Stepping Outside the Comfort Zone Towards World-Scale Virtual Reality

Christian Holz (really: all the MSR collaborators and interns on these projects!)
ETH Zürich

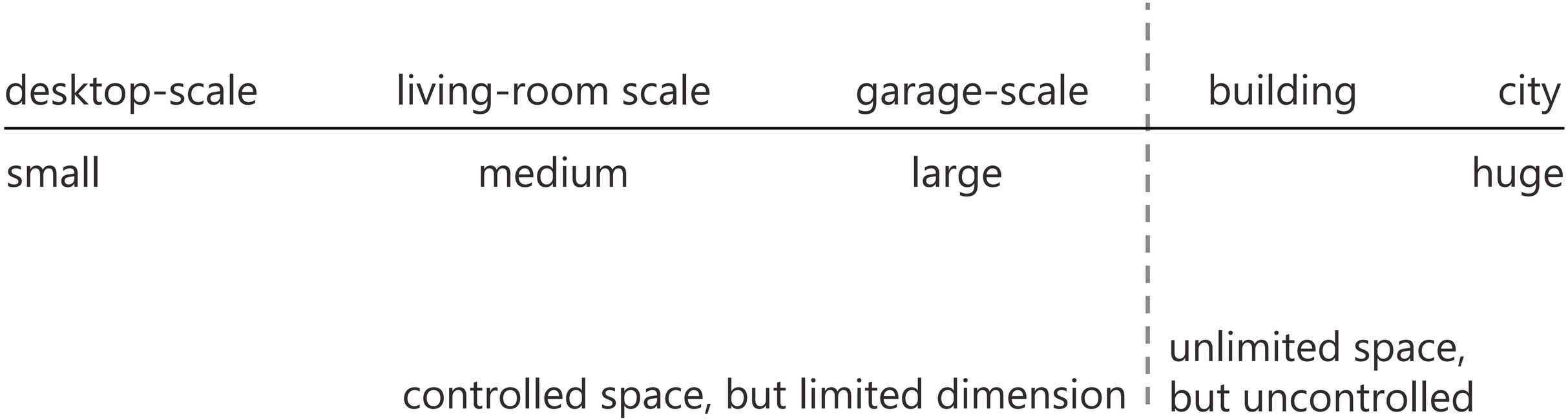
VR spaces today

desktop-scale	living-room scale	garage-scale
small	medium	large

VR outside the comfort zone

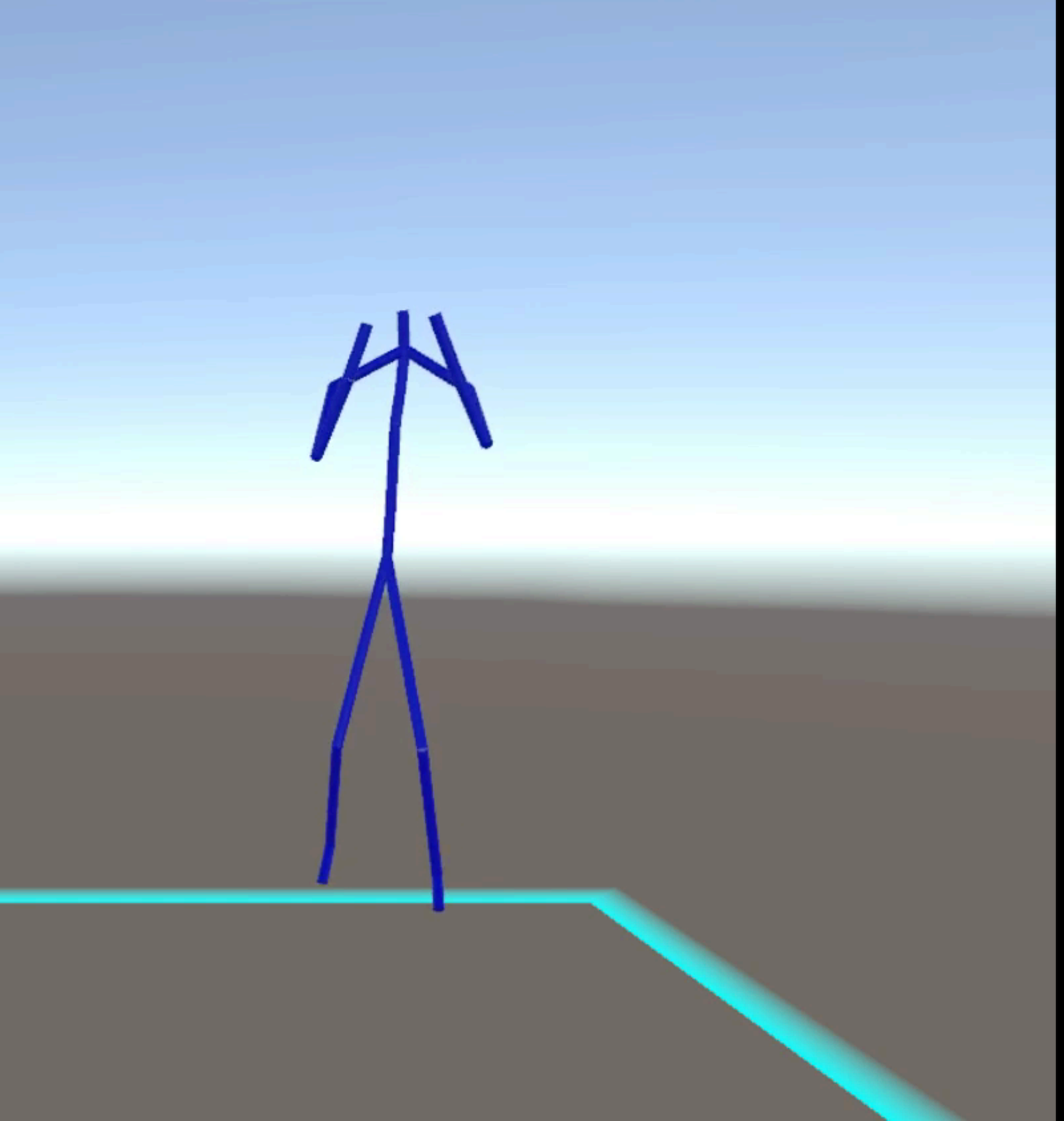
desktop-scale	living-room scale	garage-scale	building	city
small	medium	large		huge

