

# Investigating Virtual Reality Locomotion Techniques with Blind People

Renato A. Ribeiro, Inês Gonçalves, Manuel Piçarra, Letícia S. Pereira, Carlos Duarte, André Rodrigues, João Guerreiro

LASIGE, Faculdade de Ciências, Universidade de Lisboa, Portugal

## MOTIVATION

**Locomotion** enables users to **navigate** and **explore** the virtual world. Offering a diverse range of experiences, such as:



Walking-in-Place



Teleport

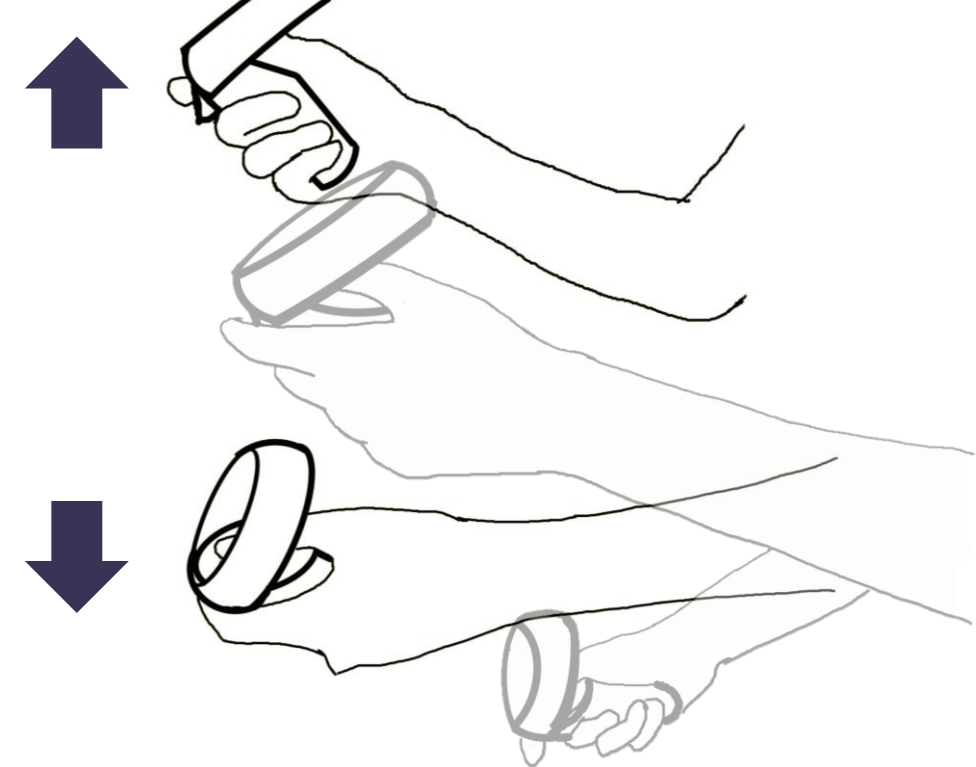
Current VR experiences have a major focus on visual feedback, posing significant challenges for blind people to both **UNDERSTAND** and **NAVIGATE** the environment.

## OBJECTIVES

Understanding the **potential** that the **most popular locomotion techniques** have to support **accessible experiences** may increase and **diversify** blind people's access to mainstream VR experiences.

