

# Behavioural Biomarker

Spring 2024

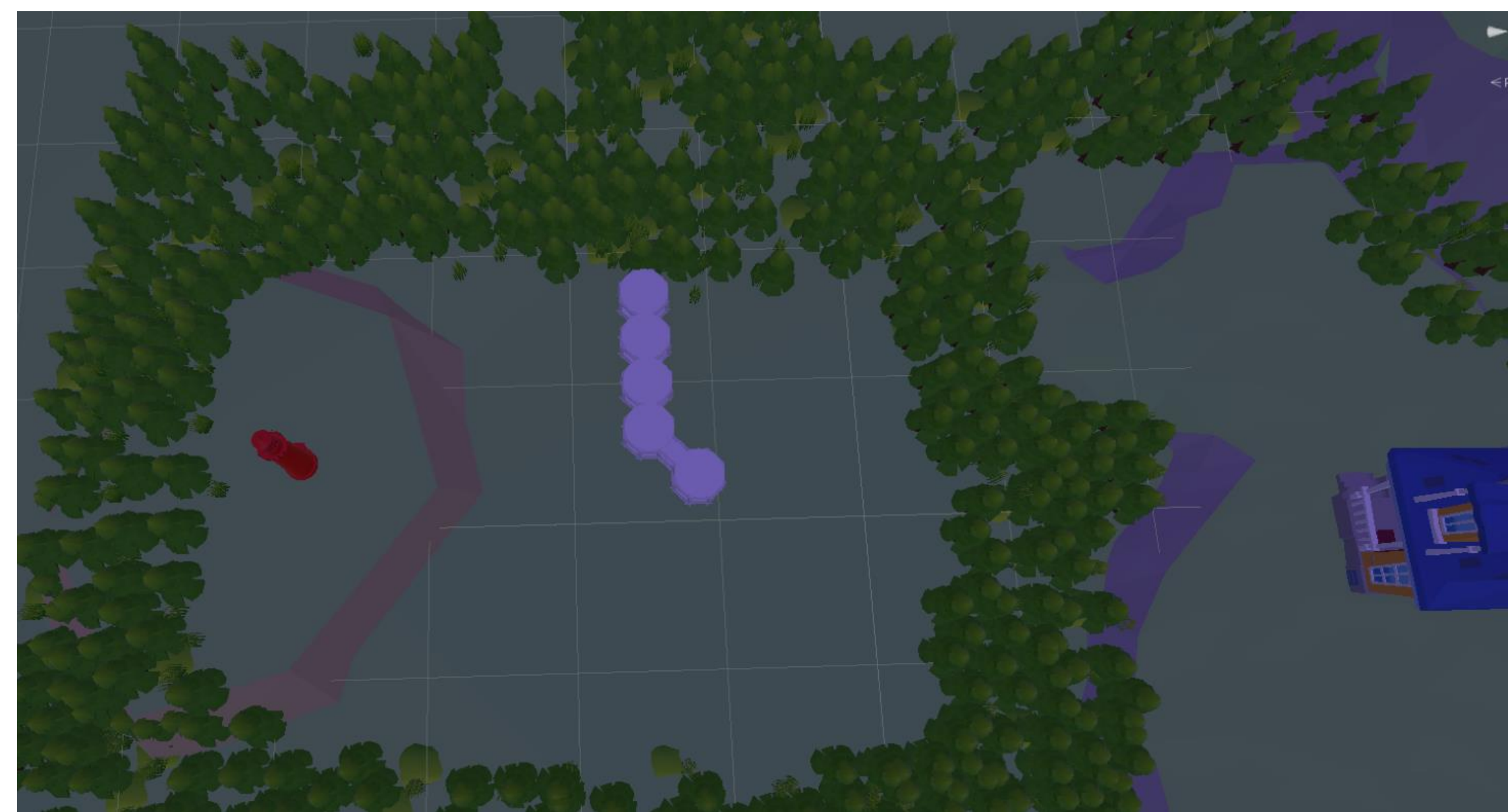
## BACKGROUND

Memory-based assessments are commonly used to evaluate neurodegenerative decline in conditions like Alzheimer's and other dementias. Among the cognitive functions impacted, navigational abilities and spatial memory are particularly important, yet remain frequently neglected aspects of memory testing. The Behavioural Biomarker project offers a novel approach to assessing cognitive decline in affected individuals using virtual reality (VR).

