



WPI

IMGD 5100: Immersive HCI

Travel

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Overview

- Travel
 - Getting from one place to another
- Wayfinding
 - Means knowing
 - Your current location (here)
 - The location of your destination (there)
 - A (partial) route for getting there from here
- These are related, but are really two large separate problems

Travel: Key Research Problems

- Limited physical space, possibly infinite virtual space
 - Think Holodeck
- Different types of travel
 - Walking, running, turning, side stepping, back stepping, crawling, quick start/stop, ...
- Need to do other things while traveling
 - Usually, travel is not the goal of your current task
- It is very easy to get (cognitively) lost in virtual reality

Support for General Walking

- Multi-sensory cues
 - Visual
 - Auditory
 - Tactile
 - Kinesthetic
 - Vestibular
 - Cognitive

- Each technique used for travel has more or less support for each of these

Overview of Travel Approaches

Gestural

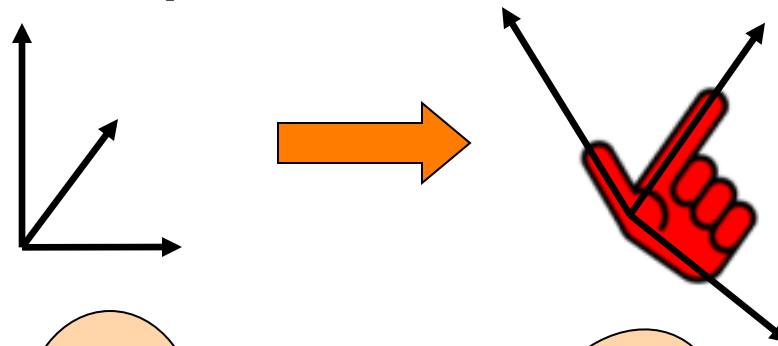
- Hand
- Head
- Foot (walking in place)
- Body (real walking, re-directed walking)

Device

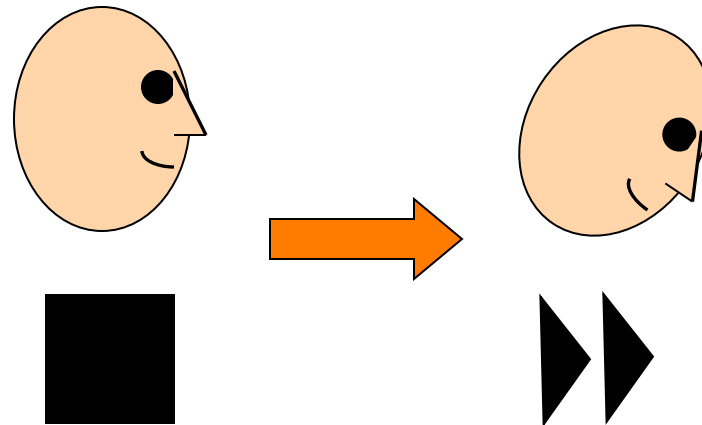
- Hand-held devices (joystick, gamepad, 2D mouse)
- Platforms
 - Passive (tilt, pressure, VirtuSphere)
 - Active (treadmills, steppers, CirculaFloor)

Gestures for Travel

□ Hand typically...



□ Head...



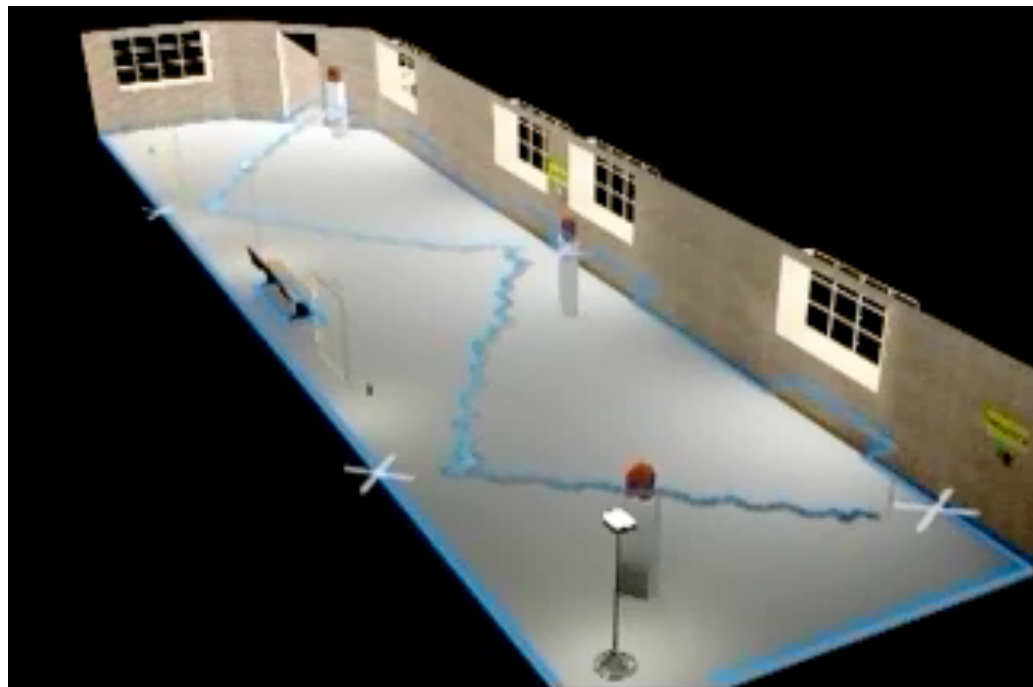
Gestures (cont.)

- Walking in place (Gaiter [Templeman])
 - Forward/backward/side-step gestures
 - Go prone, run, small real steps



Gestures (cont.)

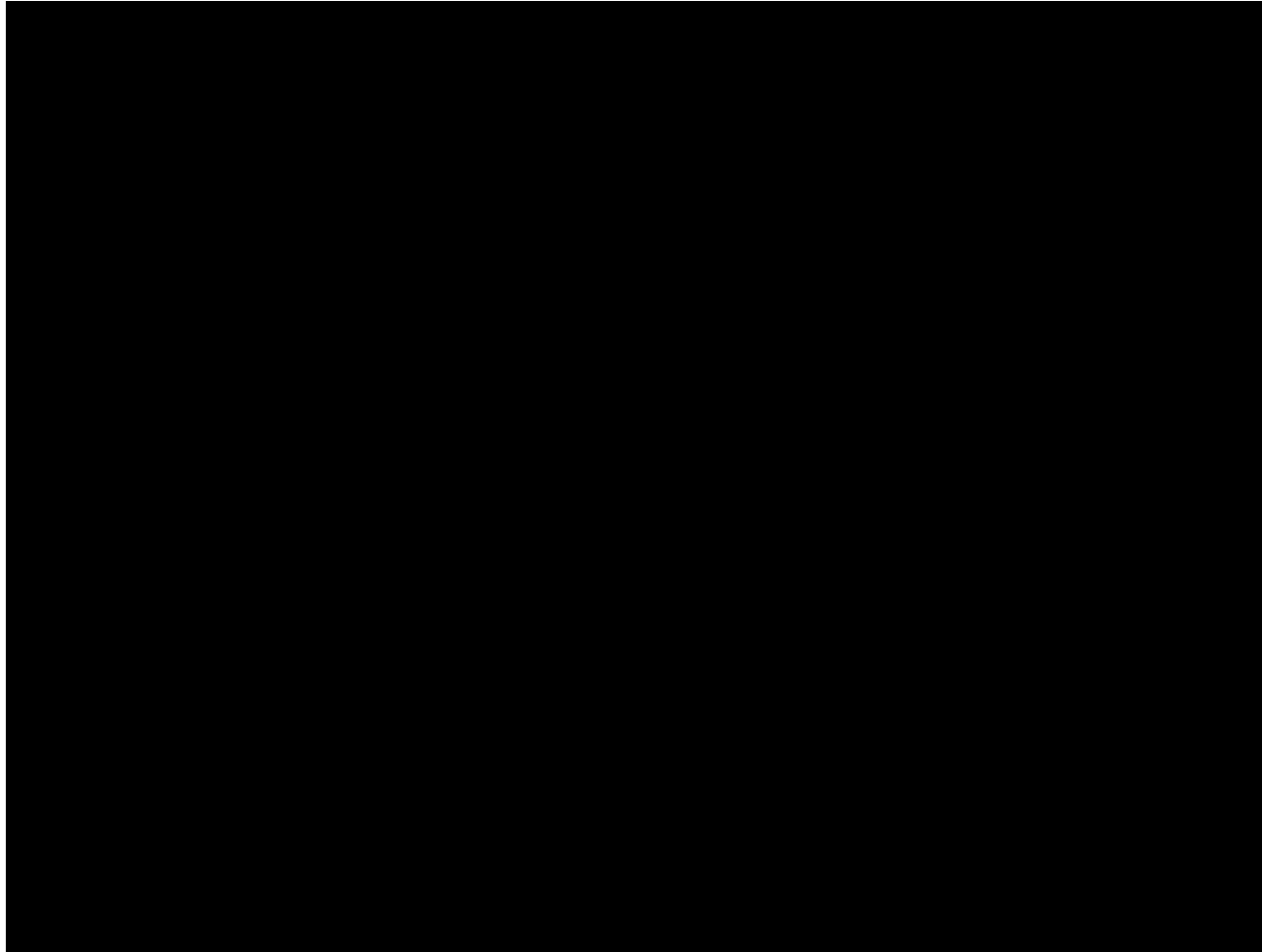
- Redirected walking (UNC-CH)