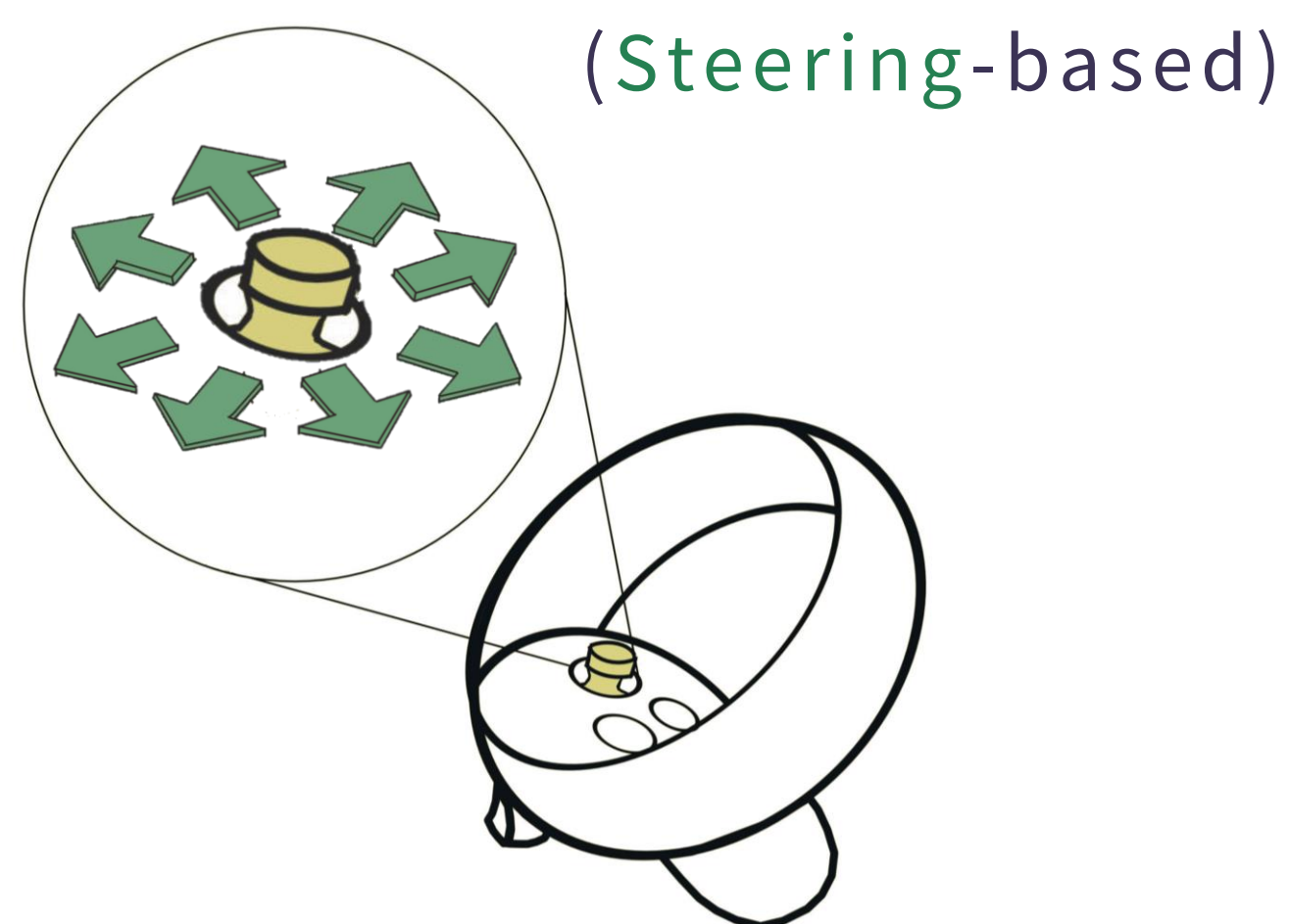
### Arm Swinging

(Walking-based)



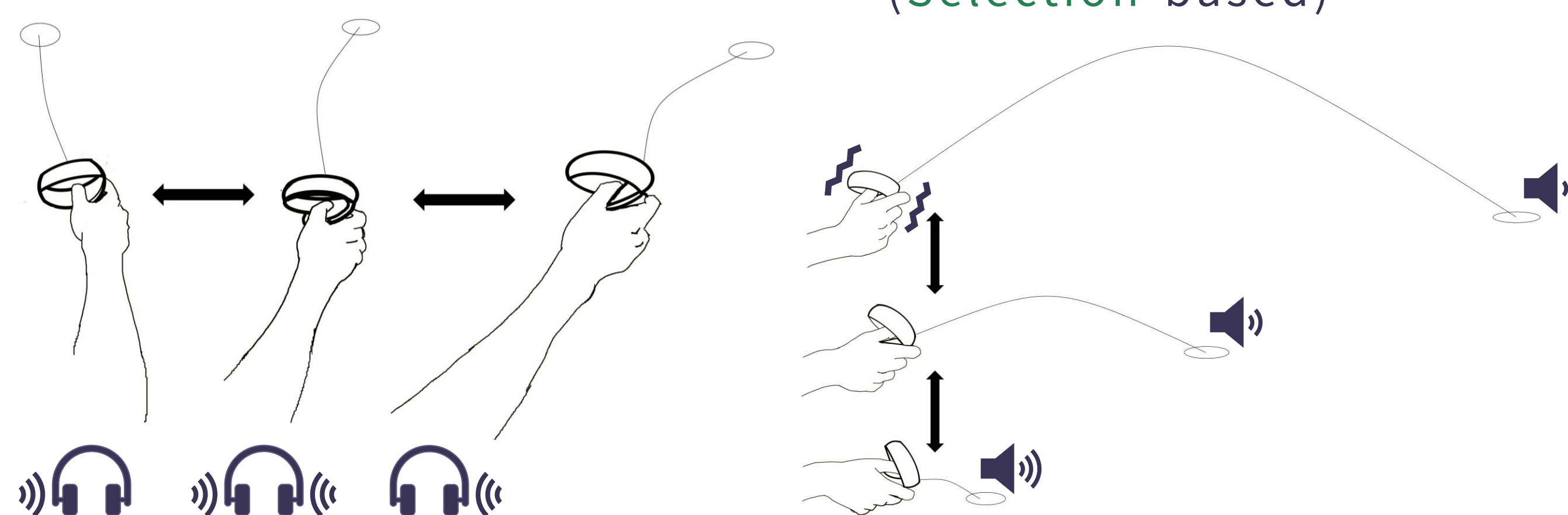
### Linear Movement

(Steering-based)



