

CS 465 Multimodal Interaction for 3D User Interfaces Project Proposal

Proposal Title: Exploring Multimodal Interaction with Virtual Pets in VR

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Introduction

This project explores how people interact with virtual pets in Virtual Reality through multimodal interfaces, including controllers, gaze, and speech. As VR technology evolves, it offers unique opportunities for users to form connections with virtual beings, which can have implications for entertainment, therapy, and companionship. Understanding how different interaction methods affect user experience and emotional connection with virtual pets is essential to designing more immersive and meaningful VR environments. This project aims to investigate the impact of various interaction modalities on user engagement and emotional response, contributing to the broader field of Human-Computer Interaction (HCI).

Previous Work

Research has shown that multimodal interaction enhances user immersion and realism in virtual environments. Lee and Jung (2023) explored the combination of speech and gaze to control virtual entities, finding that this approach improved users' sense of presence and emotional involvement. Similar work demonstrated that interacting with virtual animals through voice and touch could evoke real emotional responses, suggesting the potential for virtual pets to provide companionship or emotional support. Studies like these highlight the importance of exploring multiple interaction methods to understand how they shape user experiences and connections with virtual beings in VR.

What I Will Do

This project I will create a VR environment where users can interact with a virtual pet using three distinct modalities: controller input (petting, feeding, playing), gaze-based interaction (looking at objects or the pet to trigger responses), and voice commands (calling the pet, giving verbal cues). The goal is to evaluate how these interaction methods influence user engagement and emotional attachment to the virtual pet.

Demo/Prototype

The prototype will feature a virtual environment where users can interact with a virtual pet, such as a dog or cat, through different interaction methods. For instance, users will be able to use controllers to play fetch, use their gaze to guide the pet to specific areas, and use voice commands to instruct the pet to sit or follow them. The environment will include playful elements like toys and food bowls to encourage various types of interactions. The design will prioritize responsiveness and natural feedback to enhance the feeling of connection with the pet.



Experiment Design

The experiment will assess how interaction modality affects user experience and emotional connection. The independent variable will be the type of interaction modality (controller, gaze, voice), while the dependent variables will include measures of user engagement, emotional response, and perceived connection to the virtual pet. Data will be collected through post-experience questionnaires. By comparing user responses across different interaction methods, the experiment will provide insights into which modalities are most effective for fostering emotional bonds with virtual pets.

Conclusion

This project aims to deepen our understanding of multimodal interactions in VR by exploring how users engage with virtual pets through controllers, gaze, and speech. The findings could inform future VR applications in therapy, education, and entertainment, highlighting the potential of VR to simulate meaningful relationships with virtual beings.

Deliverables

By the end of the semester, I will deliver a full report written in LaTeX, a working VR prototype for the Oculus Quest 2, and documentation of the experiment results. The report will detail the project's design, implementation, research findings, and conclusions, accompanied by images or diagrams of the VR environment and interaction flow.

References

S. Lim and S. -Y. Dong, "Effects of Interaction with Virtual Pets on Self-Disclosure in Mixed Reality," 2023 IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Sydney, Australia, 2023, pp. 1-9, doi:10.1109/ISMAR59233.2023.00014.

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D. Cheok et al., "Metazoa Ludens: Mixed-Reality Interaction and Play for Small Pets and Humans," in IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans, vol. 41, no. 5, pp. 876-891, Sept. 2011, doi: 10.1109/TSMCA.2011.2108998.

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