



Albacore Submarine VR Experience

Charles Stumpf Cameron Allen Zichao Yi Lali Ntwali

College of Engineering and Physical Sciences, University of New Hampshire, Durham, NH 03824

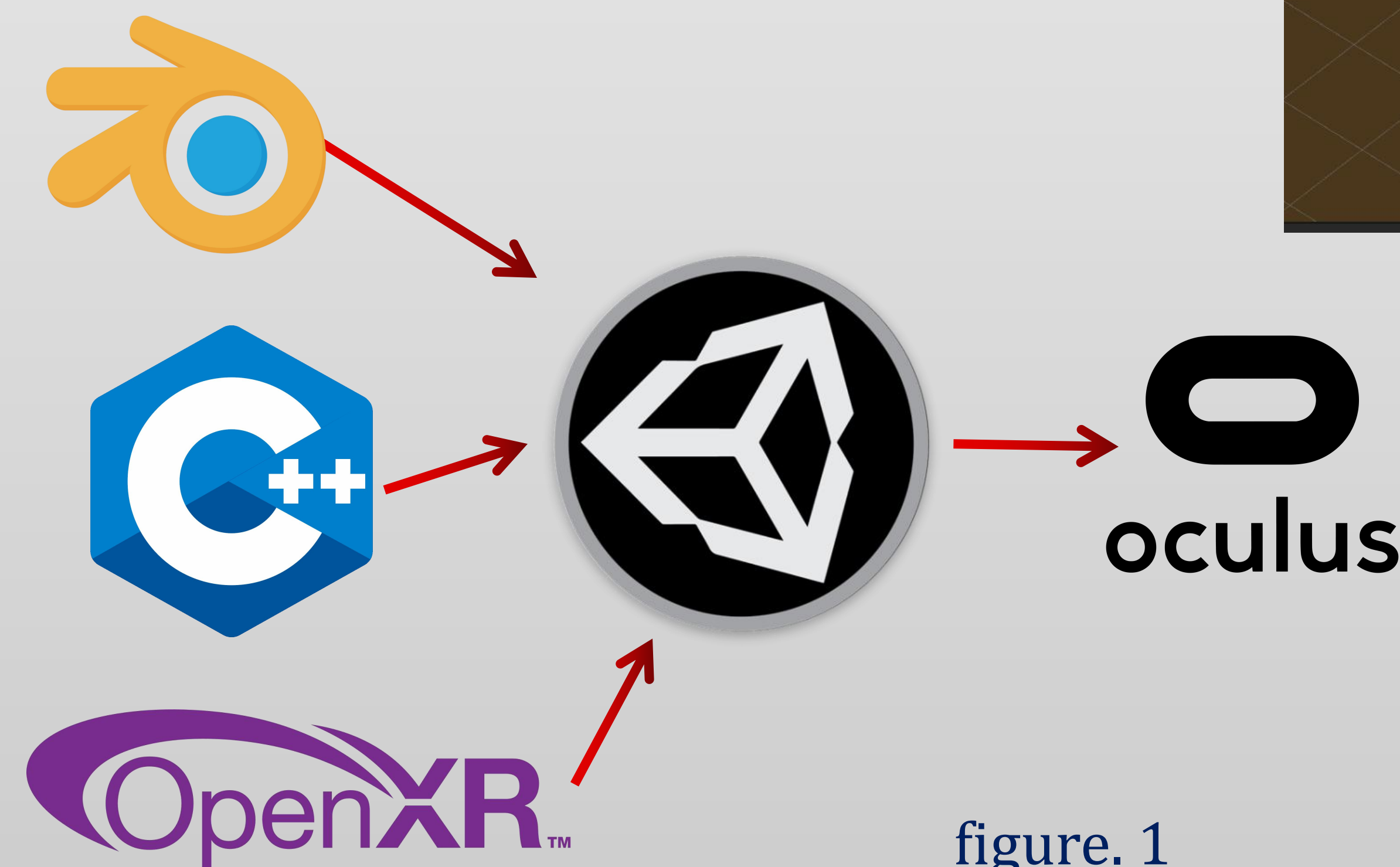


Introduction

Our project aims to create a virtual reality experience of a decommissioned military submarine, the Albacore, which is now a museum exhibit. This will allow 90% of individuals who are unable to physically tour the submarine due to disabilities or claustrophobia to experience it virtually. The Albacore Park currently only offers physical tours, which are not accessible to all individuals.