### Point & Teleport

(Selection-based)



## AUGMENTATIONS

FEEDBACK	AS	LM	P&T
Footsteps			
Collision			
Veering Prevention			
Direction & Proximity			
Distance Travelled			

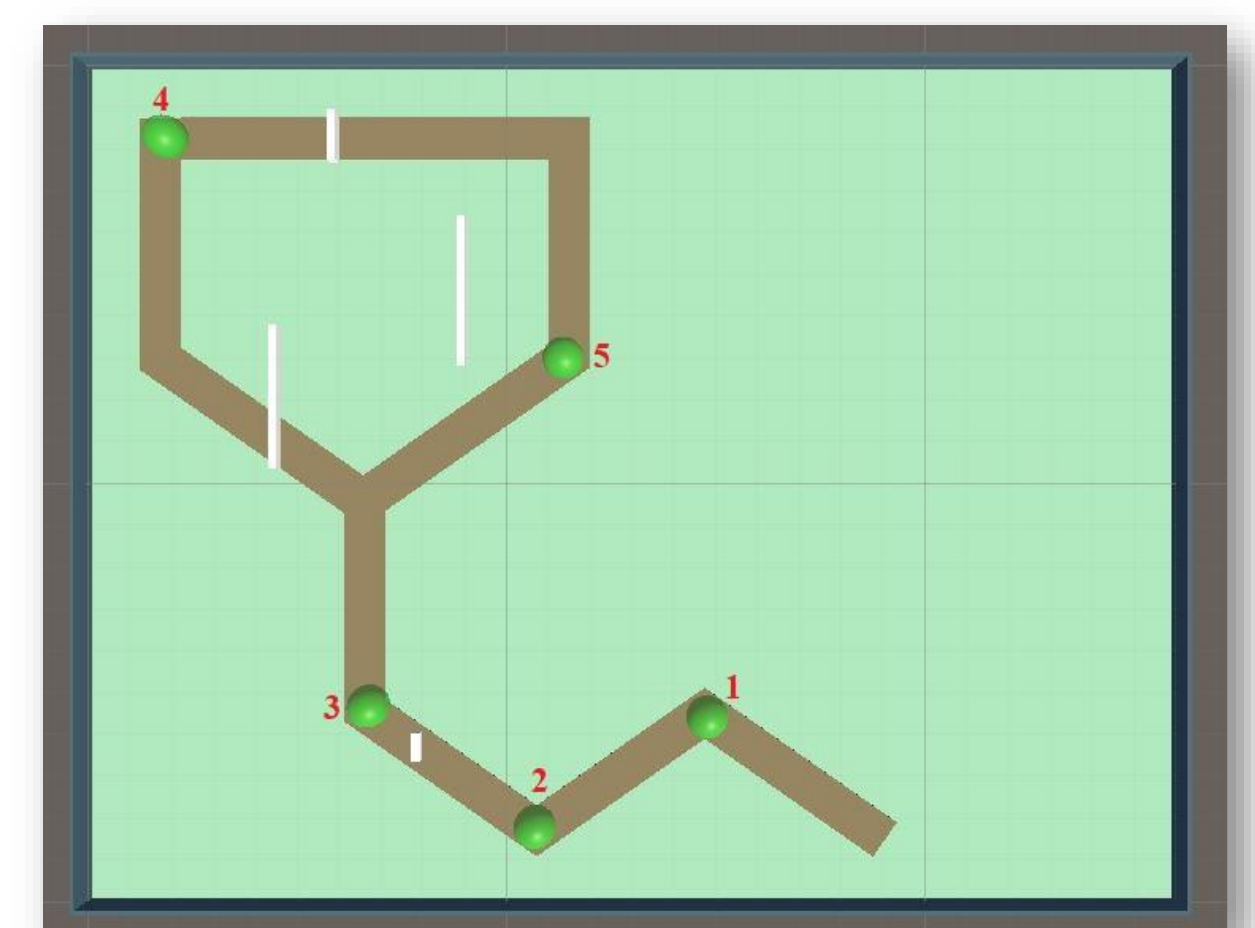
**AUDITORY FEEDBACK** **HAPTIC FEEDBACK**



AFTER LANDING

## METHODOLOGY

**14 Blind Participants** executed a **navigation task** with the **3 techniques**: Reach 5 objectives as quickly as possible, with each objective having a **3-minute time limit**. These tasks were followed by **semi-structured interviews**.



## LESSONS LEARNED

- **AS, LM, and P&T** - with careful audio and haptic design - can support accessible VR Experiences.
- Body rotation makes interactions even simpler.
- **AS** is perceived to provide greater awareness and control of movement.
- **P&T** has great potential for efficiency but may require additional training.
- Specific body language may affect performance.
- **P&T** can be designed to support scanning the surroundings.
- Veering is also a problem in virtual navigation.



Published at CHI 2024.

Check the full paper:

