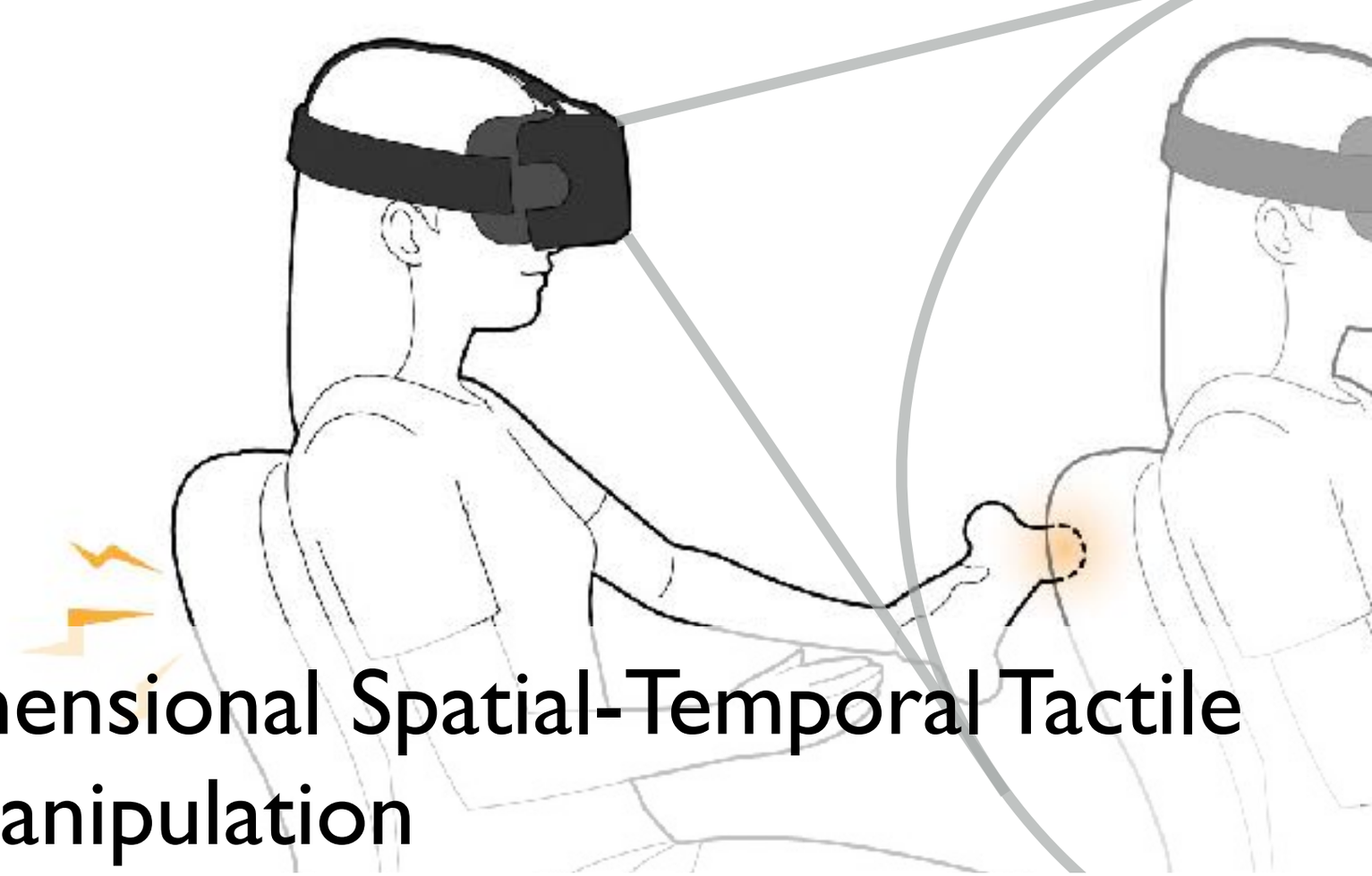
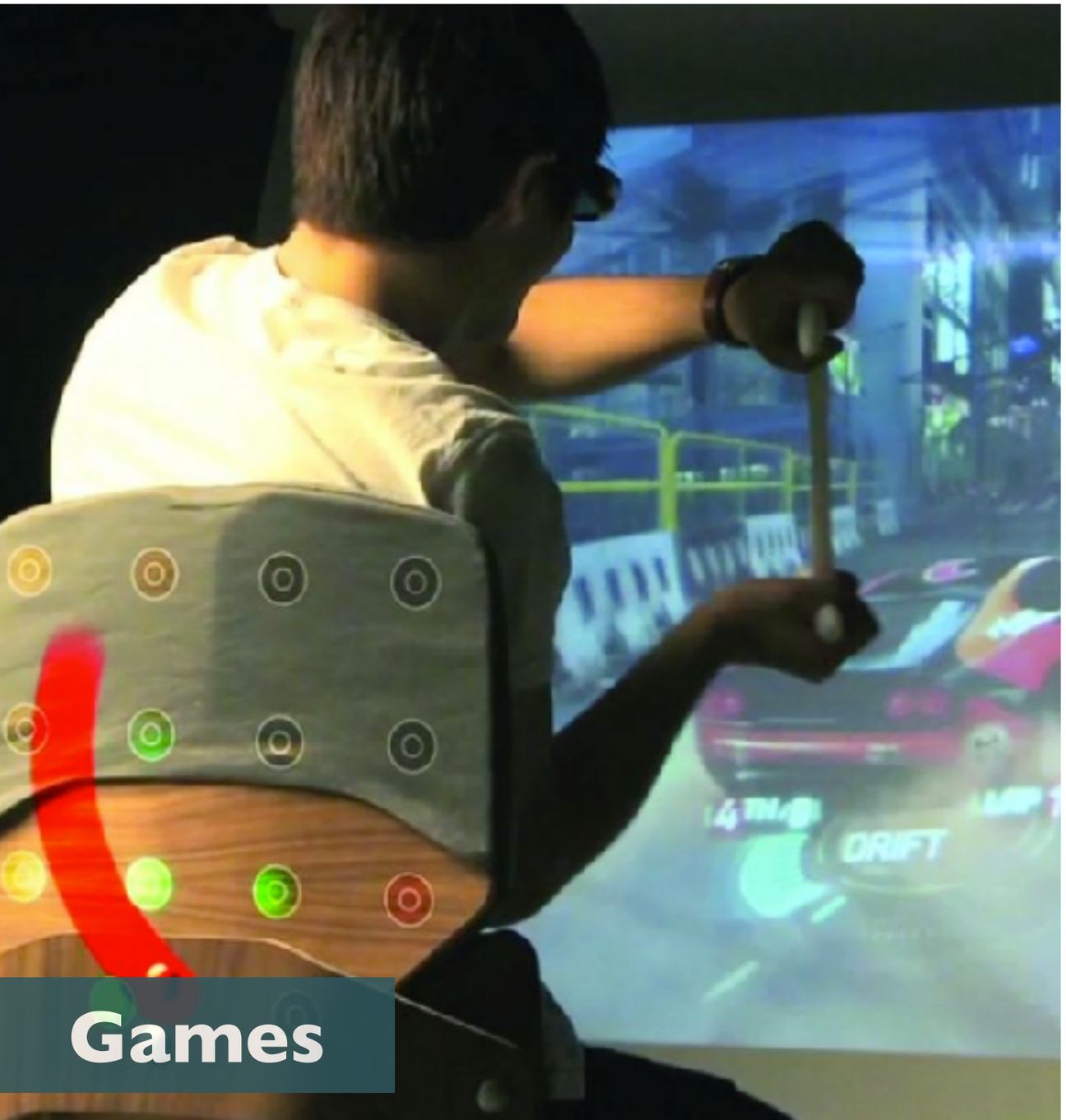


VibroPlay:
Authoring Three-Dimensional Spatial-Temporal Tactile Effects with Direct Manipulation

Da-Yuan Huang
Liwei Chan
Xiao-Feng Jian
Chiun-Yao Chang
Mu-Hsuan Chen
De-Nian Yang
Yi-Ping Hung
Bing-Yu Chen

Vibrotactile patterns can enhance the immersion of multimedia contents



Games

Videos

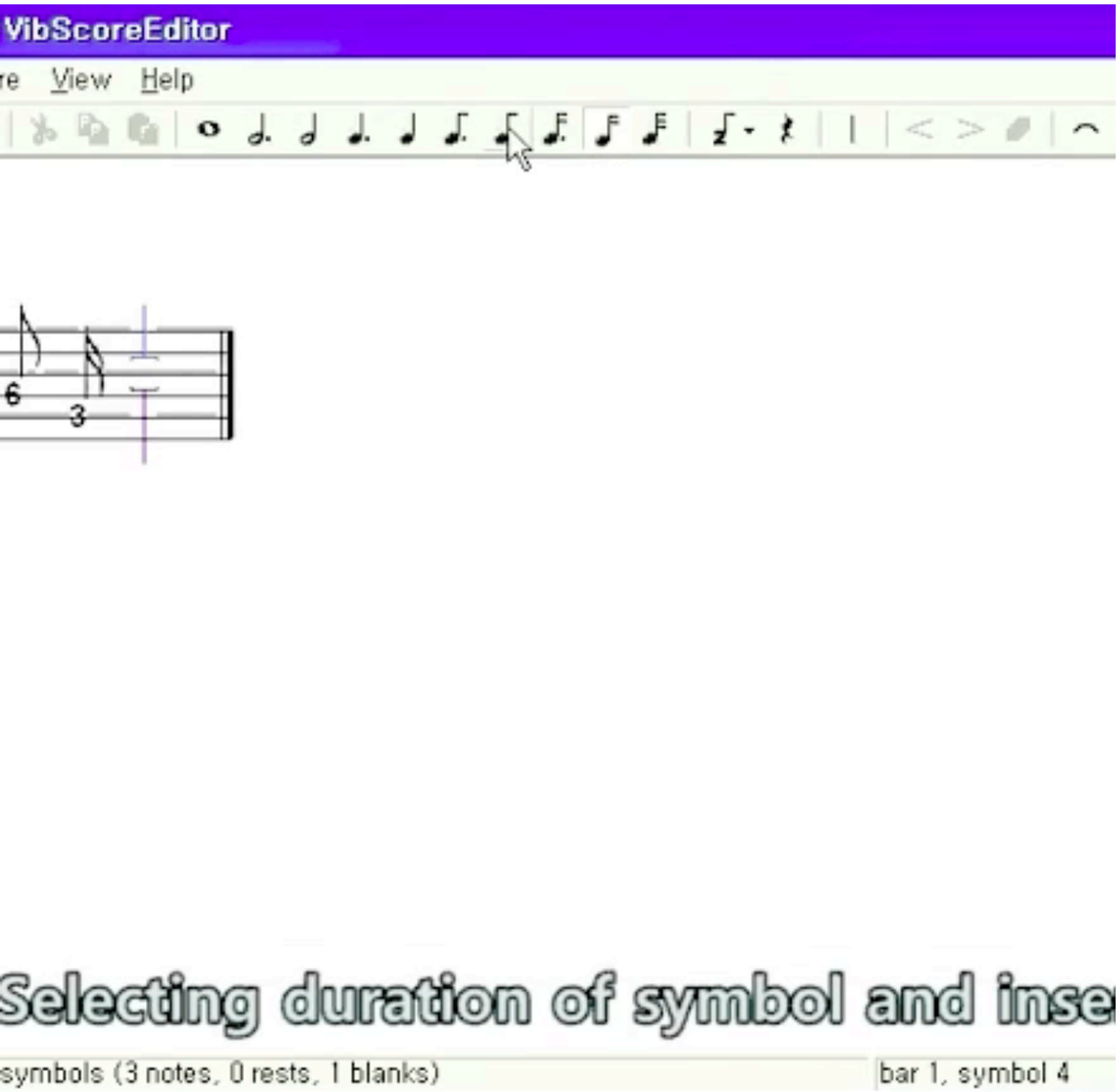