VR outside the comfort zone

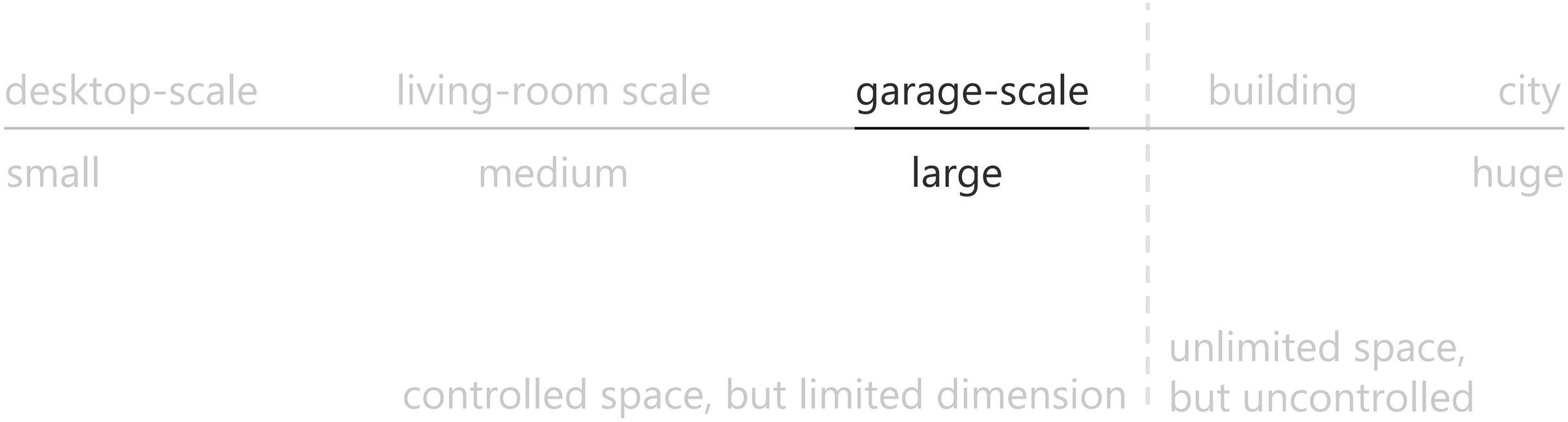


VR outside the comfort zone

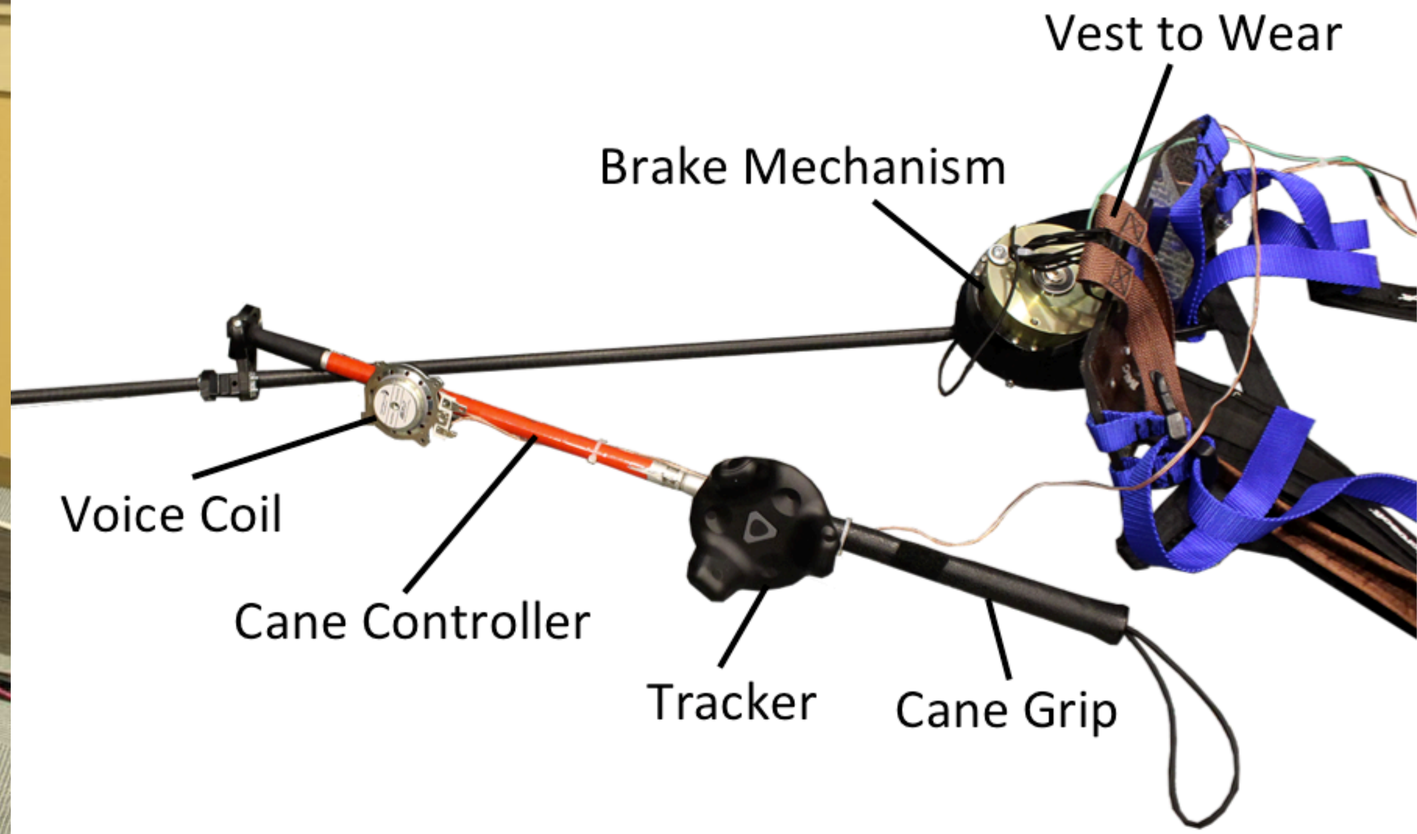
CREED VR



VR outside the comfort zone



Canetroller



orientation & mobility using a white cane

provides tactile and audio feedback

