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Journal Review 1

The primary paper that I chose for the Journal Review assignment was: “Experiencing the Sights, Smells, Sounds, and Climate of Southern Italy in VR” which was published in *IEEE Computer Graphics and Applications* Volume: 37 Issue: 6. The secondary paper that I chose from the references provided in this paper was: “Evaluating the Importance of Multi-Sensory Input on Memory and the Sense of Presence in Virtual Environments” published in the *Proceedings from IEEE Virtual Reality 1999*. These papers both discuss the importance of combining the use of stimulation to trigger visual senses and other non-visual senses while inside virtual reality environments. Both papers highlight the major issue of getting the users more involved with what they are seeing through exposing them to tactile, auditory, and olfactory sensations associated with the experience. This is an interesting problem domain as most people do not think about smells and touch being related to user interfaces.

In the secondary paper that I picked, “Evaluating the importance of Multi-Sensory Input on Memory and the Sense of Presence in Virtual Environments”, researchers conducted an experiment to understand how much of an impact each of the human senses had on the immersion of a virtual office tour experience. Along with immersion, researchers aimed to test if the addition of other senses positively influenced the users’ memories of the environment, and items in the environment. The experiment divided volunteers into two groups, the first group would be undergo the experience with the addition of auditory, olfactory, tactile and visual stimulation. The second, or control group, would undergo the same experience solely with visual stimulation. The process required volunteers to put on a virtual reality headset, an oxygen mask, and headphones while observing an automated tour of an office environment. Each volunteer would be moved throughout different rooms and be asked to look around and explore the room from two different positions. The paper gives us a few examples: When volunteers of the multiple stimulation group traveled near the bathroom, they would hear the sound of a toilet flush. Then, when the same group would travel near a coffee maker, they would smell coffee grounds. Lastly, when they walked by a fan in the lobby they would feel some air blow on them. After each volunteer completed the tour they were then asked to fill out a questionnaire asking them to rate their immersion in each room on a scale of 1-10. The second part of the questionnaire requested that volunteers write down what room a variety of items were in. The results showed that for each additional sensation introduced to the volunteer, they reported a greater sense of immersion, as well as had increased accuracy in reporting the locations of all the items, compared to the control group.

The primary paper that I chose, “Experiencing the Sights, Smells, Sounds, and Climate of Southern Italy in VR”, discusses the research conducted by a team that were asked by a smaller region of Italy, Apulia, to help them boost their tourism. Instead of advertising through internet advertisement and travel magazines the researchers took this opportunity to convince the regional authorities to allow them to leverage some existing virtual reality technology to create a rich experience for prospective tourists. The researchers decided that they would make a fully immersive tour experience, that stimulated more than just the tourist’s mind through what they would see on a piece of paper. They wanted to create a virtualization system that could be reused throughout a range of numerous tourist destinations while ensuring the content could be used by non-technical individuals without much training. This system was called MATE. For their

initial foray into building MATE, the researchers looked into the area that they were going to "virtualize" and compiled multiple pictures as well as other useful information that could be used to target non-visual senses like the smells, temperature, and sounds. They then created an enclosed environment where they could manually control the stimulatory effects of all of the senses targeted in the visitors. Unlike the virtual reality headsets used in the secondary article above, the researchers decided to use very large television screens to generate the visual stimulus on a broader scale. This allowed them to fill many people into a large room. In this room, they used a complex and high-tech air conditioning and heating system to control the temperature very rapidly. They used a "Solid Fragrance Release System" with a fan-powered vent to immerse the room with aromas associated with what the visitors saw on the screens. They used the Microsoft Kinect as the input device, which would scan all of the people in the room and pick out the person who was closest to the screen to use as an anchor. The Kinect would then track the gestures made by the anchor, send the information to control system to perform the desired action. To test their system, the researchers gathered a group of volunteers to undergo a tour of the destination through the MATE and a basic internet virtual tour. The volunteers reported that, overall, they felt more immersed and enjoyed the tour of the destination while using the MATE system. At the end of the article, the researchers state that MATE has been created into a full scale prototype, they plan to carry it all around Europe for tourism advertisement.

The research results of the secondary paper reflecting the positive outcomes of the use of multiple sensory stimulation as a way of improve the immersion and overall perceived quality of a users virtual experience. Through referencing previous findings such as this, the researchers of the primary paper determined that a similar system of multiple sensory stimulation can be used to improve the experience of not only virtual reality, but improve the marketing world of tourism. Both research teams sought to not only improve virtual reality immersion as a tangible good, but to improve the way that users interacted with it. From reading both papers, I was overall surprised at how much of an impact the addition of stimulation of accessory human senses made on virtual reality in general. At first though, visual and auditory stimulation to me would have been enough to gain an understanding of what the user is looking at. But, by making the items or places on the screen more meaningful and "life-like" to the users through the use of all of the human senses, overall satisfaction and recollection of the scenes improved.

References:

Primary:
V. M. Manghisi et al., "Experiencing the Sights, Smells, Sounds, and Climate of Southern Italy in VR," in IEEE Computer Graphics and Applications, vol. 37, no. 6, pp. 19-25, November/December 2017.

Secondary:
H.Q. Dinh et al., "Evaluating the Importance of Multi-Sensory Input on Memory and the Sense of Presence in Virtual Environments", *Proc. IEEE Virtual Reality*, pp. 222-228, 1999.