A common practice is to deploy actuators on users or physical objects

Along with the content, these actuators implement vibrotactile effects

To facilitate the design of vibrotactile effect, an authoring system is essential.

Related Work

Authoring Tools for Tactile Effects



[Vibrotactile Score, Lee et al., IEEE Haptics '09]

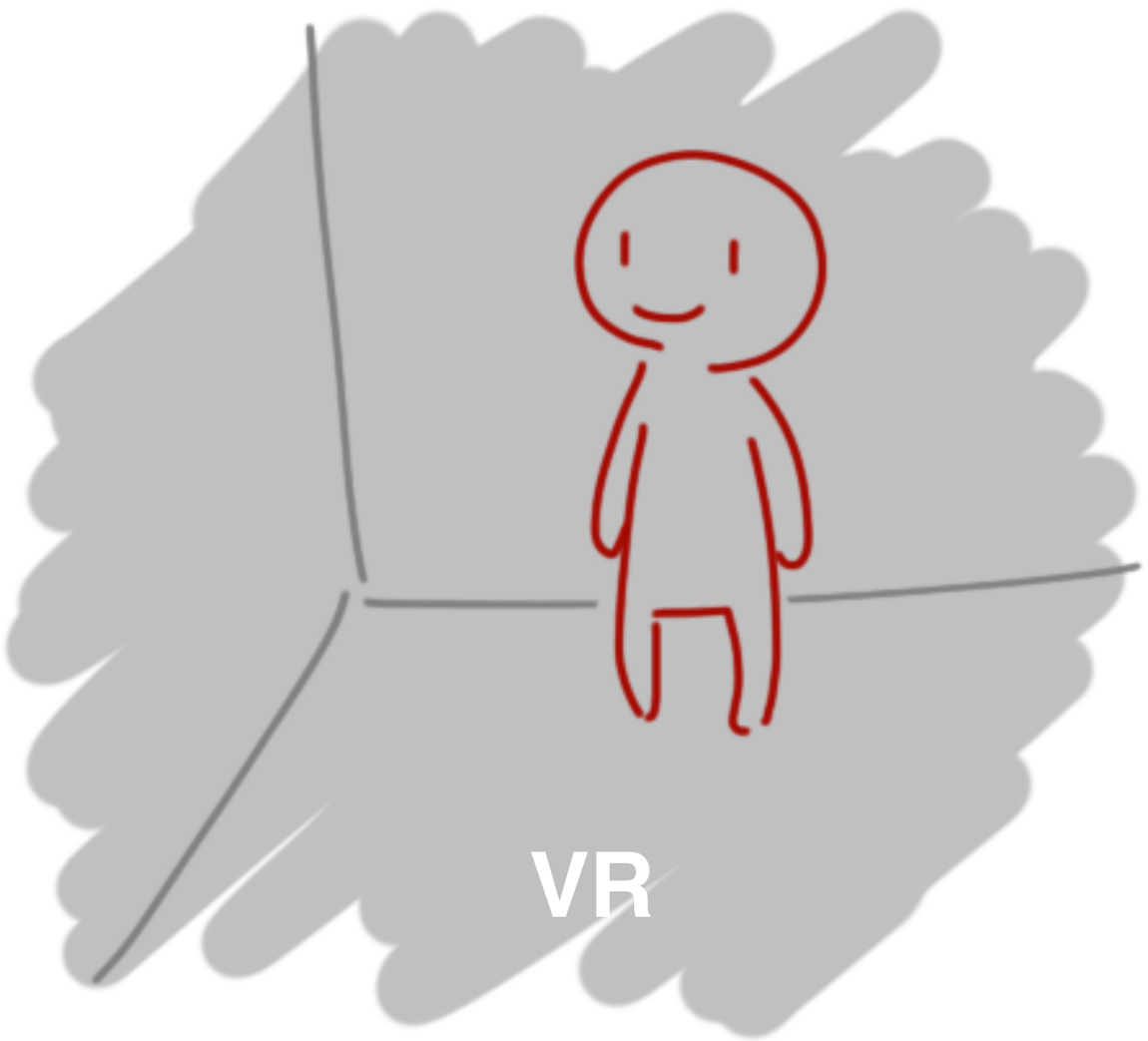
[Schneider et al., UIST '15]

