

EARSIM (Enhanced Auditory Reality Simulation for Improved Mapping)

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PURPOSE

Despite advancements in hearing technology, individuals with hearing loss struggle with sound localization in day-to-day life. Research suggests, however, that the brain can adapt to localizing sound using only one ear, emphasizing the need for accessible training programs in both educational and clinical settings.

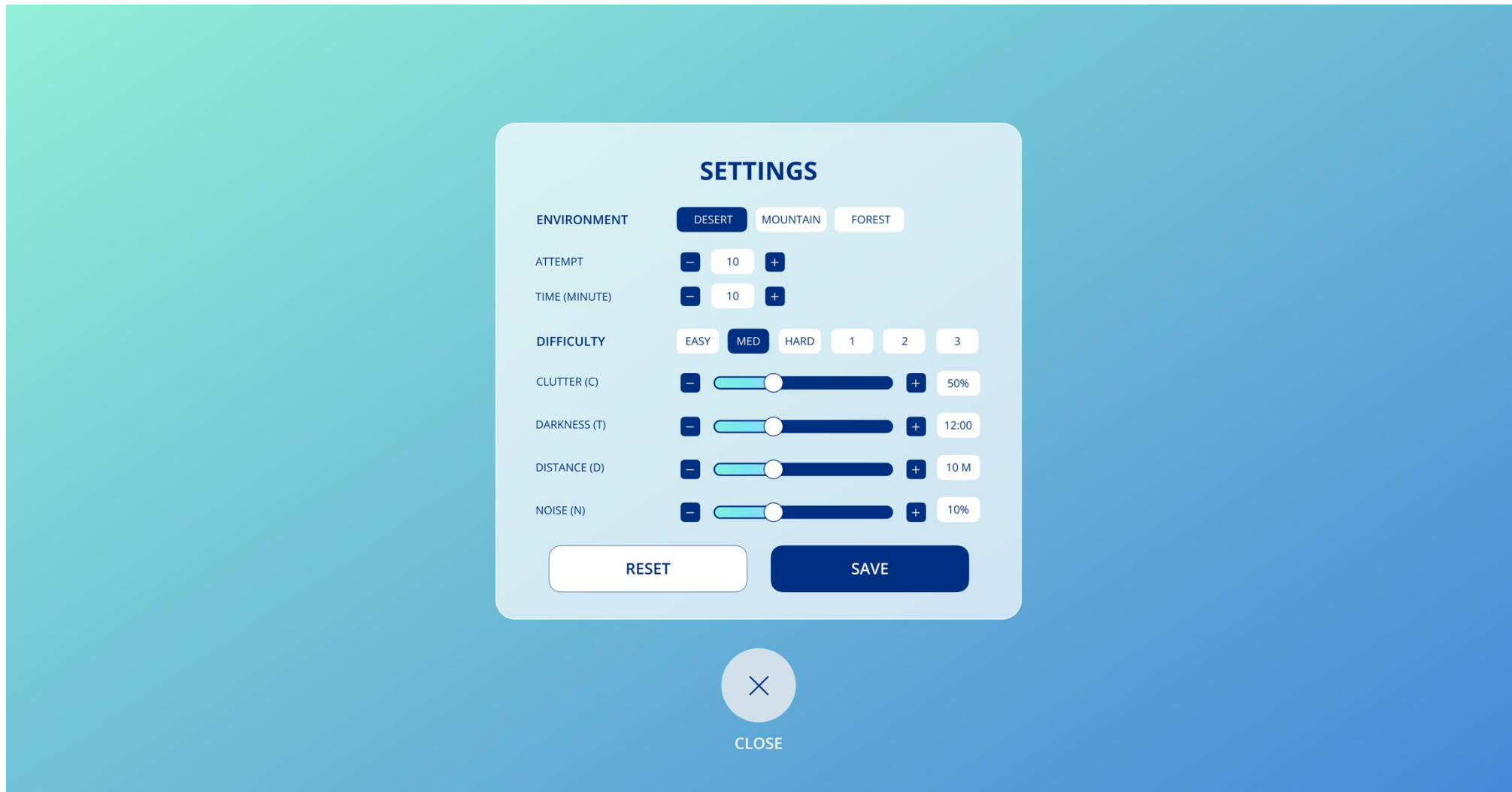
PROJECT DETAILS

EARSIM is a VR-based auditory training experience designed to enhance users' sound localization abilities. The game increases in difficulty by introducing environmental distractions and altering sound clarity. The current prototype is developed in Unreal Engine 5.4.4 and is compatible with Meta Quest 2 and 3, with optional headphone support for improved audio accuracy.



PROCESS

Users interact by pointing and selecting the location of animal sound sources, receiving real-time feedback and scores based on accuracy. The experience features adjustable difficulty settings, a scoring system, and a progress panel that includes a timer countdown, target reminders, and performance tracking.



ENVIRONMENT DESIGN

The environment is built on a Procedural Content Generation (PCG) framework, enabling comprehensive customization to replicate real-world settings. Key environmental parameters, including vegetation density, weather conditions, and time of day, can be adjusted dynamically. The current prototype features three distinct environments, each offering a unique experience.



