Development of a tool for audio/visual self-motion perception experimentation

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Motivation:

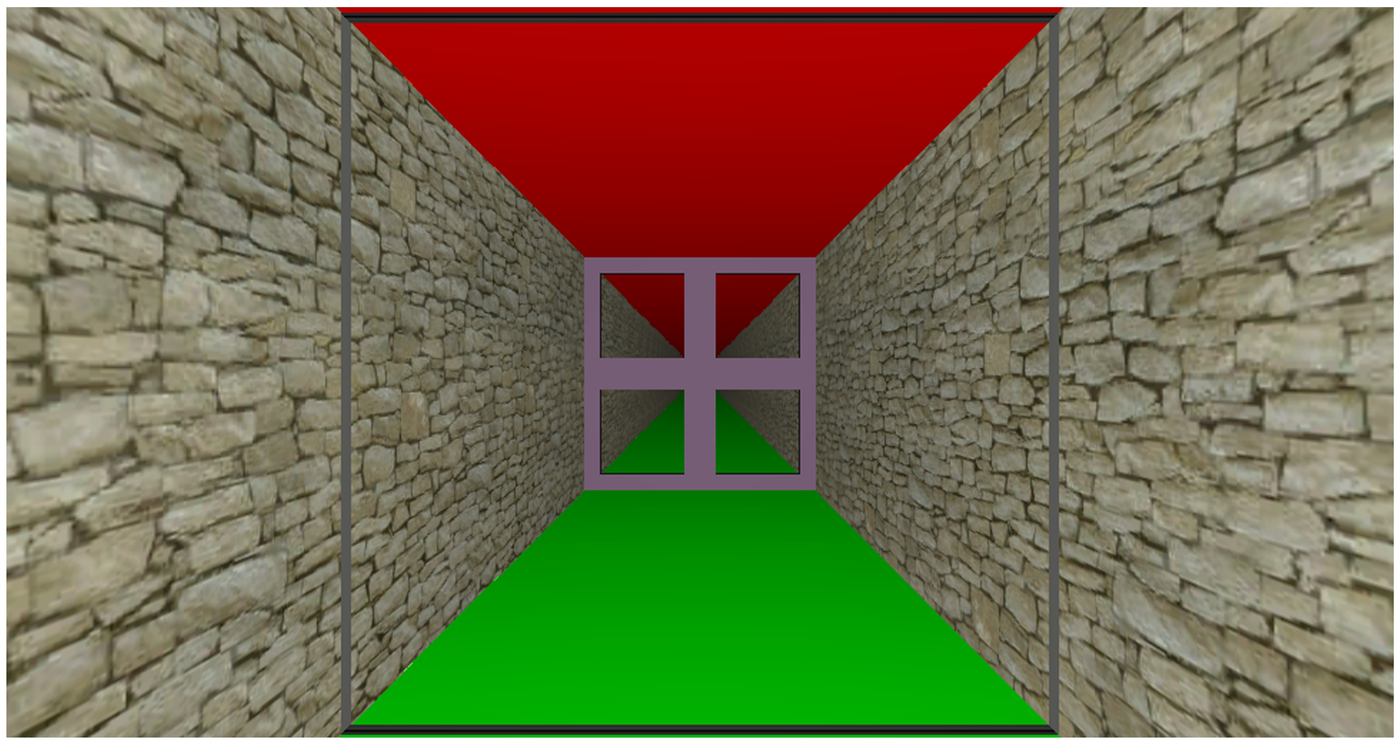
The purpose of this project was to build upon the study by Karpalos et al. [3] by examining the interaction of visual cues with auditory cues in the perception of self-motion. Just as the addition of auditory cues increase the accuracy of self-motion perception when combined with physical motion cues as opposed to physical motion cues alone, it is anticipated that the addition of auditory cues will also increase the accuracy of self-motion perception over visual cues alone. The system developed during this project will be the base for an experiment whose results will have potential implications for the designers of immersive environments that aim to simulate self-m