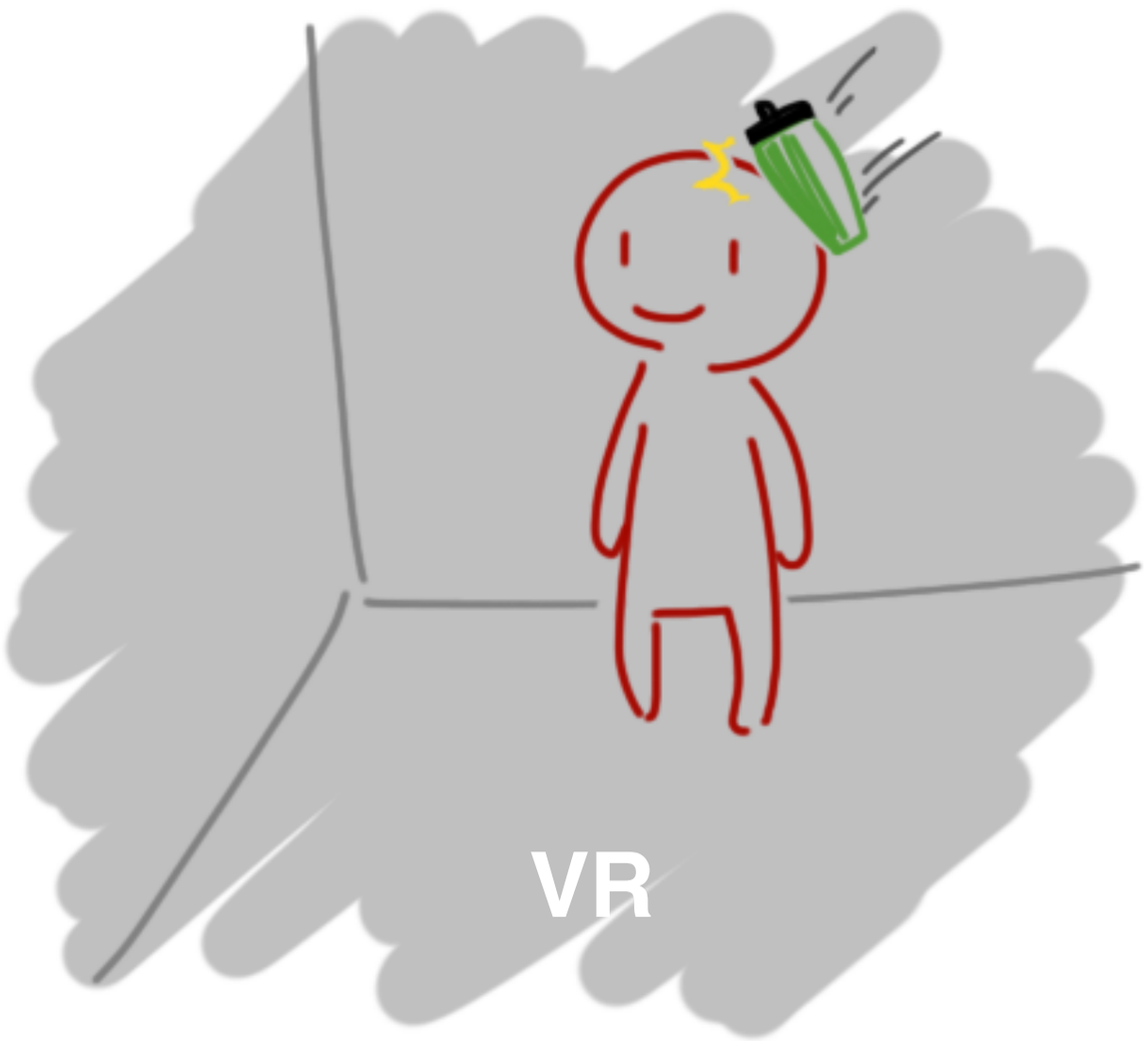
Problems of previous works

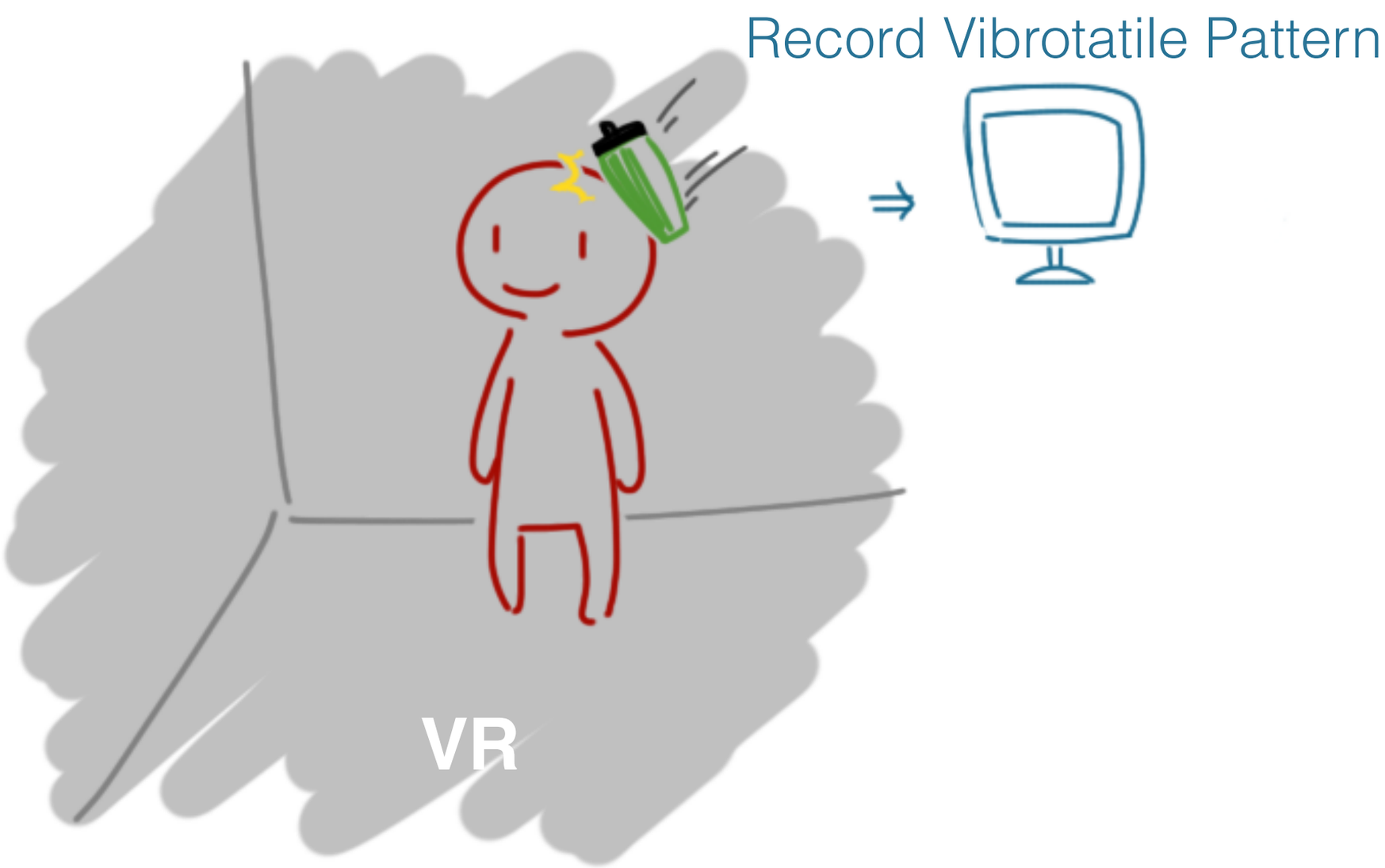
Low-level authoring tools :
require professional domain knowledge

