

VR Submarine Game

Noah Katz - nkatz3@stanford.edu Kais Kudrolli - kudrolli@stanford.edu

Gameplay

Our project is submarine game made in Unity for VR. In the game, the player acts as the helmsman of a small submarine. The player will navigate an underwater environment, piloting the submarine to collect gold coins dispersed throughout the game. If the player runs into an enemy fish, they lose. If they collect all the rings, they win. The player controls the submarine with a combination of head rotation and a button on the headset. Looking in a different direction will rotate the direction of the submarine. When the button is pressed, the submarine will begin to accelerate in that direction up to a max speed.

Goals

Our goal here was to make a fun sandbox game with an intuitive set of controls that make the experience feel immersive in VR. Any mechanics introduced should be easy to pickup for a player with no instructions, and there shouldn't be any confusion on how to navigate in the world. We wanted the gameplay to be simple but with enough variation to keep it interesting. Finally, we wanted to make a visually pleasing environment so that it wouldn't distract you from the immersion and actually look like you are floating in the ocean.

Interaction Design

As stated in the previous section, we wanted the controls to be as simple and intuitive as possible. To do this, we use only the rotation of your head, and a single button to control. We felt that using rotation as part of the control scheme was a good idea since the ability to look around naturally in VR is what makes it immersive, and people tend to look in the direction that they intend to move in so it felt right when the controls matched that idea. We found good assets from free stores online like itch.io, turbosquid.com, and poly.google.com, that we used to make the world more visually pleasing, and put effort into making these assets feel like they fit in the world. For example, we made the fish face the direction they swim, used animations included with our assets to make the fish wiggle as they swim, and make the fish turn smoothly in the water rather than snapping to a rotation angle. Other assets we designed ourselves using Unity shapes or found in other searches. We applied fog, lighting, scenery and textures to complete the underwater effect. Finally, we adjusted the hitboxes of objects to make sure collisions between fish and the camera occurred at a distance that looked real.

Game Design

We designed a few different kinds of movements for fish. Some move in circles, some oscillate, and others will follow you when you get close. To keep it intuitive, we had 3 different models for

these 3 types of enemies. As an example, when you see a whale you know that it does the same thing as every other whale. We made hitboxes very generous to compensate for the fact that the player's camera will end up feeling slightly disconnected from where one may expect to collide with. When you're being chased, we tell the player because it would otherwise be difficult to know that an enemy is following behind you, or if that enemy has stopped.

Related Projects

The VR game IronWolf [1] provides an immersive naval submarine simulator where the player controls a more complex submarine and fights other submarines. It aims to provide a high fidelity experience of piloting an actual naval submarine. Operation Apex [2] allows the player to be a diver and interact with undersea life. It has very nice visuals and realistic interactions with animals, so much so that you can experience an actual shark attack. Our game is similar to these because it aims to provide an immersive underwater experience; however, our's provides the more lighthearted, fun experience of an arcade game.

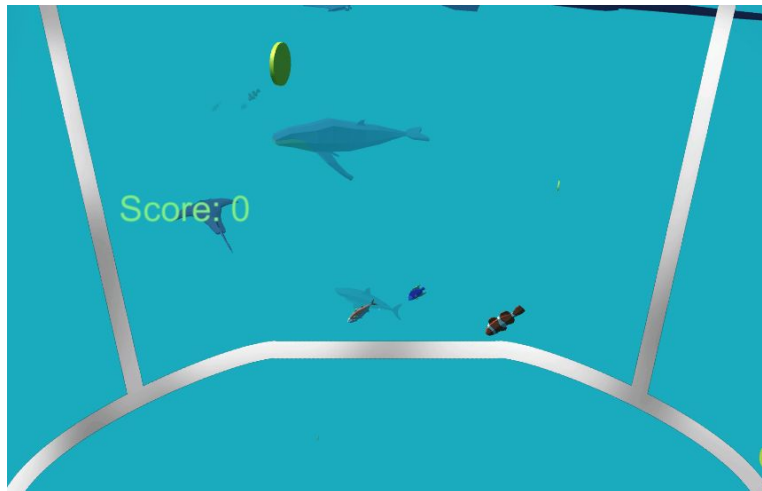


Figure 1: View of the game in Unity. Shows the different enemies (manta rays, whales, sharks), and other friendly fish. It also shows the gold coin pickups.

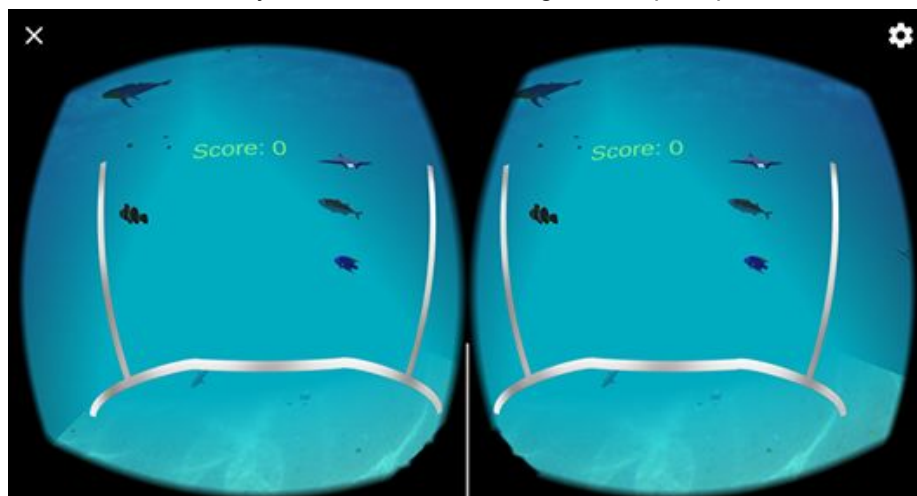


Figure 2: View of the game stereo-rendered on the phone, ready to be played on the Google Cardboard.

References

- [1] VRFocus. (2019). *Adventure In A Submarine In IronWolf VR Now Available In The Oculus Store*. [online] Available at: <https://www.vrfocus.com/2018/09/adventure-in-a-submarine-in-ironwolf-vr-now-available-in-the-oculus-store/> [Accessed 3 May 2019].
- [2] UploadVR. (2019). *Hands-On: Operation Apex Is Like Blue Planet: The Game For VR*. [online] Available at: <https://uploadvr.com/hands-operation-apex-like-blue-planet-game-vr/> [Accessed 3 May 2019].