three cane techniques

two-point touch

constant contact

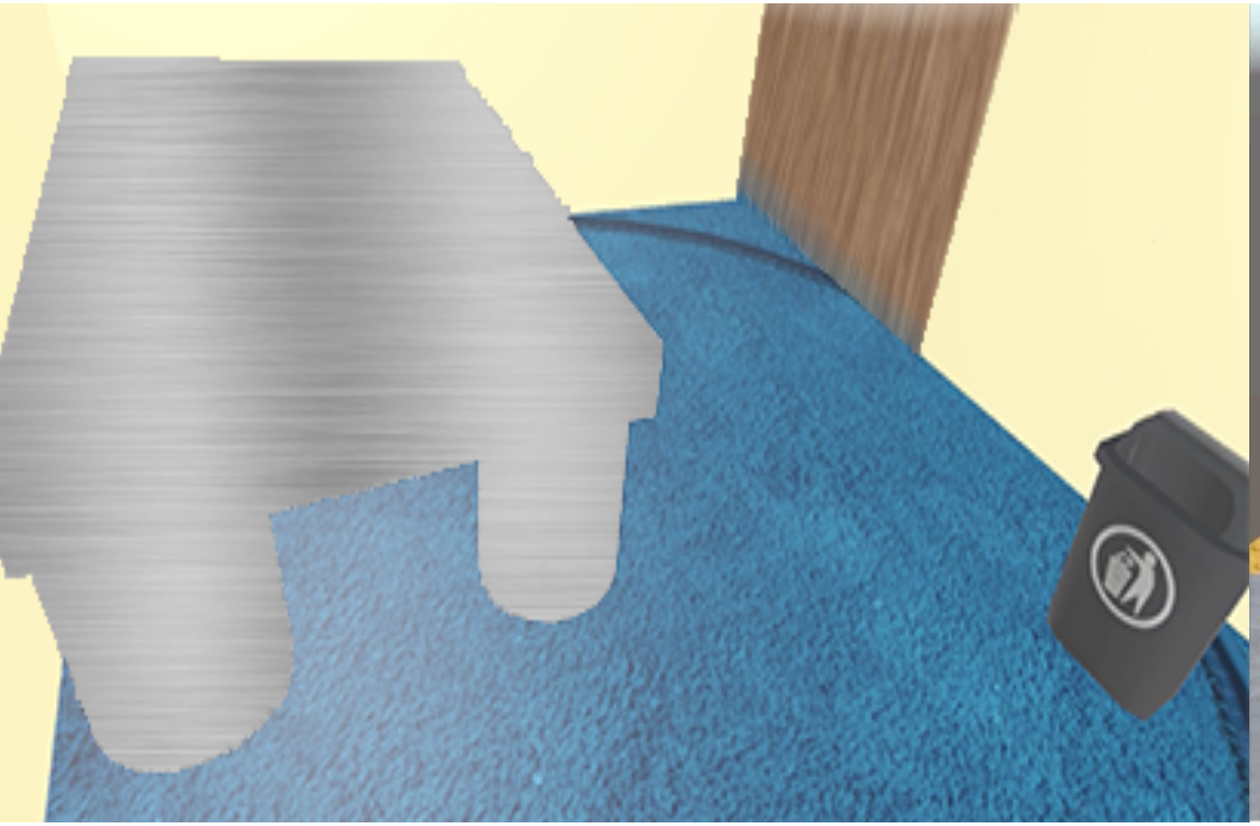
shorelining

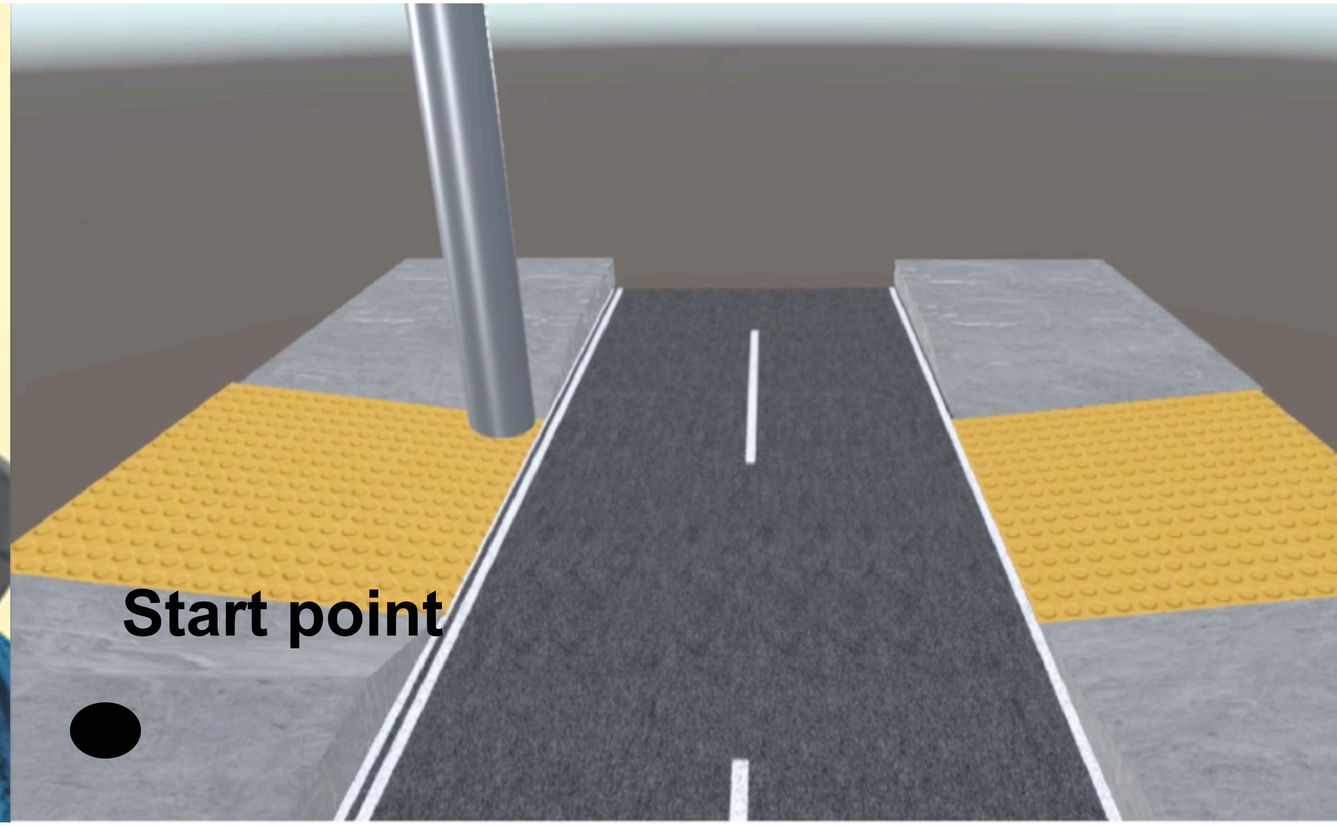
physical resistance

vibrotactile feedback

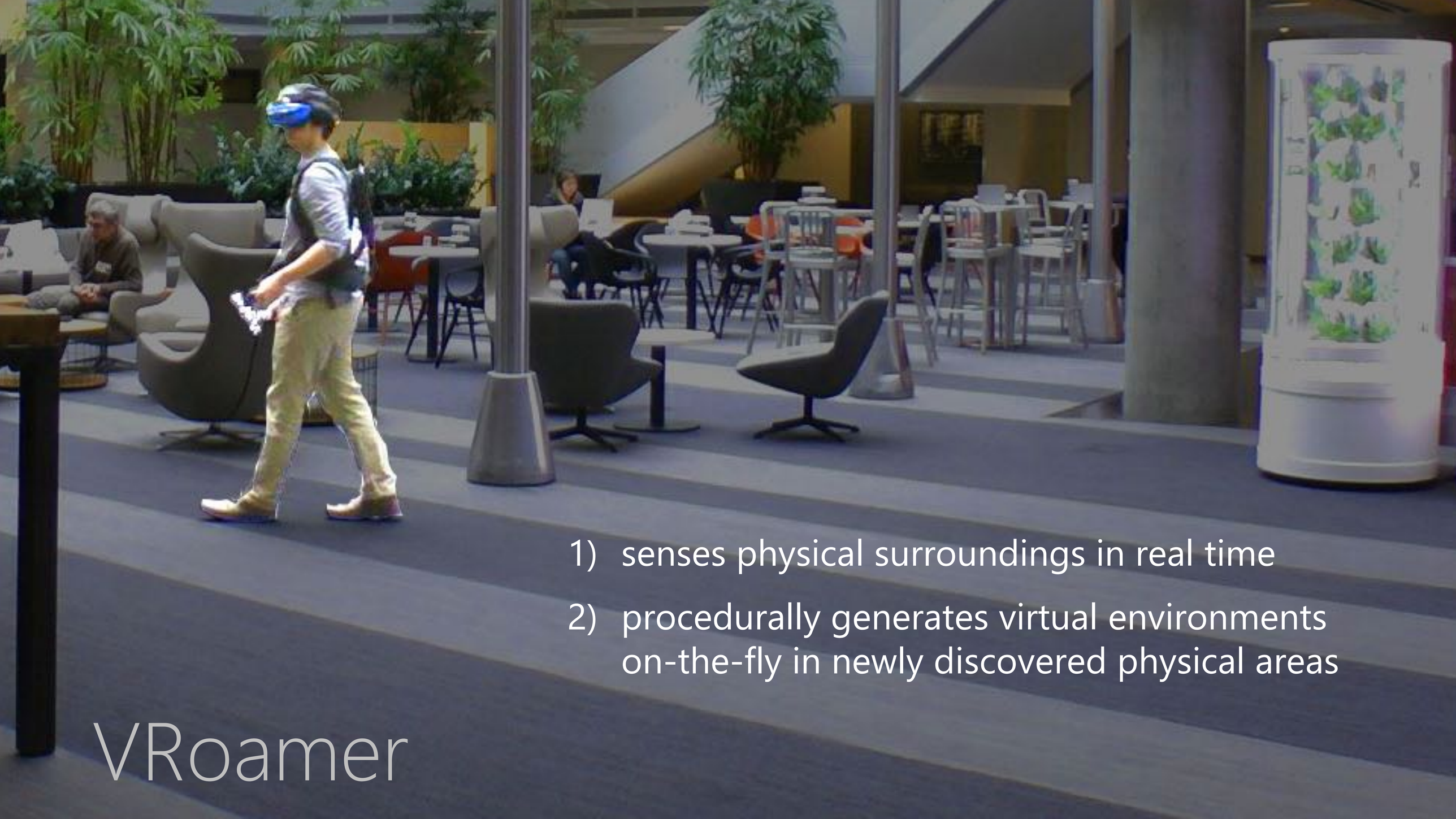
shorelining