Re-directed Walking (1)



Re-directed Walking (2)



Devices

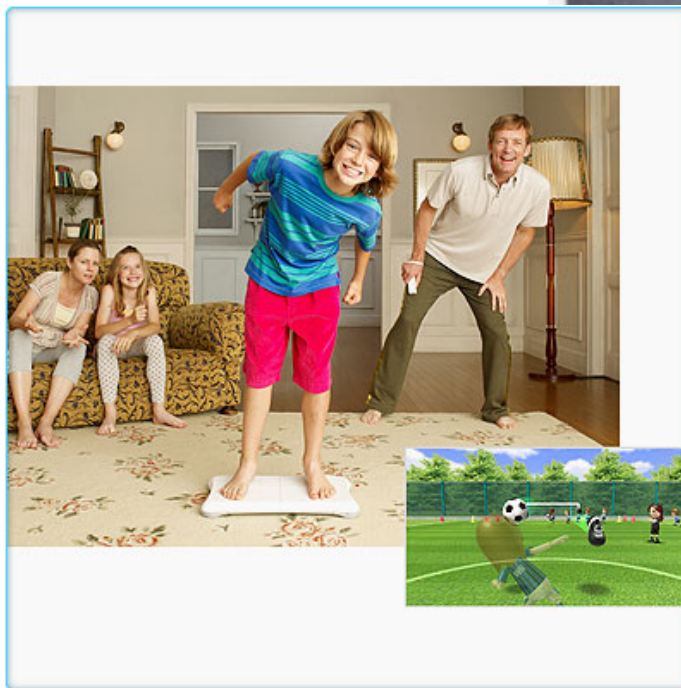
- Hand-held

- Mouse, joystick, gamepad, WiiMote, etc.

Platforms

□ Passive

- Tilt boards
- Wii Fit



Platforms (cont.)

□ VirtuSphere



VirtuSphere

Platforms (cont.)

□ Virtual Perambulator (Iwata 1996)



Virtual Perambulator (1)



Virtual Perambulator (2)



Platforms (cont.)