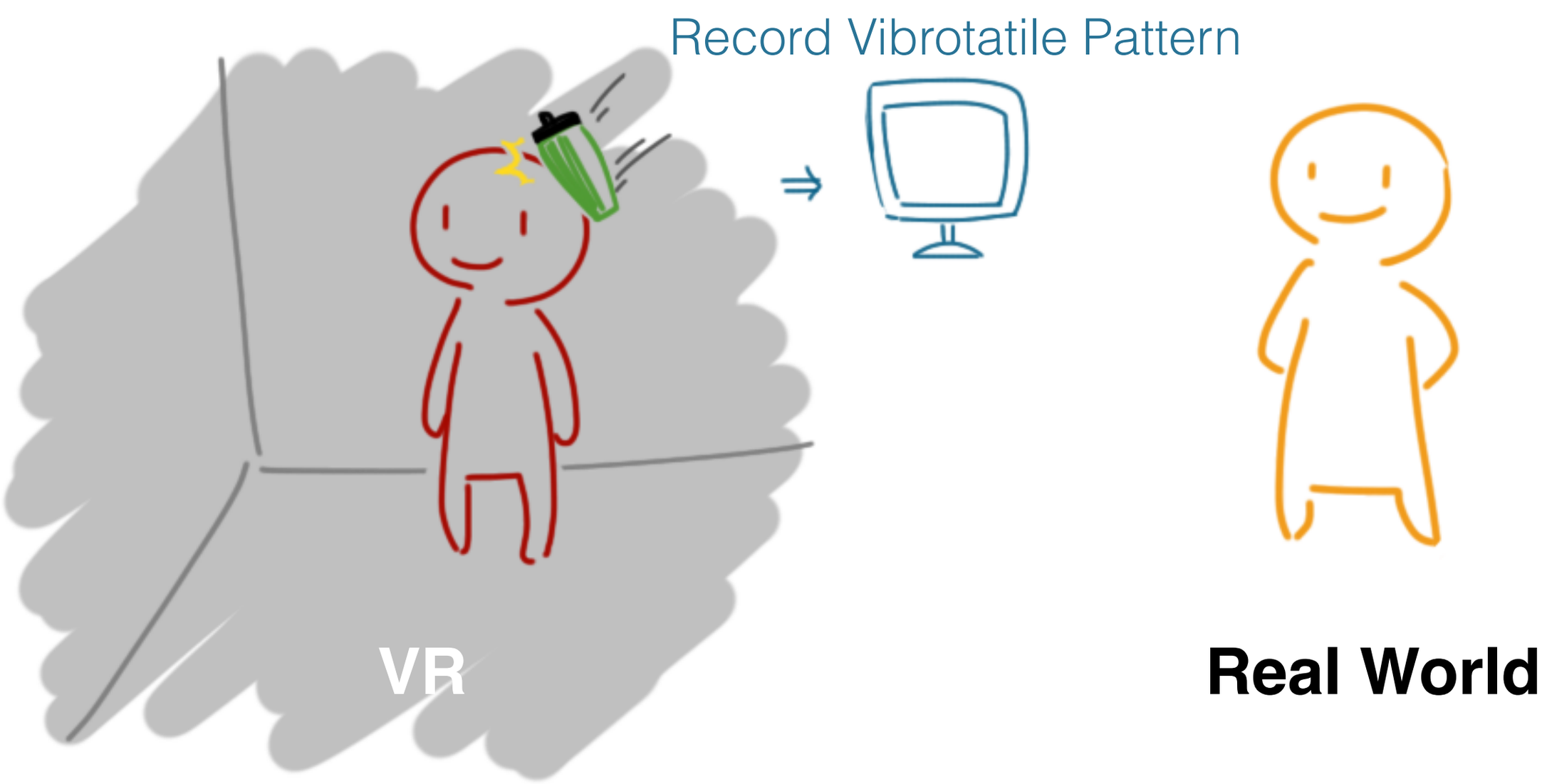
High-level authoring tools :
difficult to author 3D effects in 2D interfaces

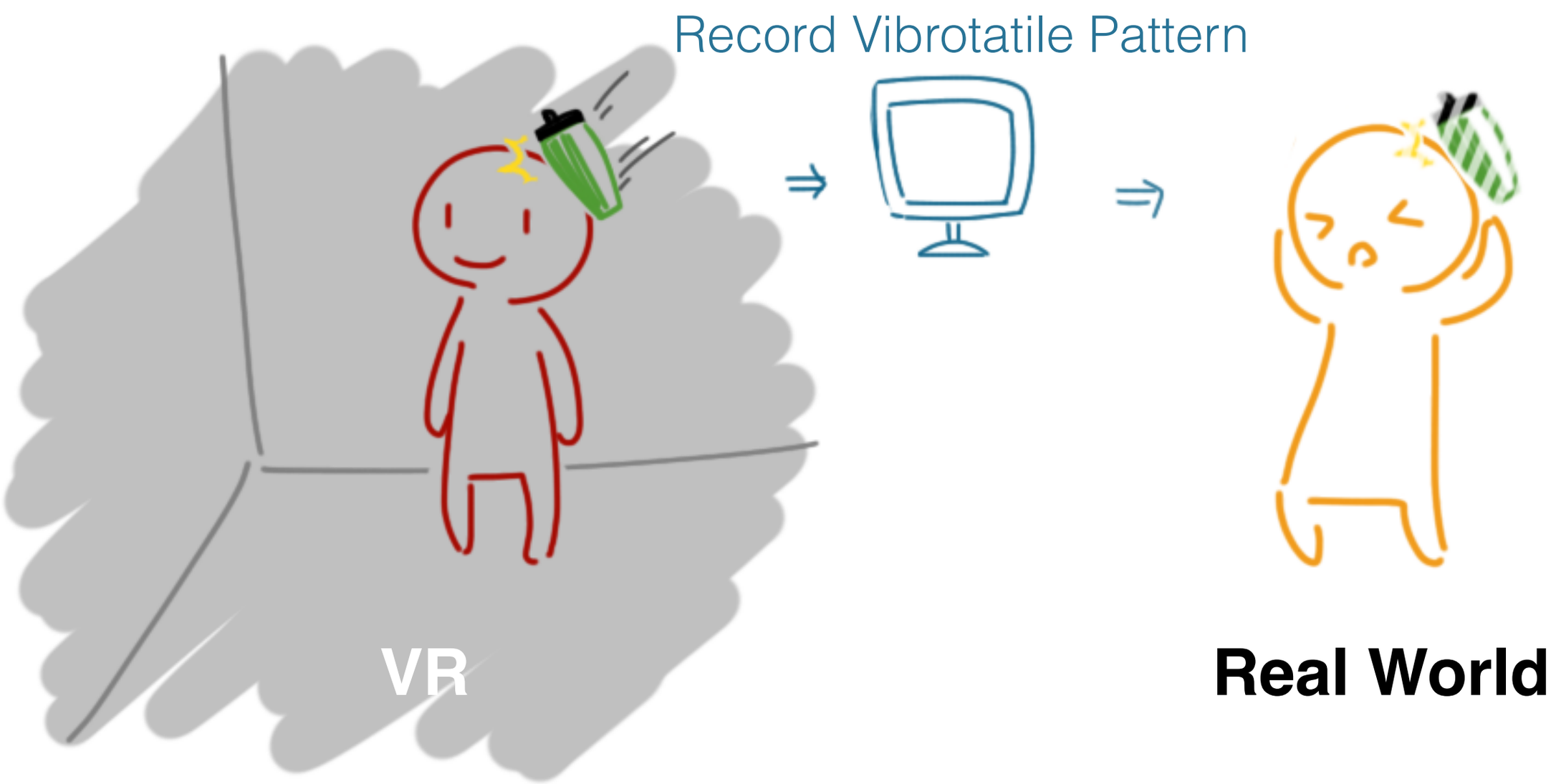
How about authoring in 3D environment?


