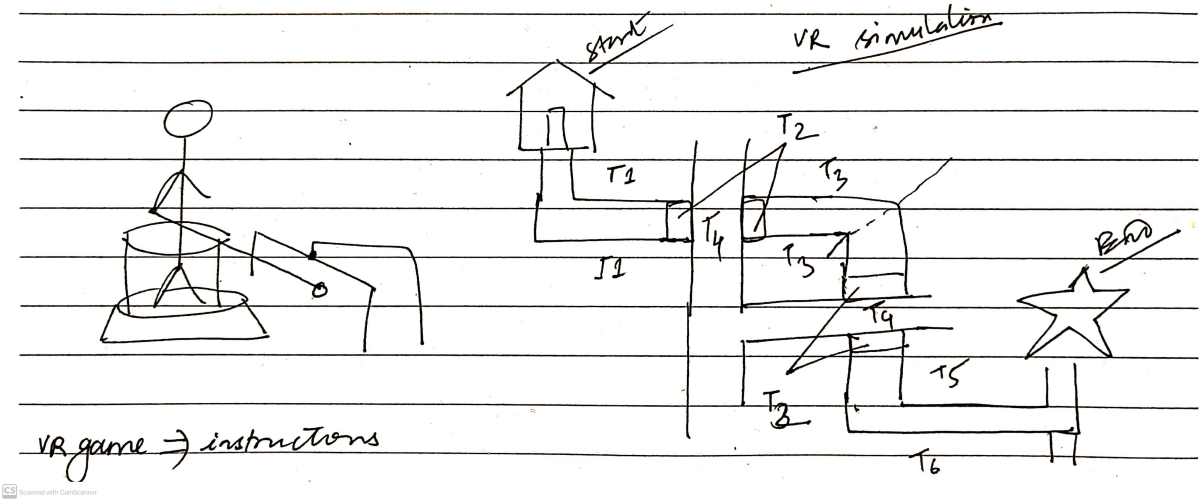
Week 2

Outdoor navigation of visually impaired simulated in VR

The plan is to gamify outdoor navigation in VR where the sensory perception of the virtual world to the user is limited only to ambient sounds, audio cues and tangible feedbacks without using any visuals.

Most of the current literature focuses on VR without visuals in the indoor setting but our approach would be to create a virtual outdoor environment where the visually impaired user navigates from point A to point B and while doing so encounters different textures of floor surfaces, their vibro-tactile feed back alongside ambient sound and surrounding noise which would work as directional cues.



[Stick figure]

As per the figure, the aim would be to use a VR treadmill, a headset and a headphone. Along this, an actual white cane mounted with actuators at the tip (or

wherever feasible) will be used.

[Map]

T1, T2, T3… → these refers to the textures of different surfaces along the path and our aim will be create a transition effect (both audio and tactile feedback) when a cane passes though one texture to the other.

Current canes techniques that would be feasible

1. Constant contact/Sweeping
2. Two point touch

Simulations replicated in the virtual environment

1. Vibro tactile

   1.1 Tactile feedback → sweeping vibration across the floor, point touch vibration

   1.2 Kinesthetic feedback → vibration generated on collision

2. Sounds and noise

   1.1 Direct Sound → cane sweeping/touch sounds, foot-step sound on different surfaces (leaves crunching and etc)

   1.2 Ambient sounds and noise → Spatial & environmental sounds (pedestrians passing by, vehicles on the road, traffic signal sounds, environmental sounds)

Focus group

- Novice white cane users (people not blind by birth)
- Children with visual impairment

Why can it be of use?

1. Outdoor navigation training using a white cane can be risky for early learners (especially children) — SAFETY
2. This simulation can be used as a fun “scavenger hunt” genre of game enabling users to learn using white canes while having fun playing it — LEARN with FUN
3. It advocates accessibility of VR experience to the blind by the use of a novel interface which mimics the real world white cane predominantly used for navigation — EASILY ADAPTABLE & ACCESSIBLE

Equipments and measurements needs (at a glance; will require thorough investigation)

Hardware

1. White cane
2. Actuators
3. Cane tracker (HTC hive mount?)
4. HMD
5. Headphones
6. VR treadmill

Software

1. VR game using Unity (or any other game engine?)
2. Spatial audio tool

Measurement tools

1. Vibration recorder
2. Sound recorder