Description of the prototype:

The prototype is set in a beautifully rendered natural environment, including rivers, forests, and wetlands, showcasing the diverse habitats of the platypus. Users can look around freely, interact with objects using hand gestures, and feel a deeper connection to the virtual environment.

Design Concept Overview:

In the virtual reality experience prototype, users take on the role of a friendly and determined platypus tasked with cleaning up the environment and moving anywhere they want in the virtual space. This interactive virtual reality experience educates users about environmental conservation while engaging them in fun and meaningful gameplay.

Design Process:

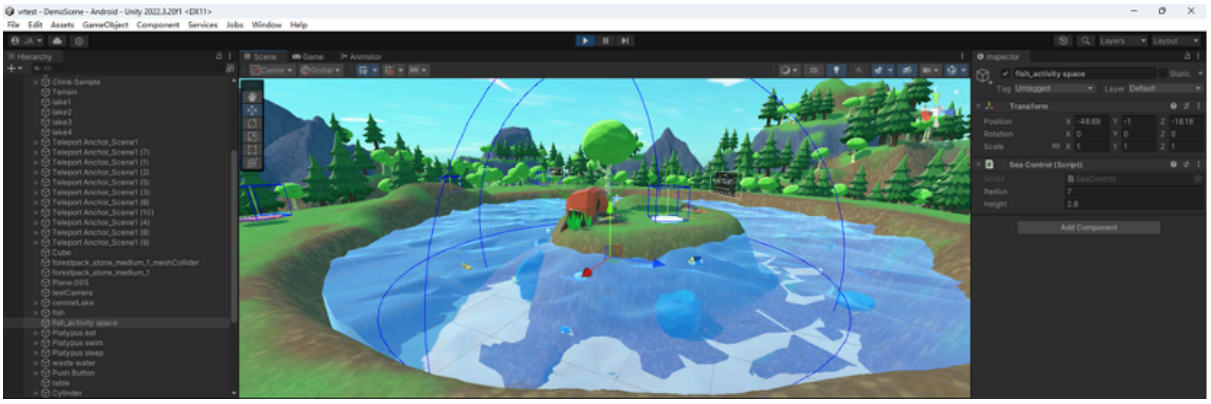
Our prototype aims to make the player aware of the fact that the platypus' living environment is vulnerable to pollution and man-made factors, and we intend to convey this idea through two mini-games:

1. Have the user shut down the source of the sewage.
2. Have players pick up trash from the ground and throw it in the trash bin.

After importing the initial scenario from the XR interaction example that we were asked to download for the class (Environment Pack: Free Forest Sample), we modified the scenario considerably by adding two small lakes, one to show the environmental damage caused by sewage discharge. The other is to show the living environment of the platypus. It was a very difficult task to create the water effect, so we just made a simulation where the two types of water look different!

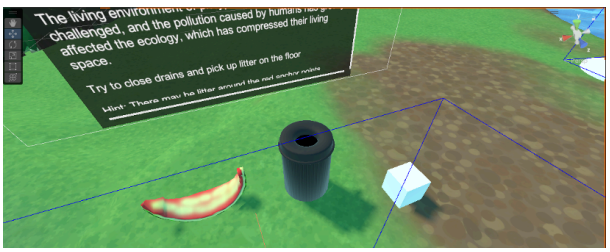
Next, we used the animation component to change the position, angle, and size of the object in the prototype, added appropriate materials to simulate the environmental damage caused by the discharge of sewage, and provided the user with a button to stop the sewage from being discharged when the button was pressed. The biggest problem here was the coding and animation, Initially, it didn't work as expected; for example, sometimes the pollutant would appear to be stagnant in the air. We then changed the codes to stop the loop to solve this problem.

We made extensive use of the 3D Fish Asset prefabs in setting up the Centre Lake in the environment, which included fish, some code to control the fish moves in a given space but not to move around, environment prefabs, etc.



Known Issue:

Eventually, there is a tricky issue that we simulate when cleaning up trash. It is difficult to gain inspiration from writing codes for this kind of interaction. We need to learn a lot of unity-related content by ourselves to understand the logic of the work, Doing the bin collision test encountered a problem, that is, if you want to make the bin detect the proximity of the rubbish and delete the rubbish, then the bin will become an entity-less trigger. If you want the trash can to detect the approaching trash and delete it, then the trash can will become an entity-less trigger, and it will fall to the ground. Later, we separated this property by adding a child object method, so the bug no longer appeared in the later tests.



Future Work:

1. Optimise code for performance, use low-latency input devices, and ensure the game is running at a stable frame rate.
2. Implement a universal input mapping system using Unity's Input System package, regularly update SDKs, and test with a variety of controllers.
3. Optimise animations by reducing polygon count, using simpler animations where possible, and ensuring the game runs at a high and stable frame rate.
4. Improve user interface, including Platypus and its environment, by inspiring a more appropriate aesthetic style.

Reflection:

Team Collaboration:

Alessio created models and interactions in Unity. Leonard focused on designing introductions and process documentation. Yuxiang and Ross were responsible for the PowerPoint presentation, known issues, and reflection section.

We used WeChat as our daily communication channel and task management system, assigning tasks and tracking project progress. Regular online meetings were held to cross-check tasks and ensure every member aligned with project goals, leading to efficient collaboration, with all components seamlessly integrated into one cohesive whole.

Areas for improvement:

Although our project was completed successfully, time management issues surfaced during its final integration stage. Allocated time seemed insufficient for task quality purposes and may have affected performance negatively. Future tasks should begin sooner, giving more time for adjustments and optimisations. Implementing interactive features in Unity presented numerous technical hurdles, including accurate hand movement recognition and responsiveness of the sewage discharge button. Future goals require deepening our technical knowledge and conducting more preemptive testing and adjustments. While development was ongoing, user feedback was scarce, crucial for user experience design. We will prioritise adding user testing phases for future projects to gather feedback and make necessary improvements.

References with external assets:

Environment Pack: Free Forest Sample
https://assetstore.unity.com/packages/3d/vegetation/environment-pack-free-forest-sample-168396#description

Fantasy Skybox FREE
https://assetstore.unity.com/packages/2d/textures-materials/sky/fantasy-skybox-free-18353

Simple Water Shader HDRP
https://assetstore.unity.com/packages/2d/textures-materials/water/simple-water-shader-hdrp-207454

Stylize Water Texture
https://assetstore.unity.com/packages/2d/textures-materials/water/stylize-water-texture-153577

3D Fish
https://assetstore.unity.com/packages/3d/characters/animals/fish/3d-fish-282104

9t5 Low Poly Australian Animals
https://assetstore.unity.com/packages/3d/characters/animals/9t5-low-poly-australian-animals-175977

Low poly Garbage Pack
https://assetstore.unity.com/packages/3d/props/food/low-poly-garbage-pack-156063