Gamification of outdoor navigational experience for visually impaired

Virtual Reality (VR) technology has traditionally been associated with visual experiences and for most, it simulates spatial information through stereoscopic rendering presented through a Head Mounted Display (HMD)[1]. However, in our view, other sensory feedback mechanisms such as audio and haptics that constitute a more immersive VR experience have not been thoroughly leveraged. In our research, we aim to extricate the dominance of visuals in VR through sensory substitution[2] and focus on empowering accessibility in VR for the visually impaired. Our main objective is to create a soundscape for virtually impaired users to assist them to experience navigating in a virtual environment through acoustic and haptic feedback.

We intend to achieve this through the help of a novel white cane that acts as an intermediary between the physical and virtual worlds. The white cane is mapped to a virtual counterpart and when the latter interacts with different textures in the virtual world, we render similar textures through the synthesis of spatial audio and haptics from a pre-recorded repository. The soundscape that we are focusing on creating is furthermore substantialized by the addition of ambient sounds of the surrounding environment, helping to create a more immersive experience. Our prospective implementation of this research can be extended to interactive storytelling, building toward empathy generation for the visually impaired, and primarily creating a training aid for novice visually impaired individuals, particularly children, to circumvent real-world limitations such as injury or use of a sighted assistant.

1. *Kreimeier, Julian & Karg, Pascal & Götzelmann, Timo. (2020). BlindWalkVR: Formative Insights into Blind and Visually Impaired People's VR Locomotion using Commercially Available Approaches. 10.1145/3389189.3389193.*
2. *Niklas Elmqvist. 2023. Visualization for the Blind. interactions 30, 1 (January - February 2023), 52–56. https://doi.org/10.1145/3571737*