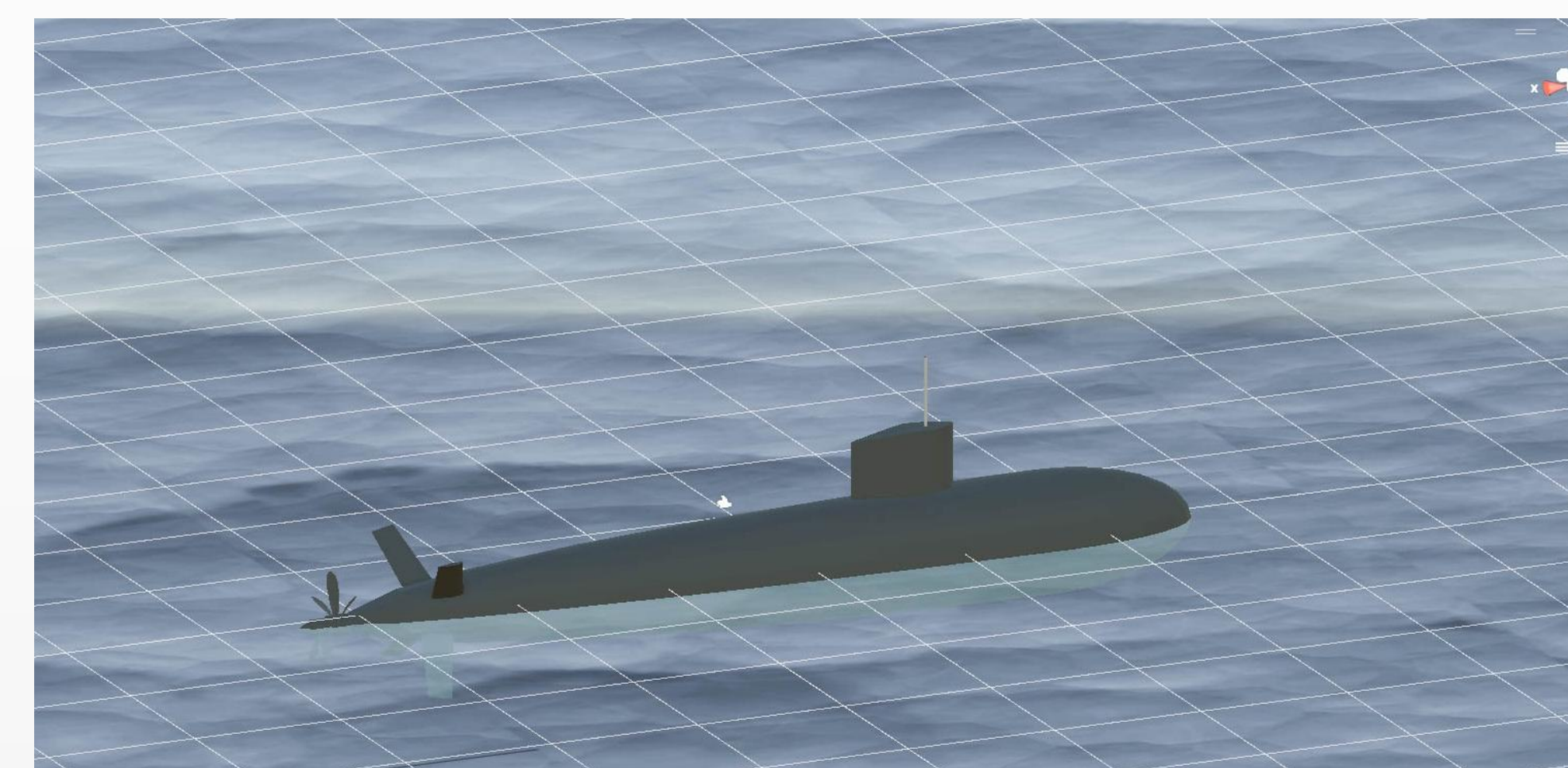
Project Requirements

- Allows individuals with disabilities to experience the Albacore submarine.
- Accurately showcases submarine controls and instruments in an entertaining and educational way.
- Allows for interactive control using a periscope and levers.
- Is accessible and user-friendly for individuals with different impairments.
- Provides comprehensive instructions and support for first-time VR users.
- The application requires high-quality, synchronized sound effects and music to create an immersive virtual environment that enhances the user's experience.



Implementation

- Oculus Quest is a tetherless device that can be connected to a PC to access a library of applications developed for Oculus Rift.
- The application is built around Unity plugins, a game engine that supports VR applications.
- The application has separate GUIs for users using VR headsets and those customizing the 3D environment.
- Blender is used for object and model creation, which can be imported as a separate file for Unity, allowing for creating game-related objects that can be used in multiple environments.