## OBJECTIVE

This project is a continuation of the pre-existing VR task developed by the principal investigator's team at the UBC School of Biomedical Engineering. The task involves participants navigating through a dynamically generated maze while tracking nearby landmarks. Following each trial, performance metrics are collected to analyze participants' navigational abilities.

This project focuses on enhancing the usability and accessibility of the task interface, alongside optimizing the original experience by streamlining back-end operations and data collection methods to provide researchers with greater control over the experiment.



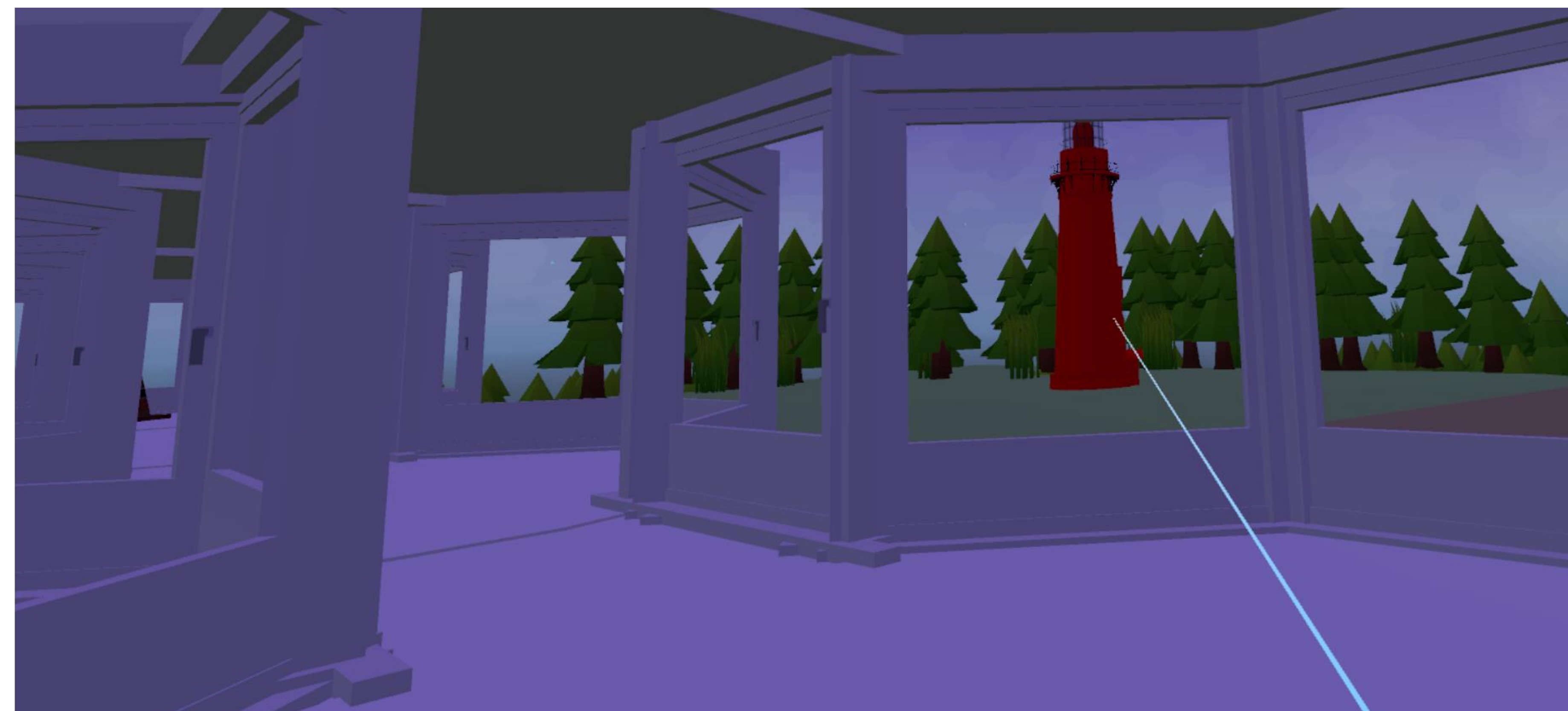
## PROCESS

### Development

The project is built on Unity. Development process includes refactoring the code, optimizing state changes within the navigational task, and remapping existing interactions and controls to enhance the application's intuitiveness.

