

Evaluating Accessible Navigation for Blind People in Virtual Environments

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Prior work¹ allowed us to verify how blind people dealt with barriers to play mainstream games and when it was almost impossible to.

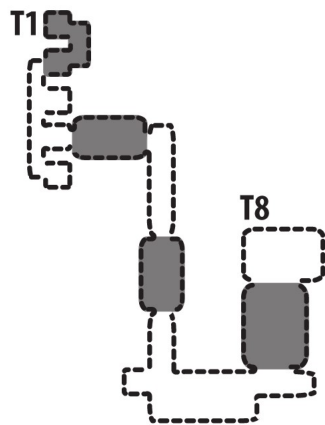
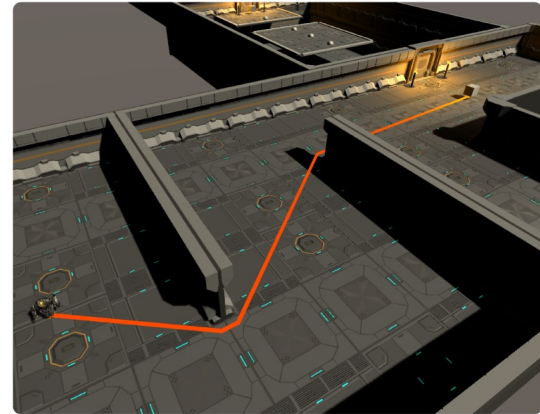
¹ Gonçalves, D., Piçarra, M., Pais, P., Guerreiro, J., & Rodrigues, A. (2023). *My Zelda Cane: Strategies Used by Blind Players to Play Visual-Centric Digital Games*. CHI '23, April 23–28, 2023, Hamburg, Germany.

Contributions: Exploration of accessible techniques and design choices based on the requirements of blind players, sharing their perspectives on the experience.

We created a VE with most common barriers to blind people navigation and orientation.

We implemented eleven accessible tools to tackle such challenges.

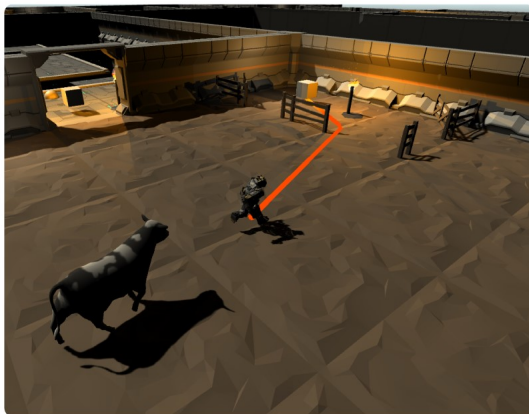
- Eight navigational tasks, 4 minutes to reach the objective's location.
- After completing a task, a new accessibility technique is unlocked.



Tasks:

- T1** Listen to **Footsteps** and **Collisions**;
- T2** Automatic or Demanded **Voice Indication** of Current Occupied Area;
- T3** **Sound Sources** as Reference Points;
- T4** Interaction with **Occluded Objects** and their State Changes;
- T5** Perception of **Ledges** and **Save/ Load** Character's Position;
- T6** Request **Directions** to Current Objective;
- T7** **Automatic Progression** after Request;
- T8** Non Playable Character **Perception** and **Interaction**;

Our **findings** resulted from a preliminary qualitative analysis, observations and concluding interviews:



> **Auditory Landmarks & Identification of Areas** give the basis for a confident navigation and mental map creation;

> **Occluded Objects** require detailed feedback of object's shape or condition, with haptic and/ or audio **feedback**;

> Common game specific features require **time to familiarize**, as well as explanation due to possible **unnatural concepts**;

> **Automated Actions** can help with troublesome situations, offering a solution if requested, avoiding forcing them;

Task completion:

32 out of 56 **completed**,

T1 & T2 had the **worst** rates (10 out of 14).

> T1 & T2 proved the **difficulty** of navigating **without** dedicated **accessibility** features;

> **Virtual Obstacles** and **Environmental Changes** can be easily conveyed with **haptic** and **audio feedback**;

> Following **directions** is intuitive, although the **camera** perspective and handling needs to be considered when designing these systems;

> **Interaction & Perception** of others benefits from properly timed audio feedback and distinct sound effects;