indoor and outdoor VR scenes



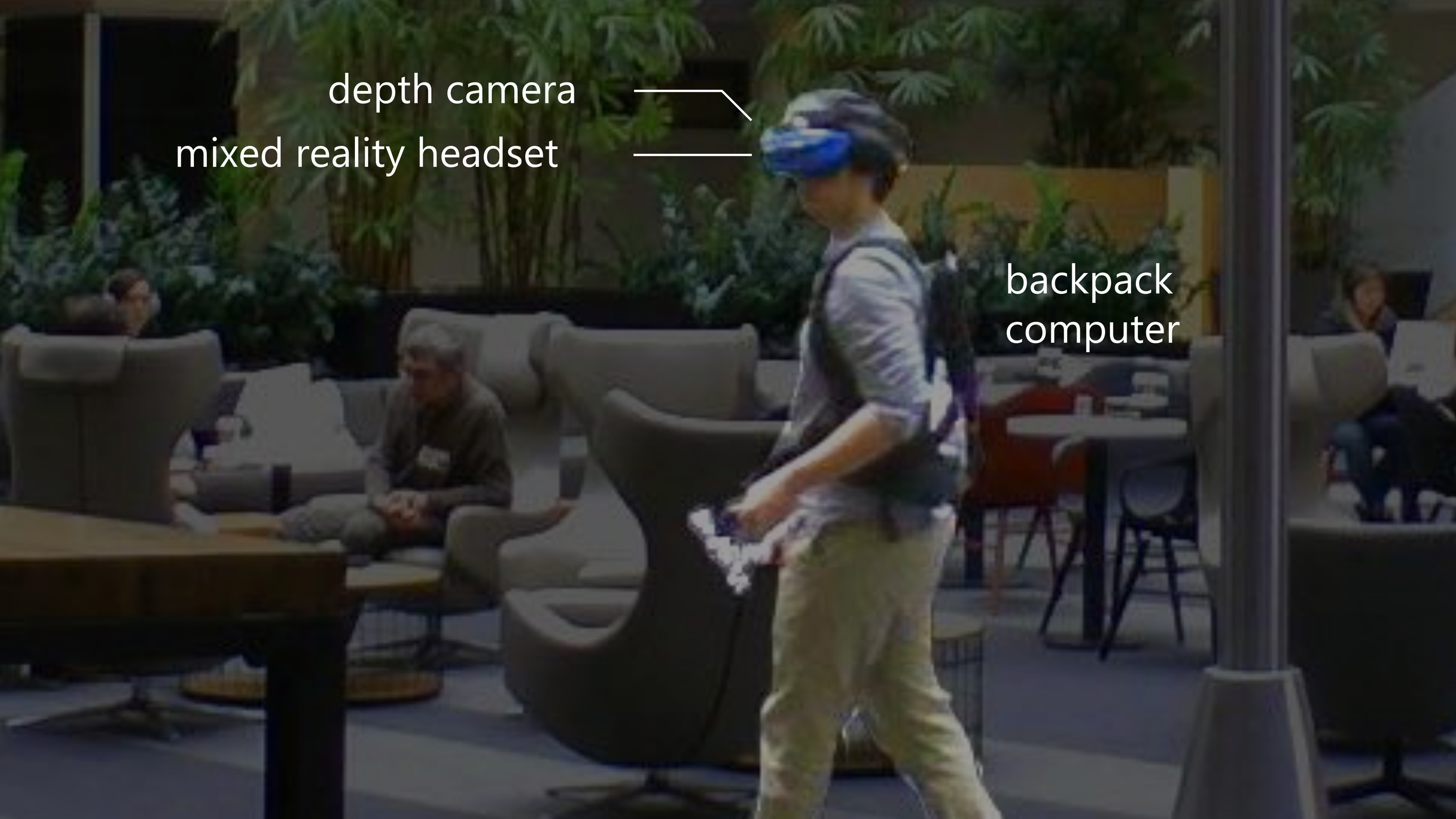


VR outside the comfort zone



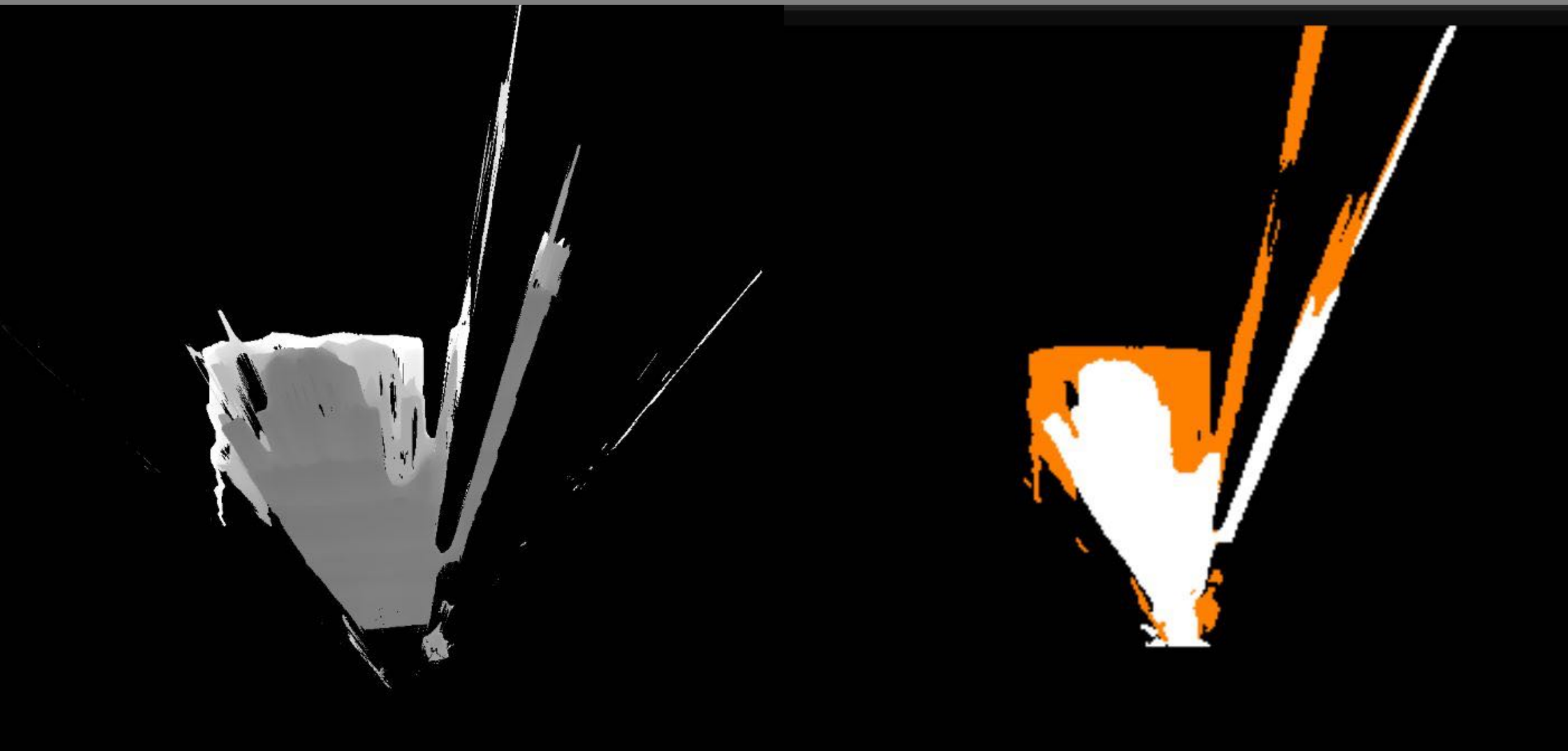
1) senses physical surroundings in real time
2) procedurally generates virtual environments on-the-fly in newly discovered physical areas

