may experience a large array of symptoms including nausea, vertigo, vomiting, and more. We felt like it was a key mission to ensure that our users didn't experience this. Especially since the motivation for our game came from a game that induced motion sickness and wasn't even a VR game - Monkey ball.

We know that Sensory Conflict Theory states that motion sickness may occur when the incoming information across sensory modalities is incompatible. If there is unnatural eye movement required, you are likely to get cybersickness. Our goal is to make this so it doesn't happen. There are many things you can do to eliminate the possibility of this and we chose to focus on a couple: eliminate rapid head movements, have the user be responsible for initiating movement, and avoid fast movement in the game.

First, we wanted to ensure that there were no rapid head movements required as this can be a big cause. We looked at our game and made sure that although the user could move their head all around to view the world, there wasn't a lot of movement required, or any quick movement so that they wouldn't get motion sick this way. Next, we looked at making sure the user was responsible for initiating movement - this is where we began to alter our initial ideas after looking at them in coding form. For our game we initially wanted our hamster ball to be continuously quickly moving and start at a quick pace. In order to get rid of this issue, we started the hamster ball at a stop and allowed the user to choose when to start it. Last, we focused on avoiding fast movement in the game, one gets cybersickness particularly when there is a lot going on on the screen. We made sure that when there were moving objects on the screen there were not a lot of moving objects at one time and if there were we slowed them down a little or eliminated a few. We designed the movement and the teleportation individually of one another so that the user has to stop in order to be able to teleport so that motion sickness will not be an issue here. Overall, our research, discussion, and implementation of motion sickness allowed us to create a better, more user-friendly game.

## Sources and research from:

- Lecture by Fransisco Ortega
- <https://www.ghostgb.co.uk/how-to-stop-motion-sickness-from-video-games/>
- [https://developer.qualcomm.com/system/files/ebook\\_cybersickness\\_qdn\\_vfinal2.pdf](https://developer.qualcomm.com/system/files/ebook_cybersickness_qdn_vfinal2.pdf)

## Division of labor between members:

For this project we worked on the vast majority of it together, sitting side by side at the computer the whole time it was being worked on. We collaborated on ideas, debugged and looked at code together, and were continually discussing what needed to be done. That being said, here is what each member worked on while the other team member was assisting:

Adam:

- Teleportation
- Being able to use the VR joysticks to grab and move the ballpaw
- Fixing buttons to be clickable in VR
  - Had to create new home level and add the buttons to it

Alison:

- Transferring our homework 1 into a usable VR template
- Redesigning levels
- Adding grabbable objects
- Fixing controls like jump
- Writing readme and short report files

Video explaining code:

<https://youtu.be/ZdBNhq5jIJs>