Outside

figure. 2

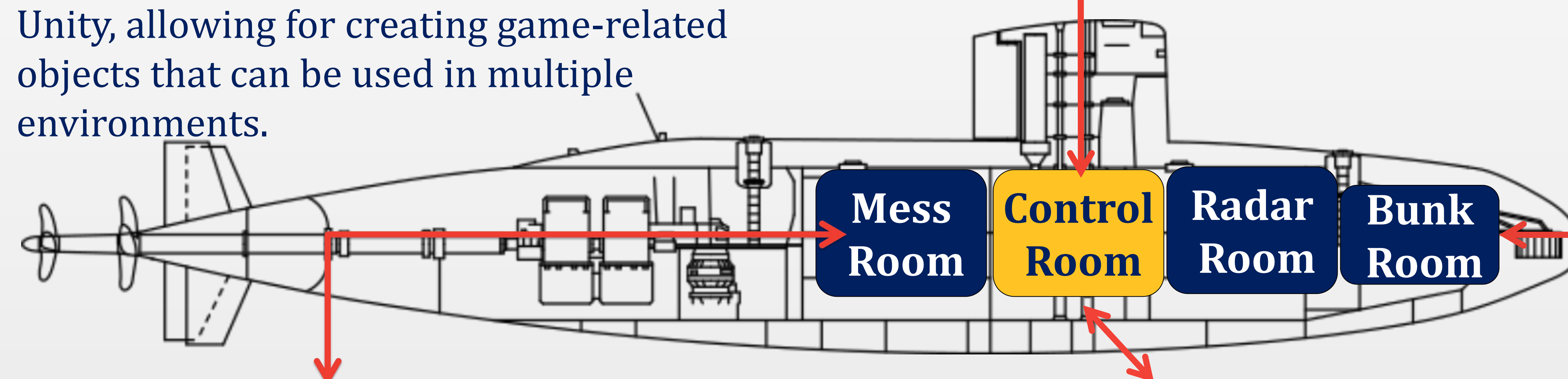


figure. 3

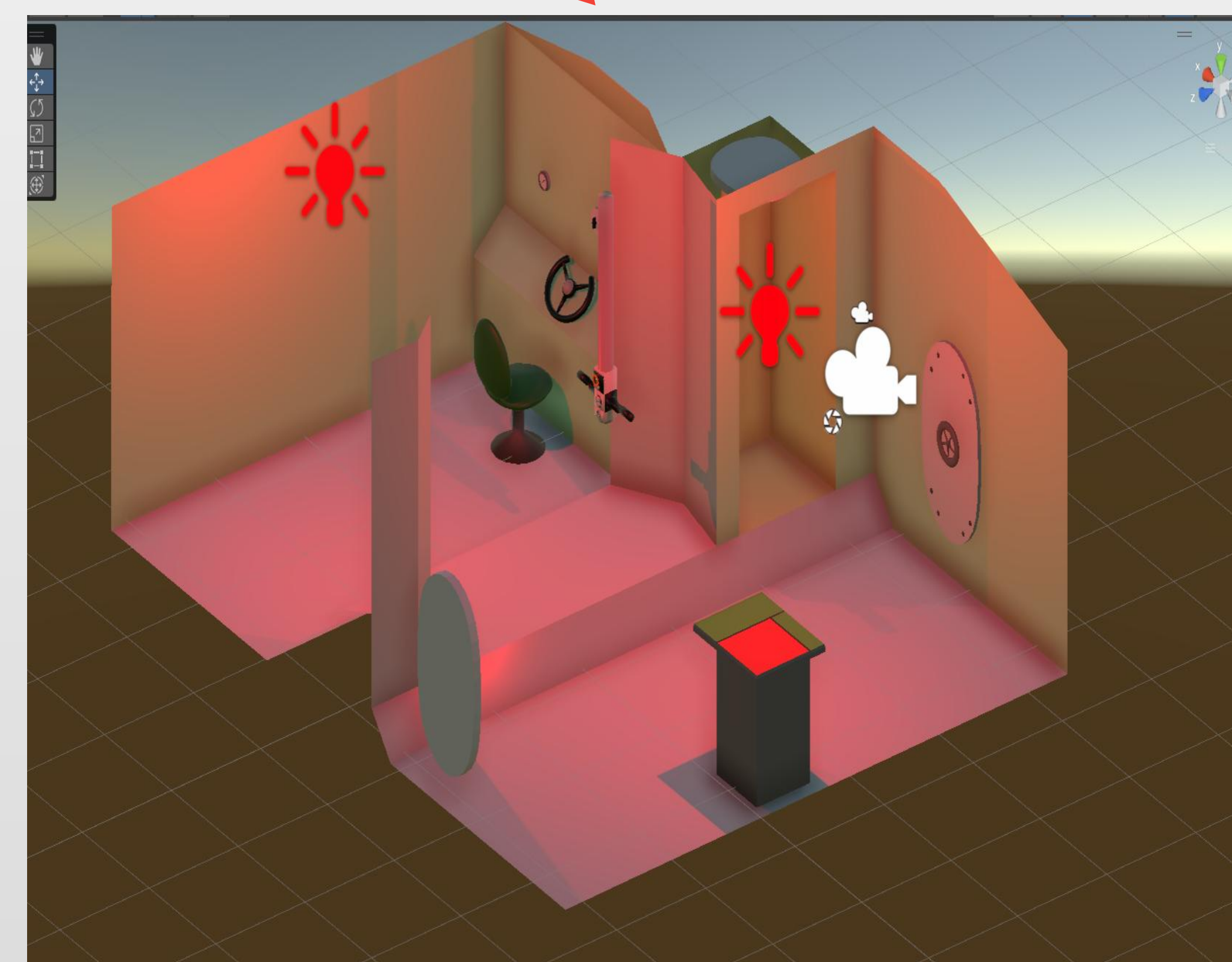


figure. 4

- Unity has its limitations and requires scripts to customize in-game features, while C# scripts allow flexibility in performance and fluency for managing script rendering.
- The OpenXR interaction library is used for a simple and concurrent user experience(see figure 1).
- The application's scenes need to be loaded separately, meaning all "rooms" need to be separate game objects.

Testing

We have undertaken comprehensive usability testing for our VR submarine game to enhance user experience and pinpoint any navigational challenges. Utilizing a test sheet, we assessed various features, examining display, interaction, movement, fluency, and learnability aspects to identify and address potential usability issues.

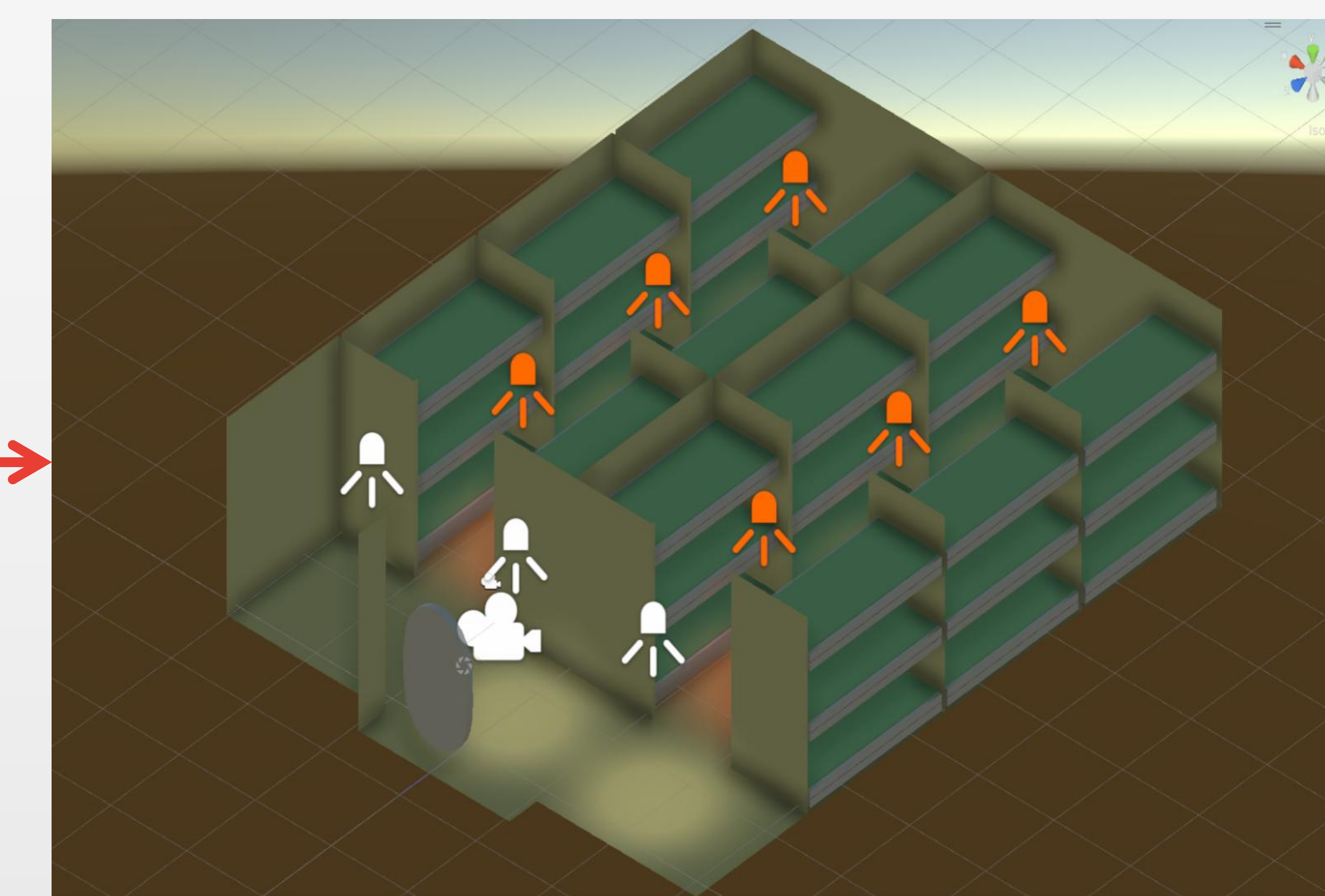


figure. 5

Conclusion

In conclusion, our VR submarine game currently has five unique rooms, including the control room, mess hall, bunk room, radar room, and exterior. We hope that future groups will continue to work on this project and build upon the foundation we have laid. Our sponsor and team hope that future iterations of the game will include a multiplayer function and more interactive features. Finally, we will strive to leave behind useful and informative resources for future teams to utilize and further develop this exciting project.

Thanks

On behalf of our team, we extend our heartfelt gratitude to our Scrum Master, **Matthew Plumlee**, and our sponsor, **Patricia Violette**.