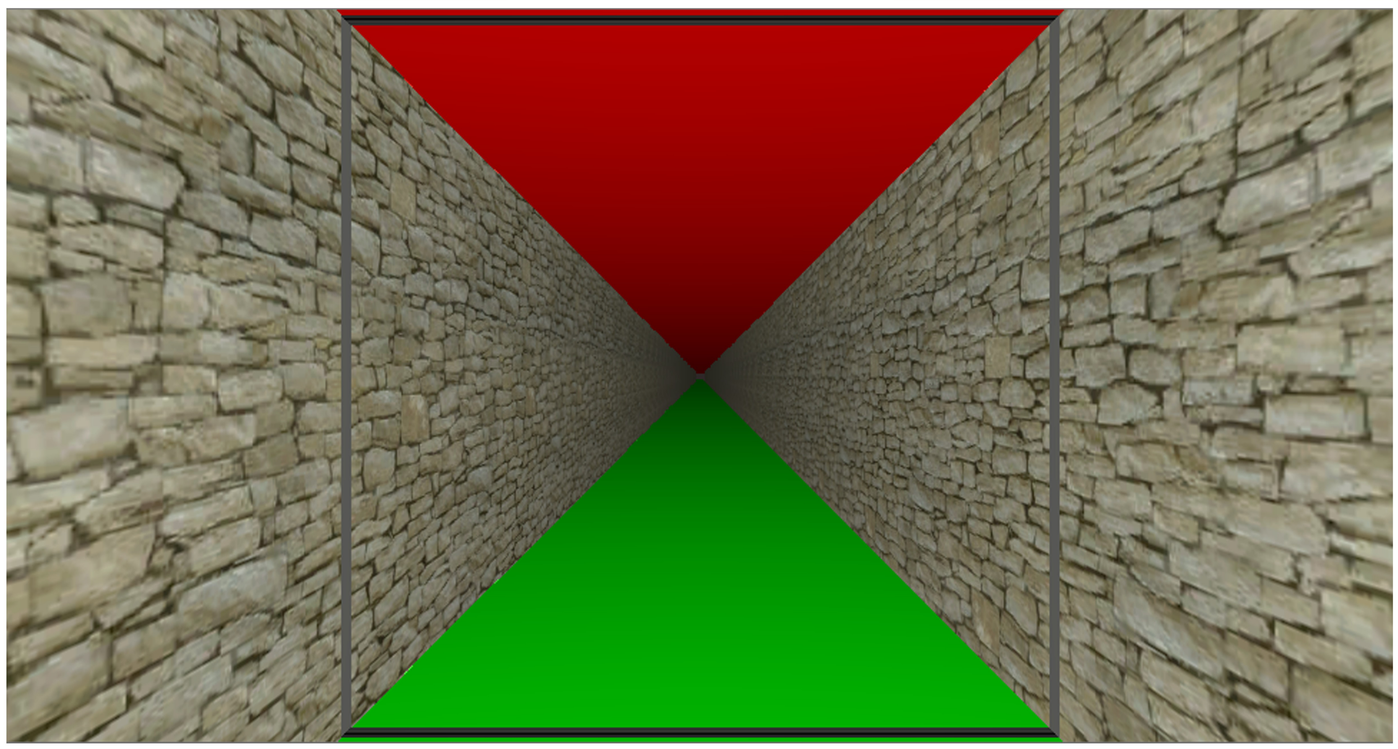
Method:

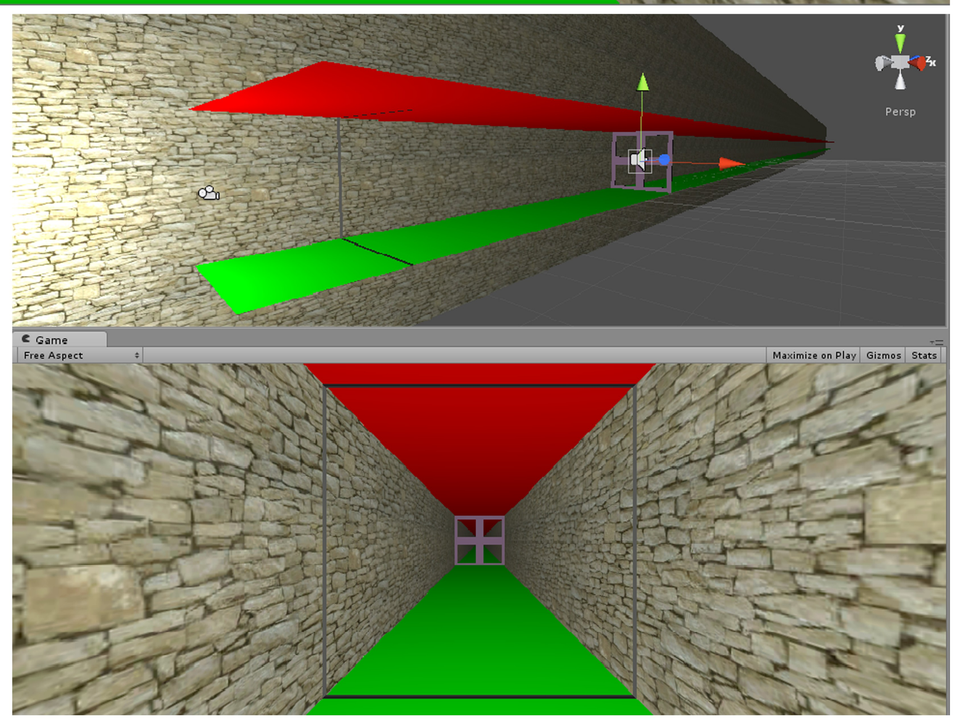
The software is developed using a Game Development Tool called “Unity” (www.unity3d.com). The developed software is able to setup a hallway either with a textured or striped wall style. The subject‘s position is at the one end of the hallway and it looks down the hallway.
A visual target appears at a specified distance down the hallway. After a button is pressed the target disappears and the subject starts moving down the hallway with a specified acceleration/velocity.
The subject presses a button when he or she thinks that they have arrived at the position at which the target appeared previously. There can be a sound attached to the visual target, to the subject, or to the hallway. The sound can also be made to move independently of the subject.
After the subject responds the systems stores the state information to a file and the next condition will be run. The configuration of each trial is given in an xml-defined input file.
There are many parameters that can be defined in the input file. The parameters described above are just one example. For example, there is the ability to enable stereoscopic versus monocular rendering.

Future Work:

Future experiments are planned that will use this tool to combine different audio and visual cues to self-motion. For example, different subject accelerations, target-distances, audio-positions and texture modes will be explores.







References:

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[2] I. P. Howard. The vestibular system. In K. Boff, R. Kaufman, and J. Thomas, editors, Handbook of Perception and Human Performance. Sensory Processes and Perception, volume 1, pages 1–29. Chichester: Wiley and Sons, New York, NY. USA, 1986.
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