- Torus Treadmill
(Iwata 1999)



Torus Treadmill



Platforms (cont.)

- CyberWalk
(Max Plank, 2010)

CyberWalk

Video attachment to IROS'09 paper

Control Design and Experimental Evaluation
of the 2D CyberWalk Platform

A. De Luca, R. Mattone, P. Robuffo Giordano and H. H. Bühlhoff

Dipartimento di Informatica e Sistemistica Max Planck Institute for
Università di Roma "La Sapienza" Biological Cybernetics

Platforms (cont.)

- GaitMaster
(Iwata 2000)



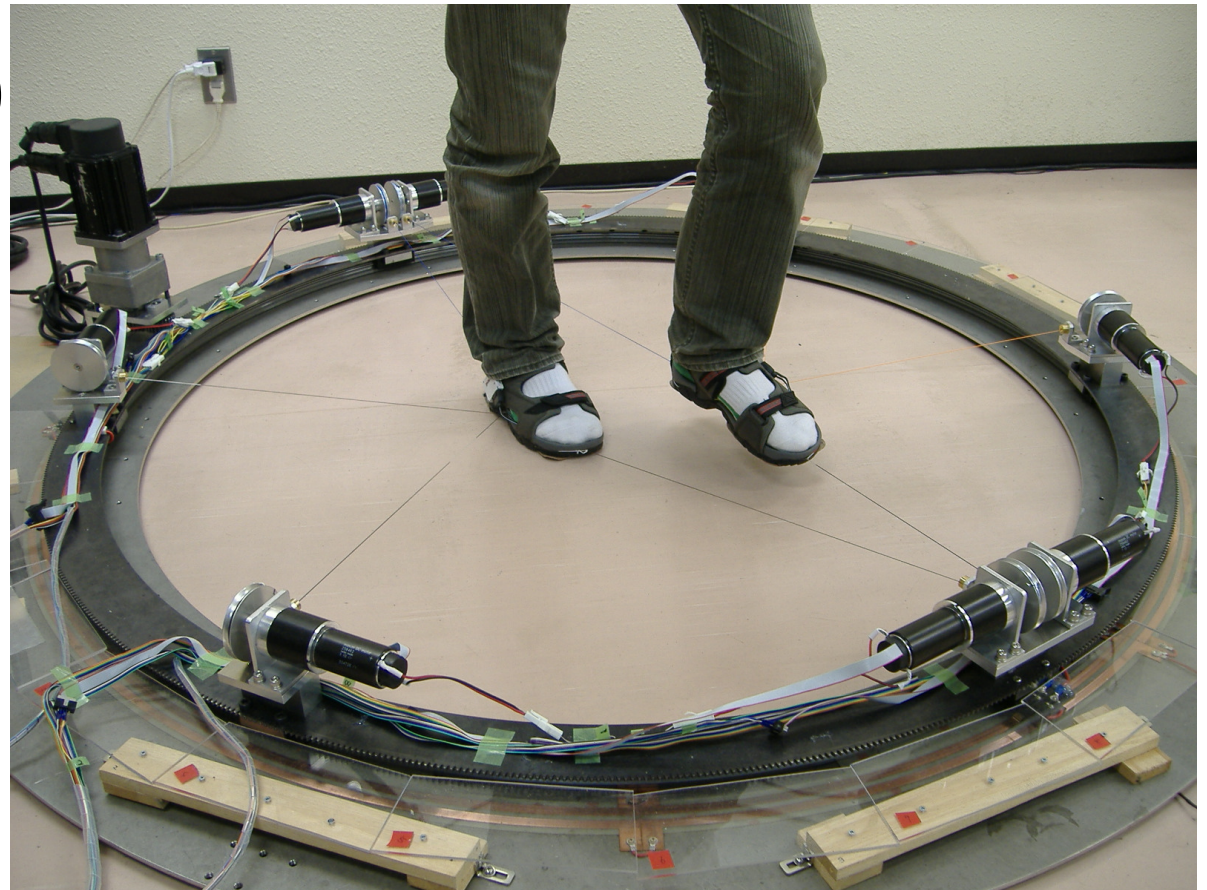
Platforms (cont.)

