Use of stereo 3D to increase immersion and therefore retention in educational virtual environments

Goal and Past Research



The studies conducted at the Robotics Academy have shown a disconnect between multiplication, a basic concept students learn at a young age, and proportional reasoning. The importance of learning proportionality is that it integrates the skill into a more natural/less academic setting. With the goal of improving student learning, we set up a 3D educational environment. Students immerse themselves while solving increasingly more difficult and complicated proportionality problems.

Commercial off the shelf system utilizes reflectors in glasses to track face alignment and pose. Reflectors and tracking software solve a traditionally computationally expensive problem that was not the subject of this research. In my research I made use of this technology to allow for adjusting perspectives and dynamic focal points in a math underwater exploration video game, Expedition Atlantis. The adjusting perspectives empowers the user to explore more freely and immerse themselves in the game. The cost adding dynamic focal points is that our Unity3D based game requires a quad buffer system. A double double buffer renders a left and right image in the background while actively displaying the current left and right image.



Stereo Background

Stereoscopic vision relies on the human brain's interpretation of view to understand depth. By sending a shifted viewpoint to the left and right eye the monitor is able to display a 3D environment. Calculating the offset of the eyes requires a location to be used as a focus point. Traditionally this is assumed to be static across all use cases. My research was in displaying a stereo environment while accounting for varying use cases.







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Future Work

Studies still need to be conducted on the significance of better immersion in regards to students understanding and knowledge retention.

References

- 1. Expedition Atlantis
 - Robomatter Inc.
- 2. Head Tracking and Stereo 3D
- ZSpace 3. Robots in Motion



University of Pittsburgh's Learning Research and Development Center (LRDC) and Carnegie Mellon's Robotics Academy "The Robot Algebra Project"

Carnegie Mellon. Robotics Academy