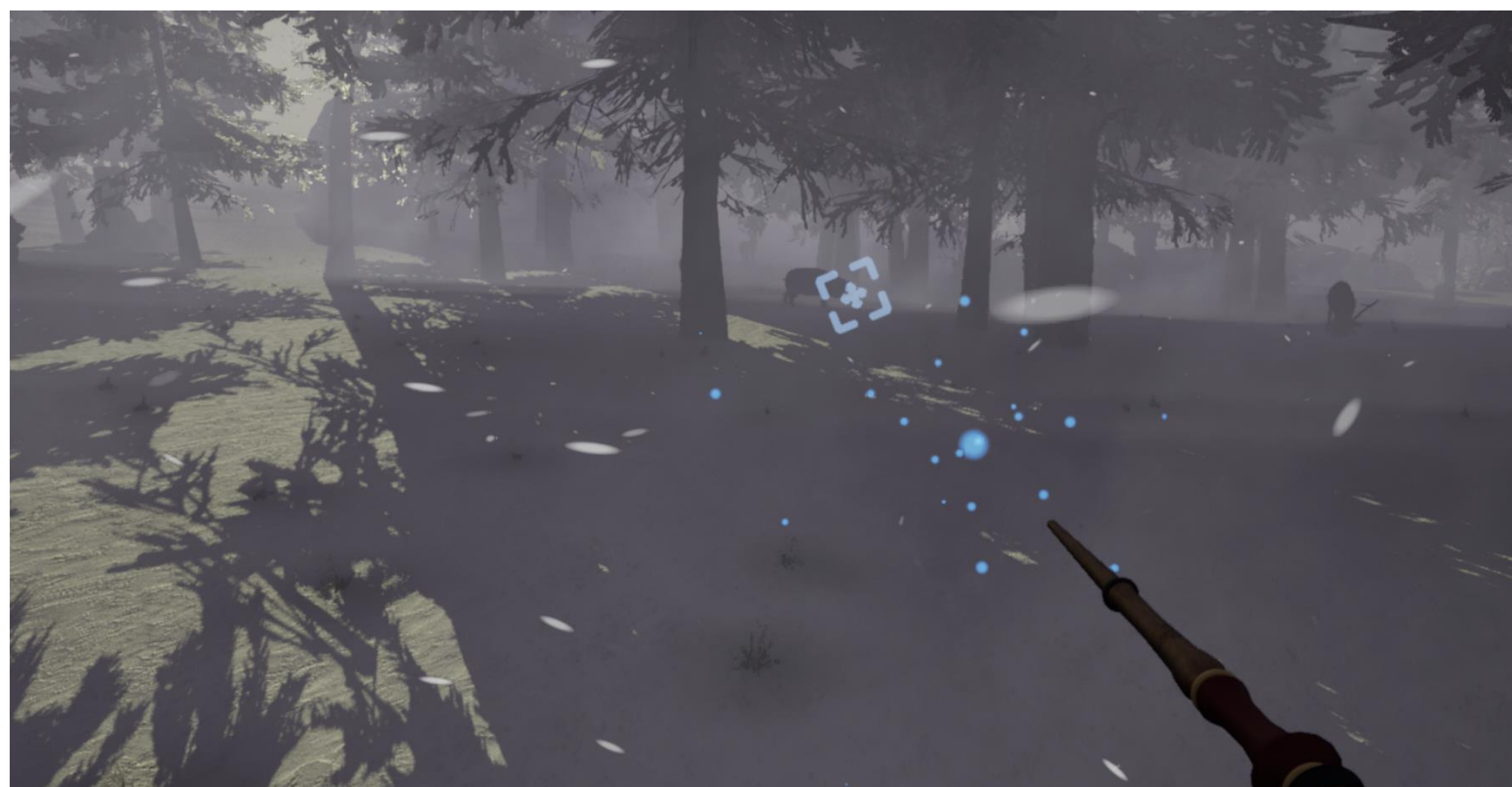
AUDIO DESIGN

EARSIM's audio design uses Unreal Engine's audio system combined with the Google Resonance Audio plugin. This integration creates an immersive and realistic sound environment with excellent directionality. The audio setup has been thoroughly tested to ensure accurate sound localization, with carefully selected animal calls and ambient environment sound clips layered to increase difficulty as users progress.

USER RESEARCH

Usability testing was conducted to evaluate navigation, task completion, and interface clarity with participants of varying VR experiences and hearing abilities. Overall, usability was rated positively, with 7 out of 12 participants agreeing that navigation was straightforward and intuitive.

Sound localization was identified as a key area for improvement, with some users struggling with unclear audio cues. Participants recommended enhancing sound cue clarity and refining the tutorial to provide clearer, step-by-step instructions, especially for users with no prior VR experience.



KEY FEATURES

- Realistic environments and animal avatars
- Adaptive gameplay mechanics
- Performance tracking and immediate feedback

NEXT STEPS

- Areas of exploration and improvement include:
- Implementation of profile system and user-based data saving
 - Introduction of more animal species for diverse sound cues
 - Improvement of accessibility options (color contrast settings, UI readability, etc.)

ACKNOWLEDGEMENTS

Principal Investigators

- Dr. Doug Sladen
Dr. Valter Ciocca
Dr. Joanne Whitehead

Subject Matter Expert

Eli Hason, Sound Designer, Wabi Sabi Sound

Student Team

- Sinnie Choi
Mark Harmon
Eric Tang
Julien Roy

Made With Help From EML Staff

eml.ubc.ca