- Powered Shoes
(Iwata 2006)

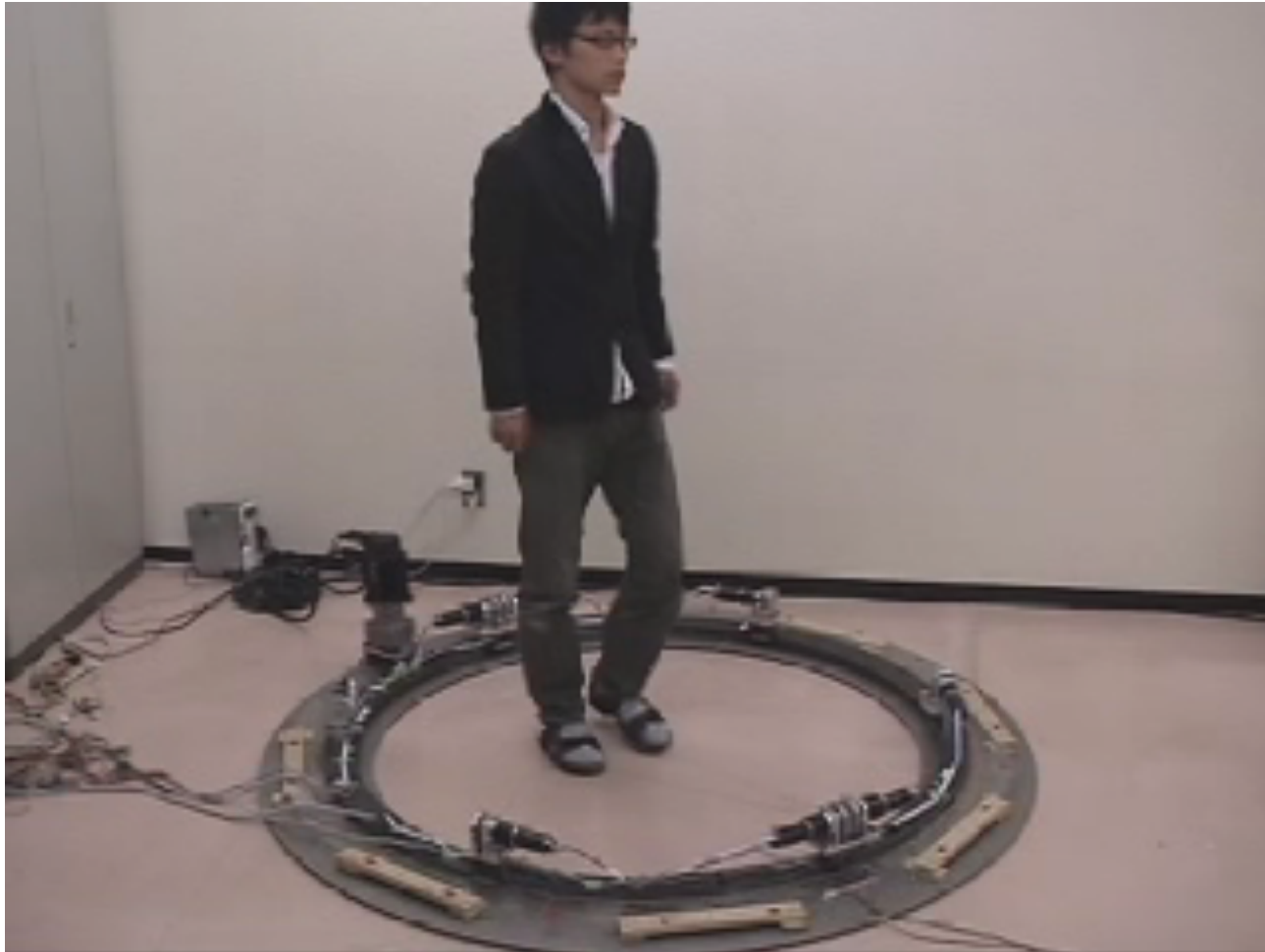


Platforms (cont.)