### Dynamic Maze Generation

The maze is generated within a 9x9 grid framework. A prefabricated room is instantiated at the user's starting location, with subsequent rooms spawning in specific orientations based on pre-custom length and turn values.

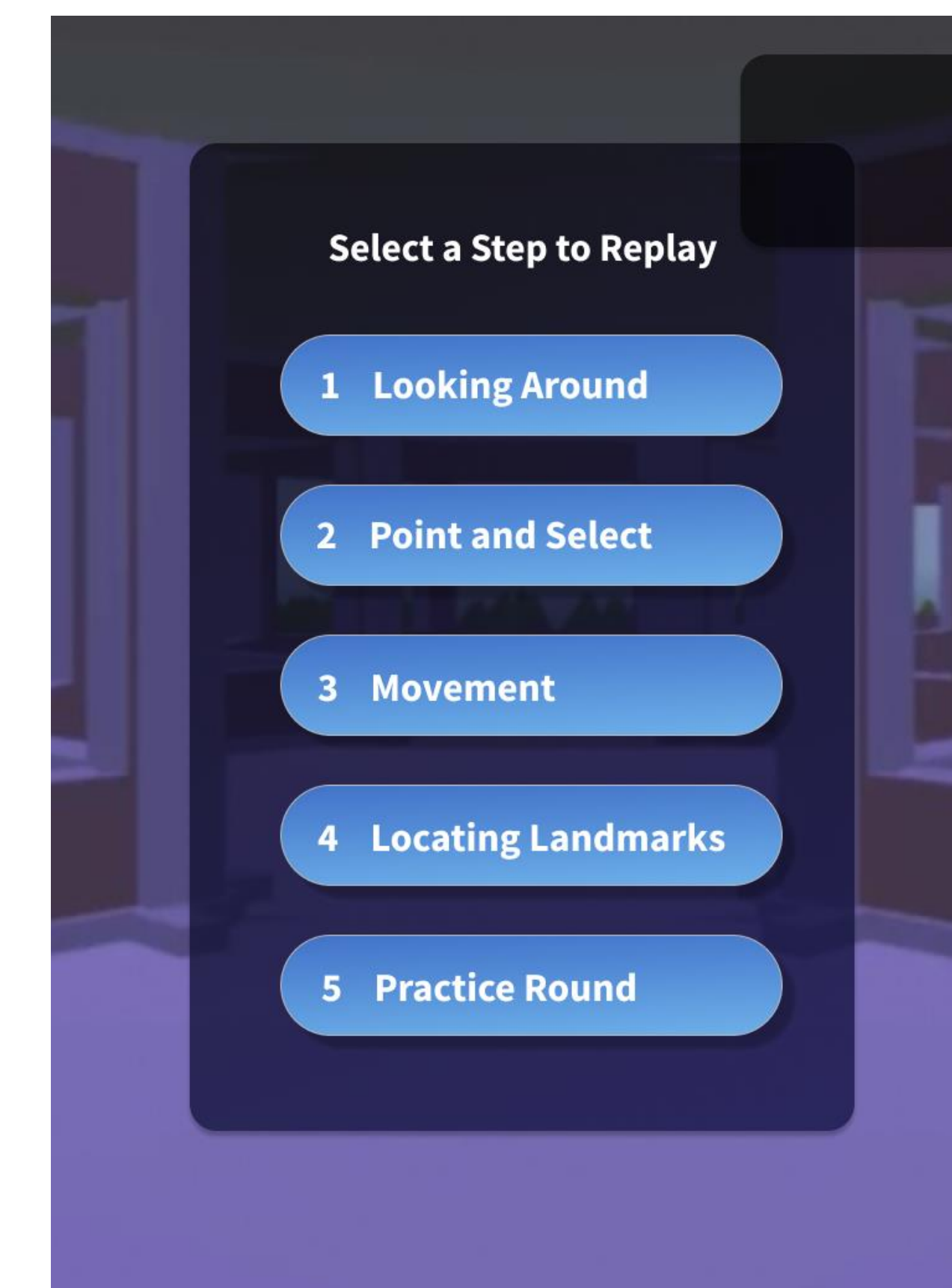


### Design

Given the intended end users possess memory deficits in various capacities, secondary research was conducted to ensure:

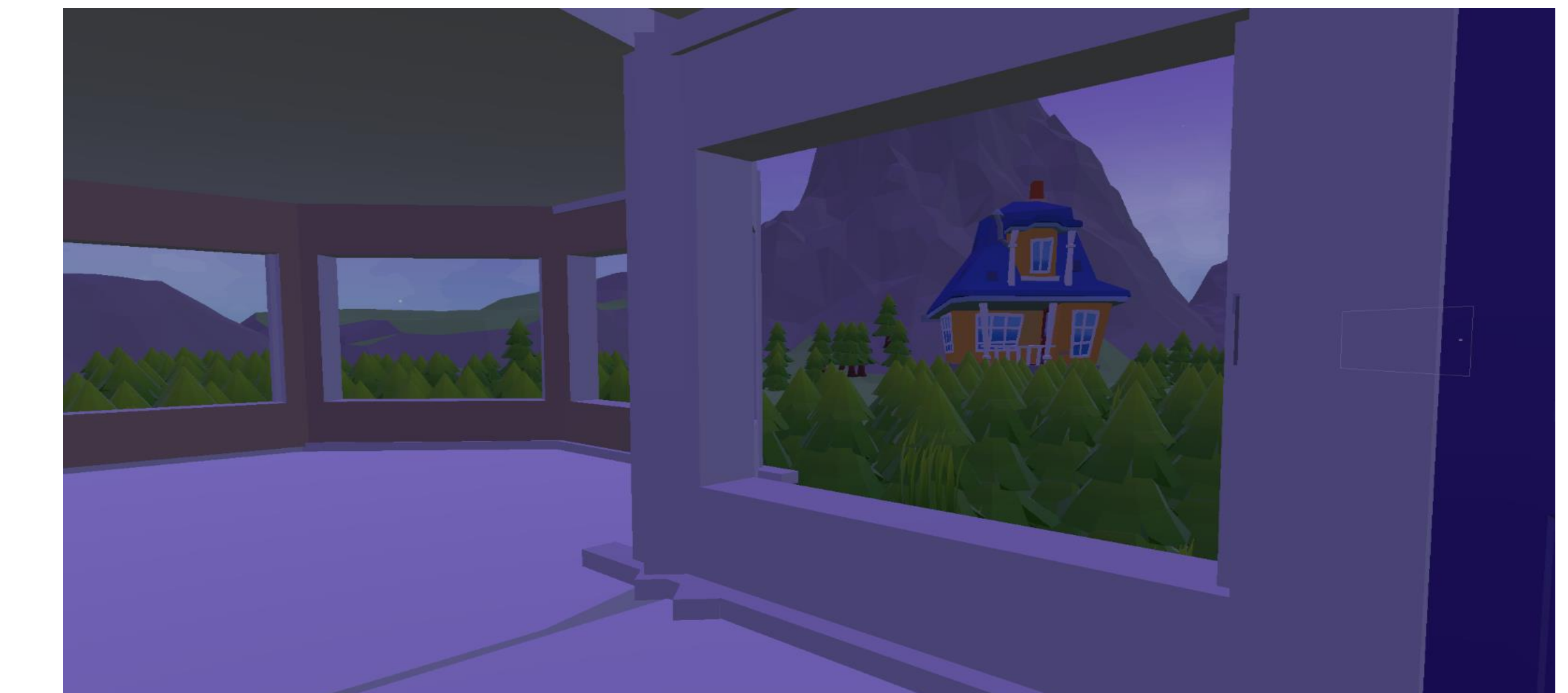
- Dementia-friendly visual layouts
- UX writing for dementia patients

Important features include pervasive console instructions acting as memory aids, easily revisited texts and diagrams, as well as accessible colour palette and clearly visible font choice.



## KEY FEATURES

- Dynamic path generation using custom parameters
- Accessible UI with memory-aid considerations



## NEXT STEPS

- Implementation of ambient audio cues to enhance immersion in the task environment.
- Introducing text-to-speech options for console prompts and tutorial panel text.
- Usability testing with Alzheimer's and dementia patients to establish viability and success of accessibility features.

## Acknowledgement

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