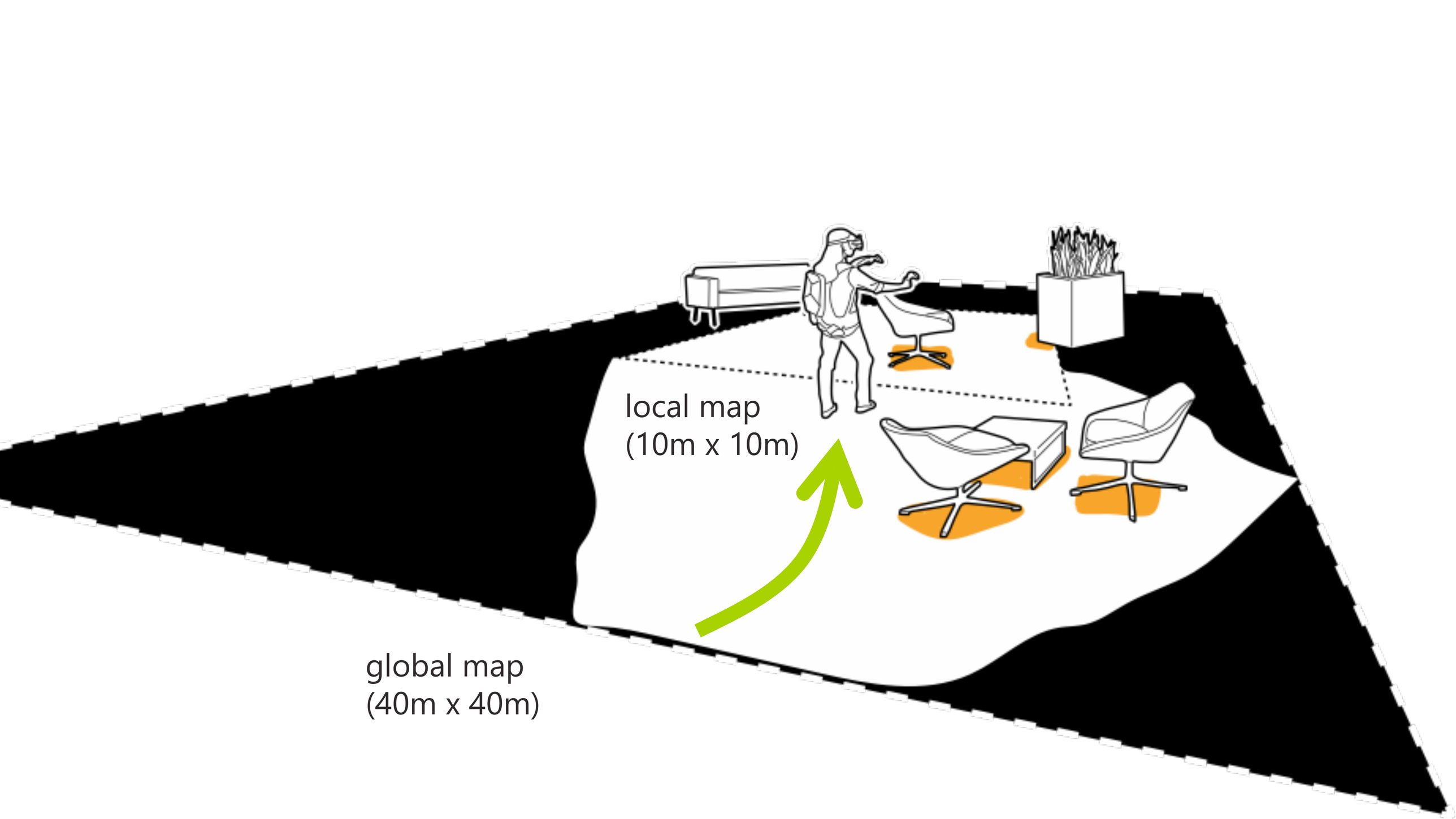
VRoamer


depth camera
mixed reality headset
backpack
computer

top view projection
(height map)

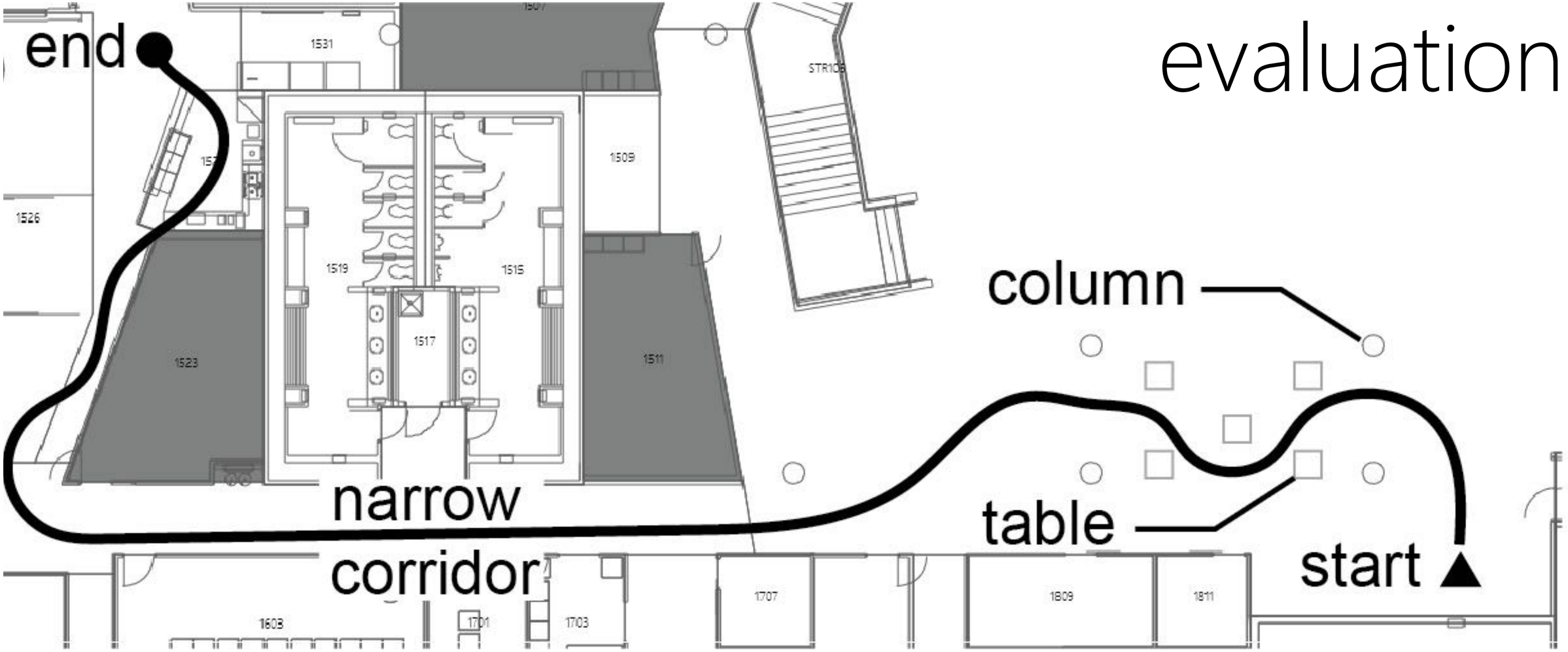
thresholding and labeling
(obstacles, floor, and unknown)