- String Walker
(Iwata 2007)



String Walker



Platforms (cont.)

- CirculaFloor
(Iwata 2004)

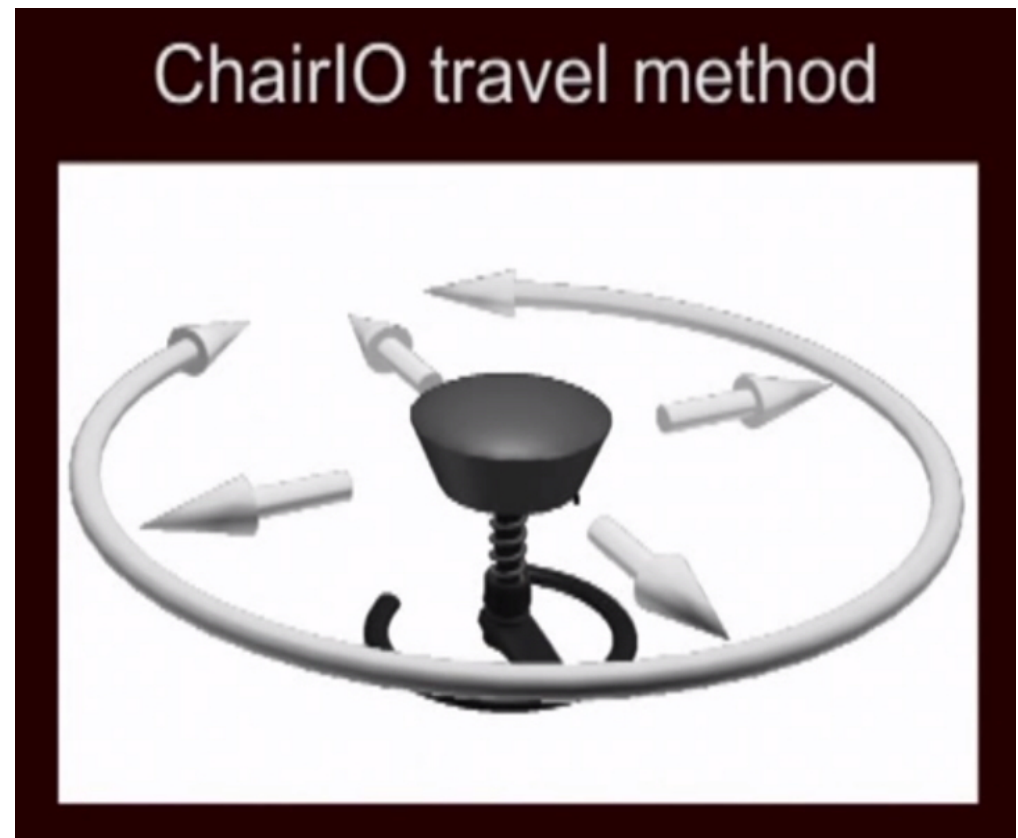


CirculaFloor



Platforms (cont.)

- ChairIO
(Beckhaus, 2009)



ChairIO

Jousting pizza -
spear and reel your food:

the im.ve
ChairIO based
supermarket interaction method

Platforms (cont.)