VR


VR


Record Vibrotatile Pattern
VR


Record Vibrotatile Pattern
VR
Real World


Record Vibrotatile Pattern
VR
Real World

Introduction

Benefits of VibroPlay

1. Three-dimensional authoring space

2. Virtual reality view with physical objects

3. Direct manipulation

4. Spatial-temporal authoring manner

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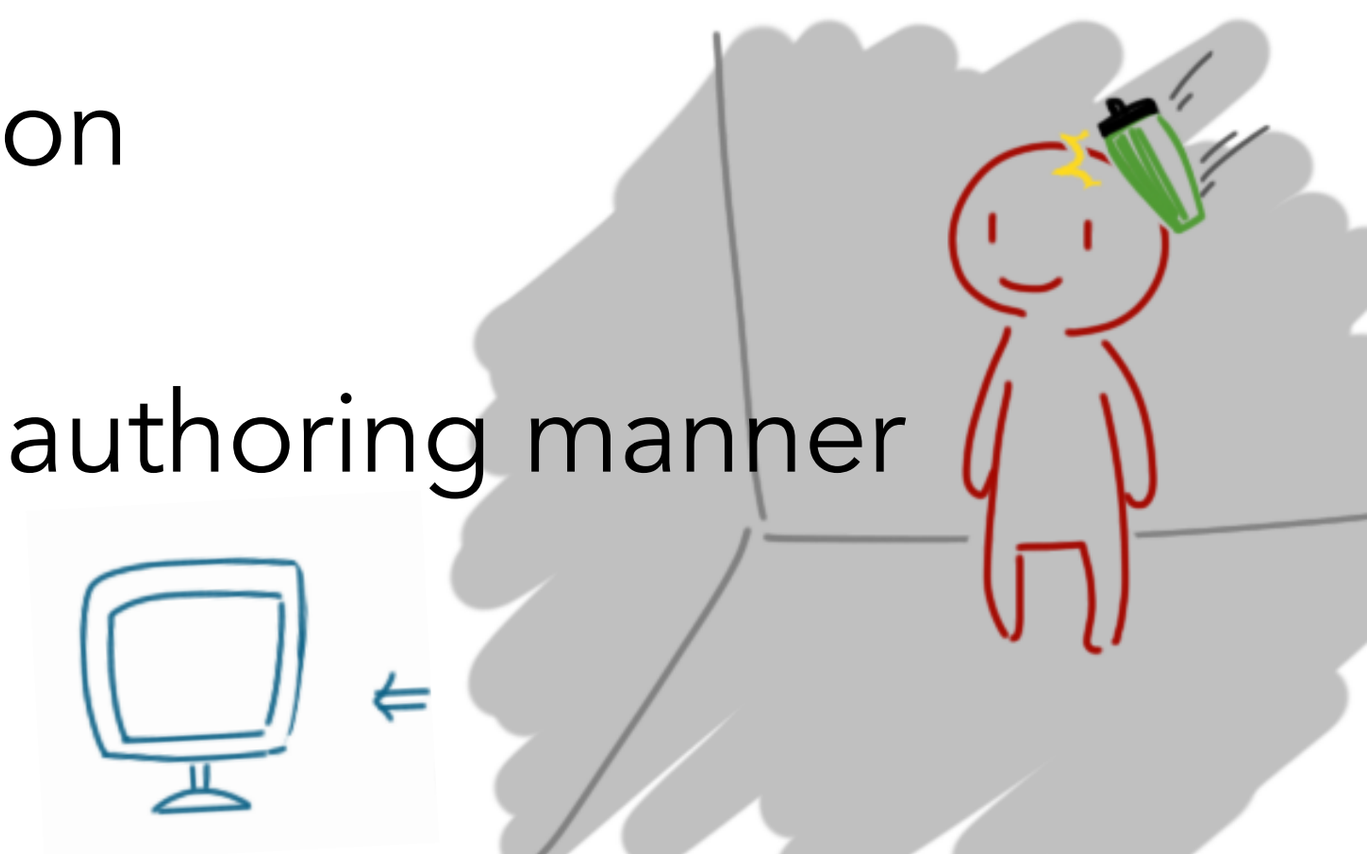