local map
(10m x 10m)
global map
(40m x 40m)

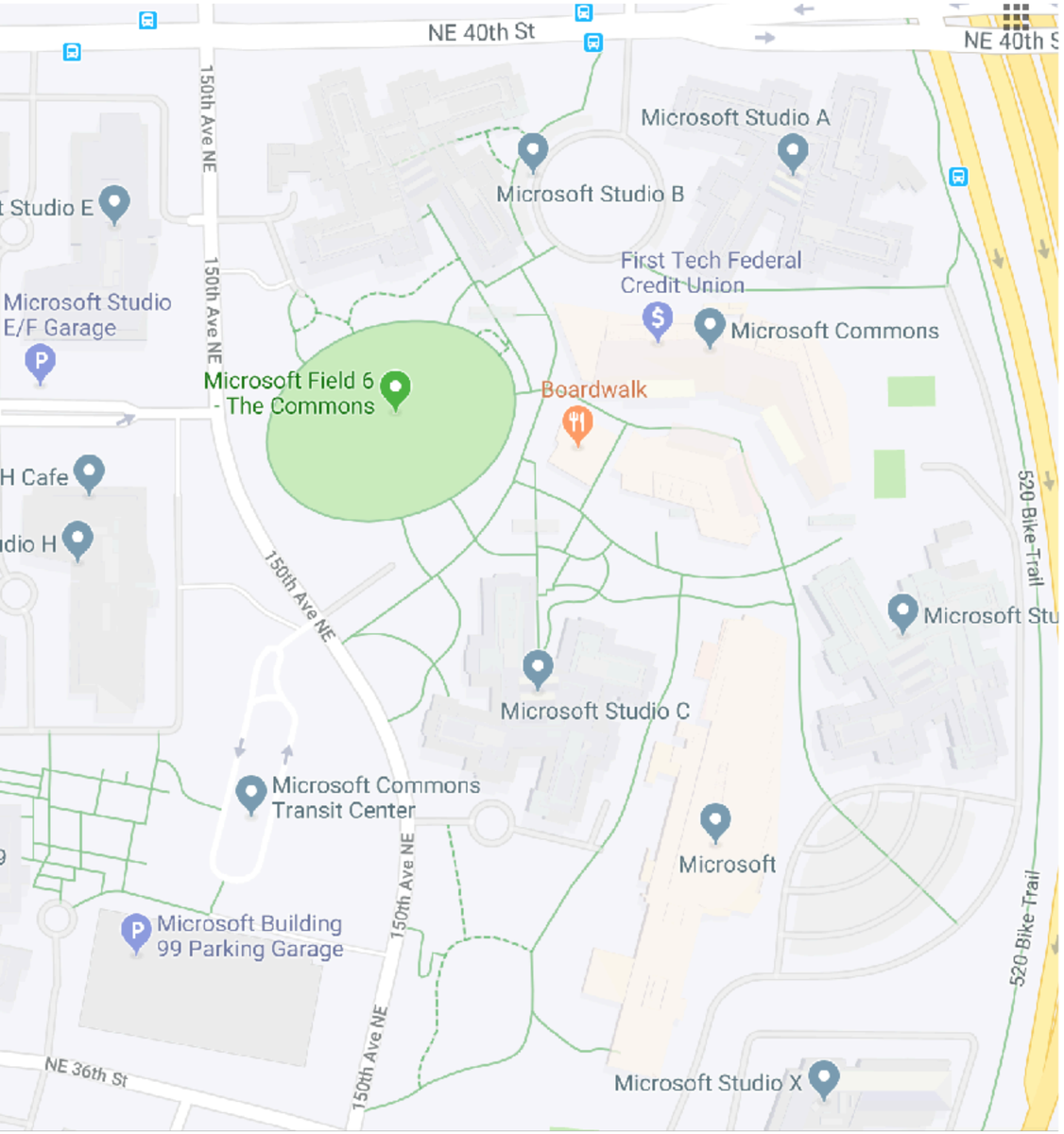
for audience reference only,
invisible to the user

evaluation


end
1531
1509
1526
1519
1515
1517
1523
1511
column
narrow
corridor
table
start
1608
1701
1703
1707
1809
1811

VR outside the comfort zone

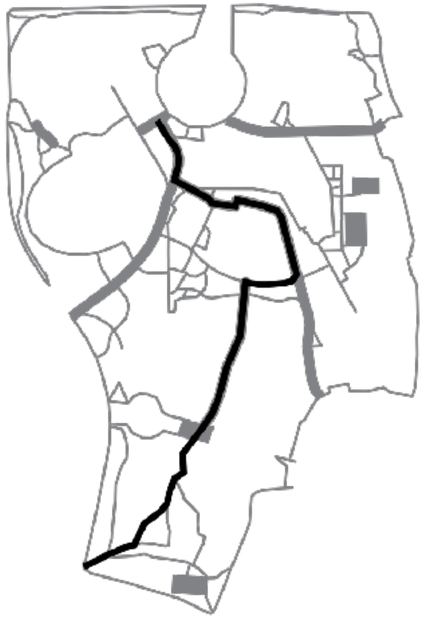
User Experience



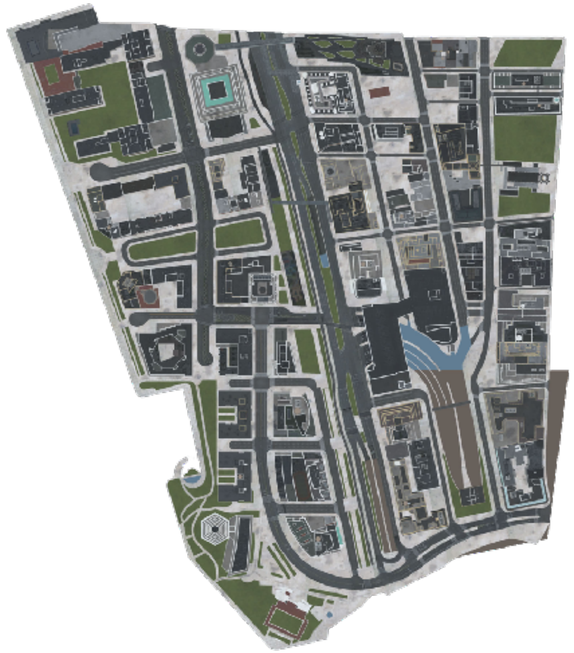
1) user selects a destination in the real world