- Tilt Board
(Wang, 2012)



Tilt Board

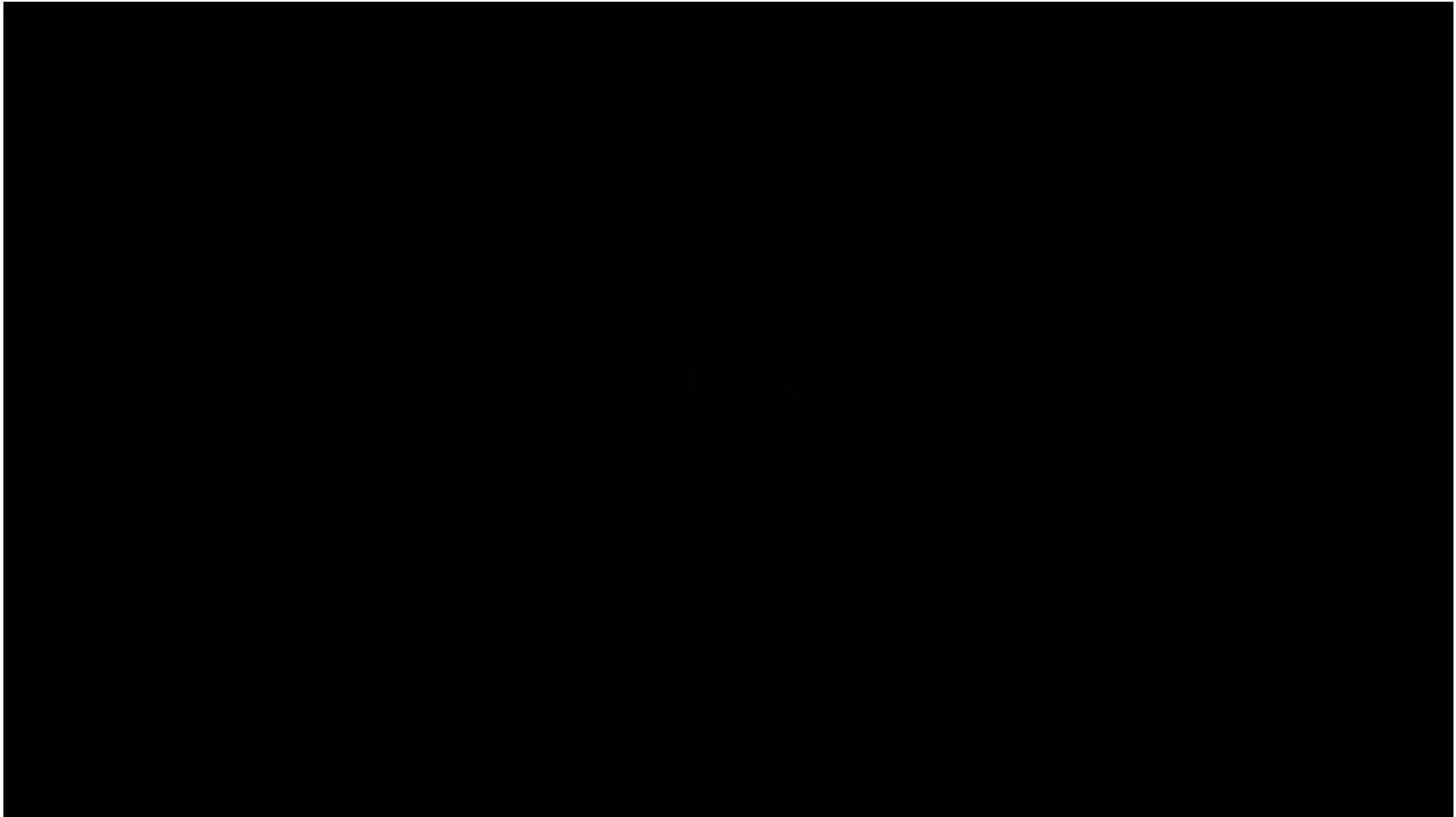


Platforms (cont.)

- Virtuix Omni (2013)



Virtuix Omni



Some Problems

- ❑ Stopping the user
- ❑ Fatigue
- ❑ Lack of vestibular cues
- ❑ Problems supporting short distance and long distance travel efficiently
- ❑ Lack of support for other tasks

Magic Barrier Tape