2) route a walkable path

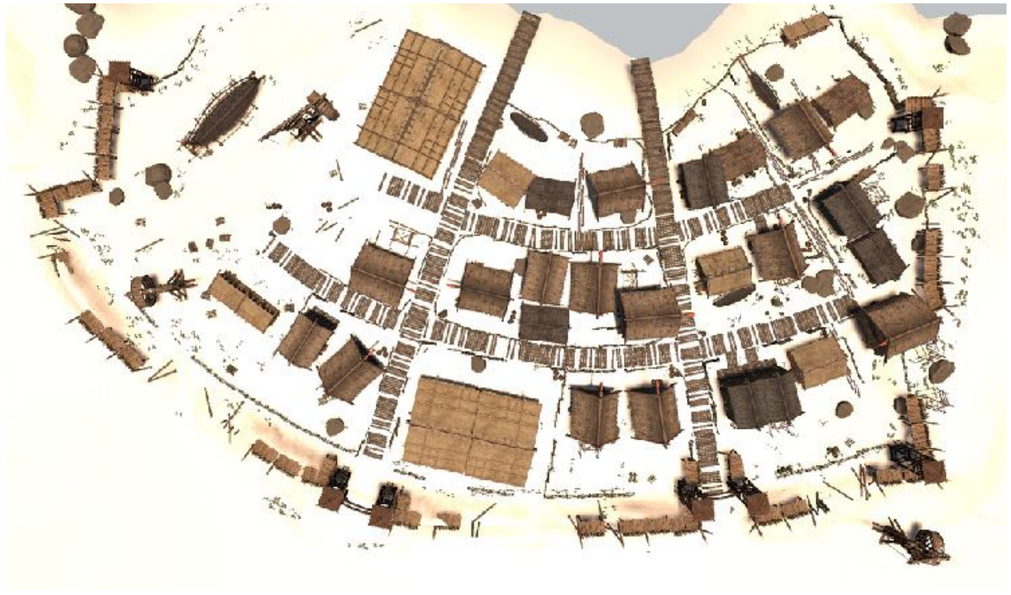
Microsoft campus



Manhattan



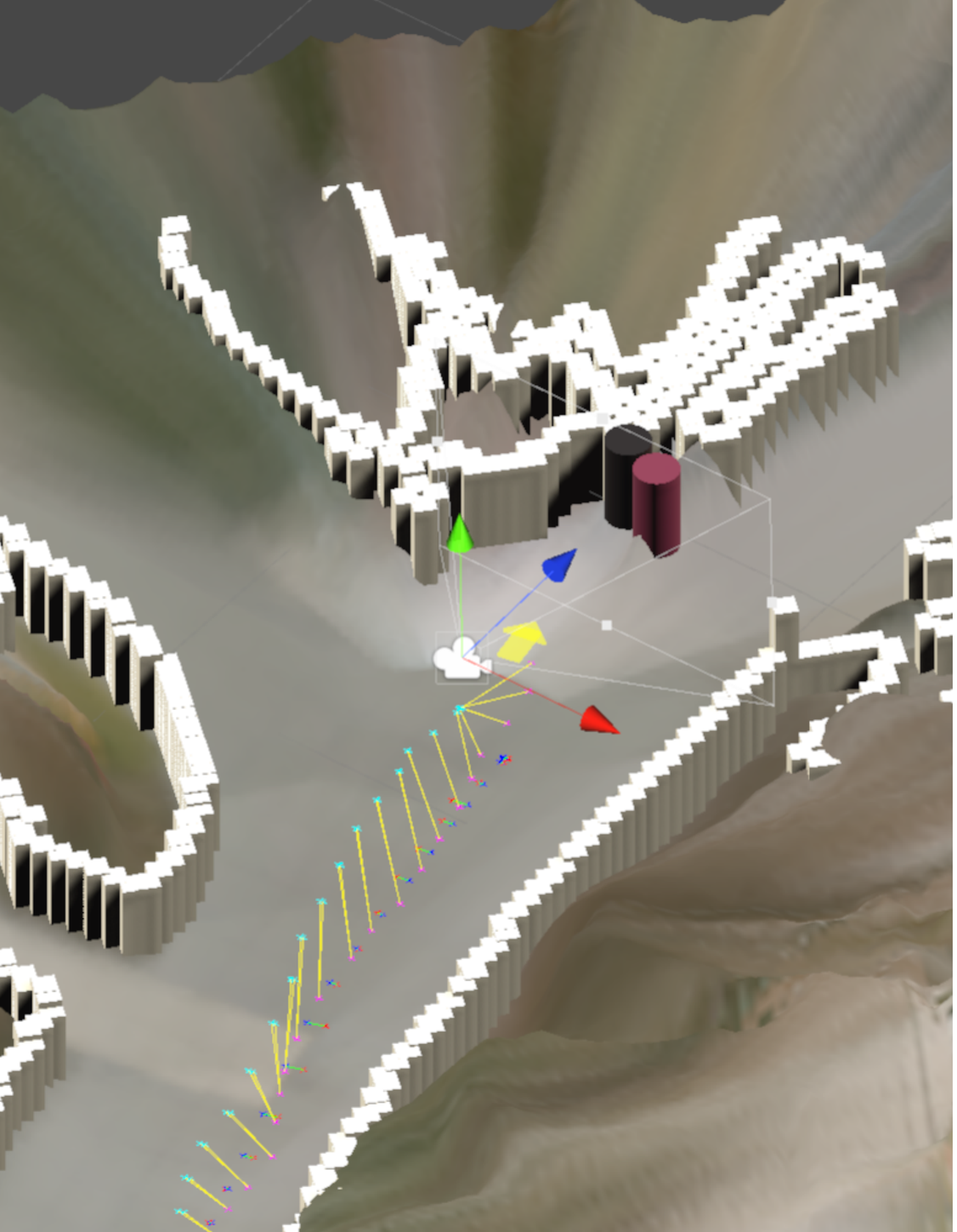
Unity Village



1) user selects a destination in the real world

2) route a walkable path

3) map a route in a virtual world



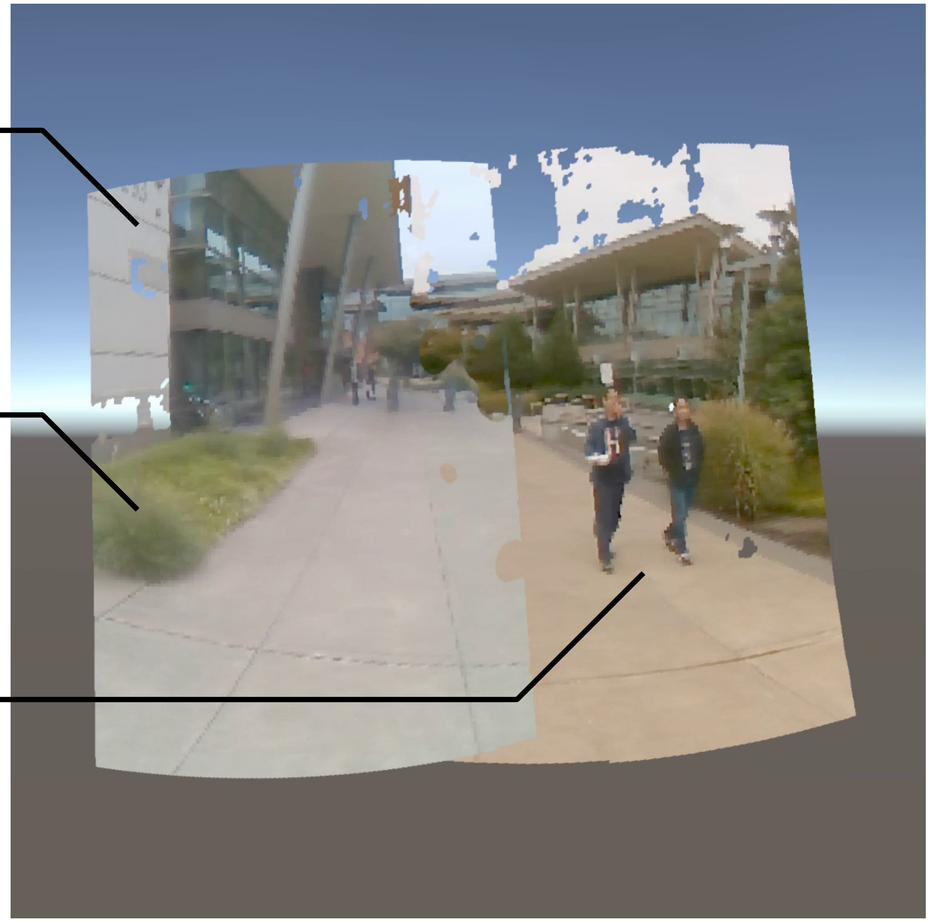
1) user selects a destination in the real world

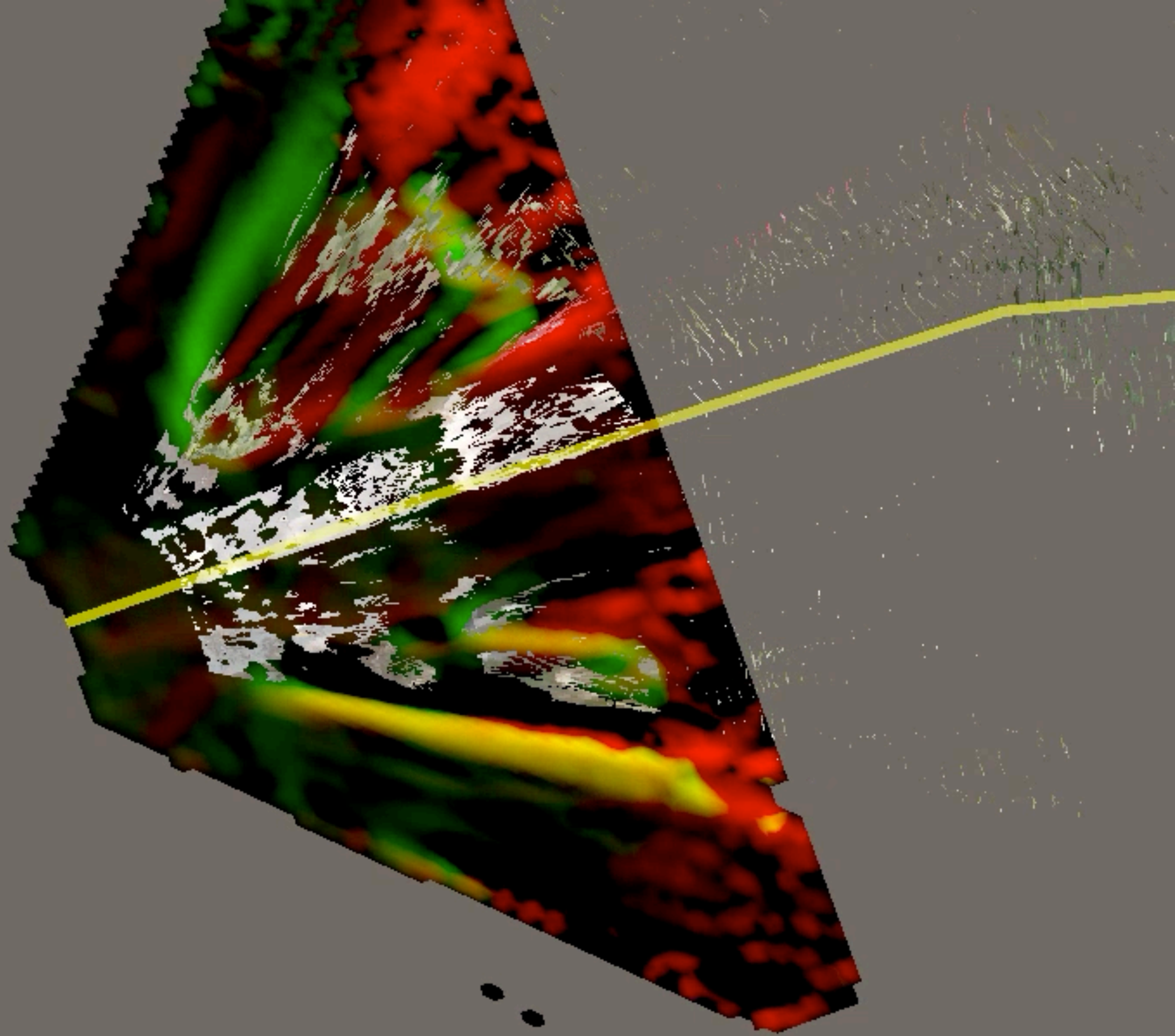
2) route a walkable path

3) map a route in a virtual world

4) navigate through VR and prevent collisions

map geometry + RGBD sensor





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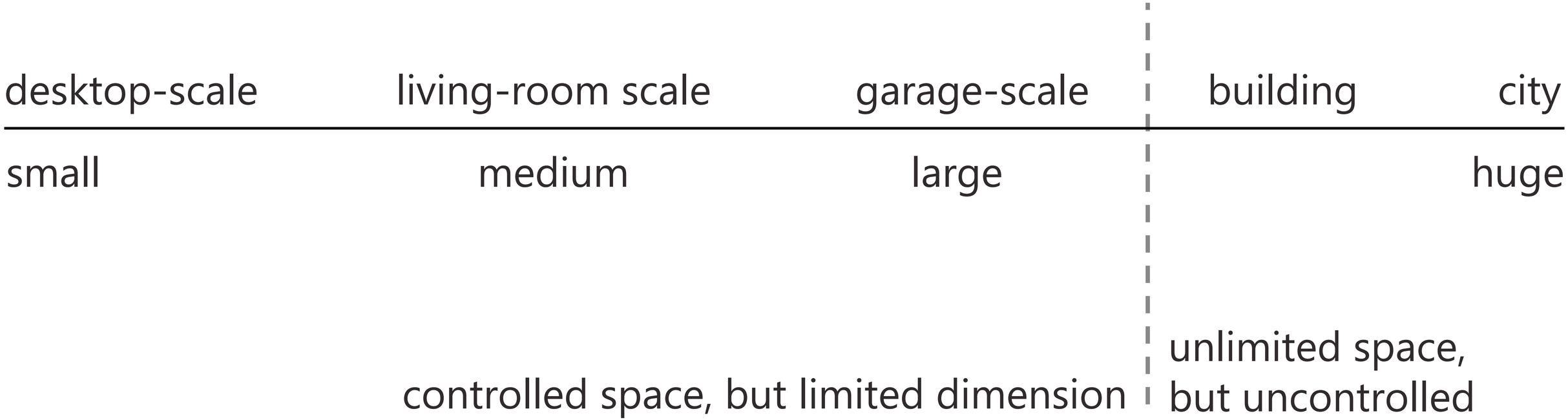

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