Implementation

Hardware Design

Intel RealSense

HTC VIVE

Hardware Design

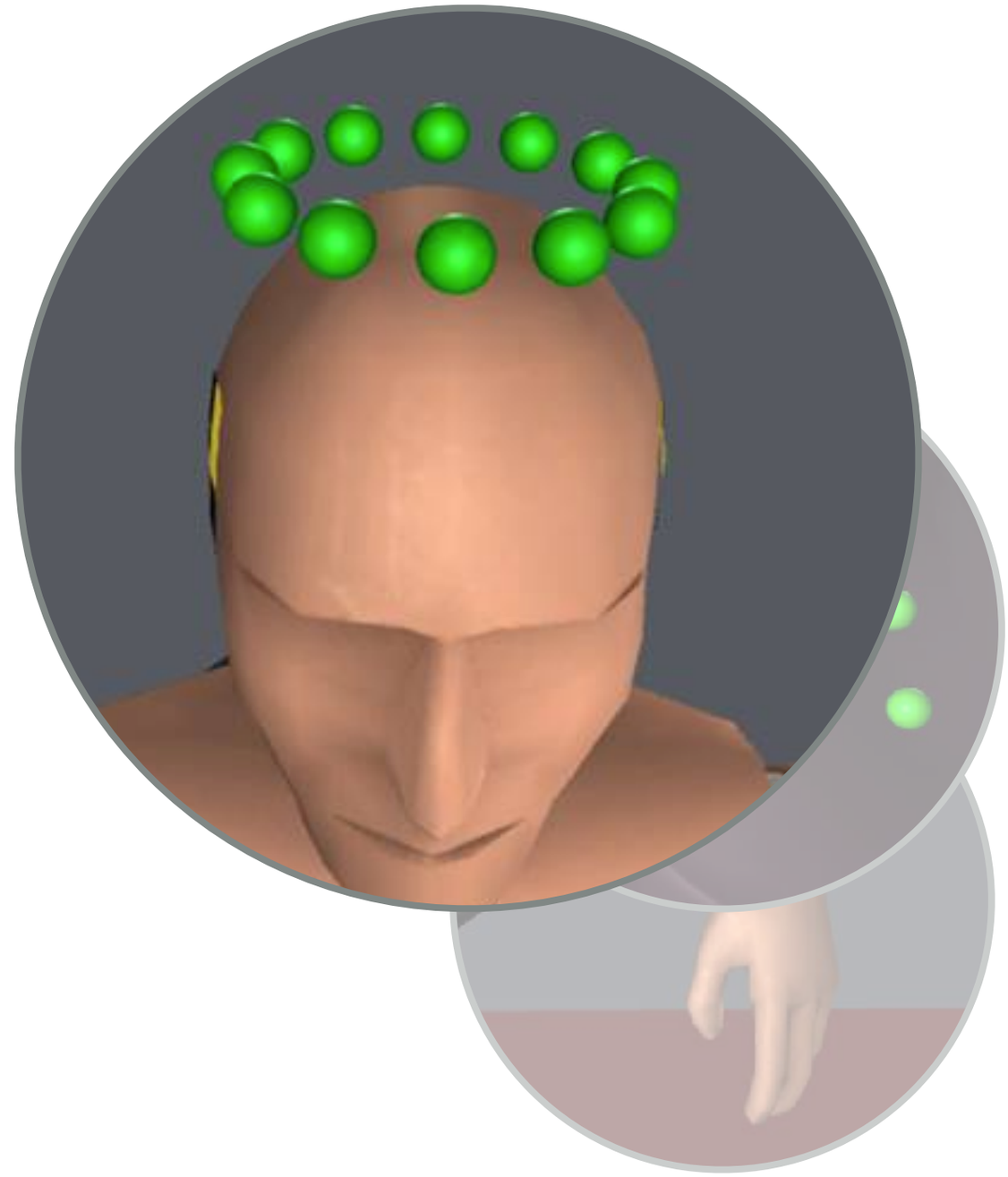
Pico Vibe 310-103
motor vibrators array

See-yourself interface

Physical Space

Virtual Space

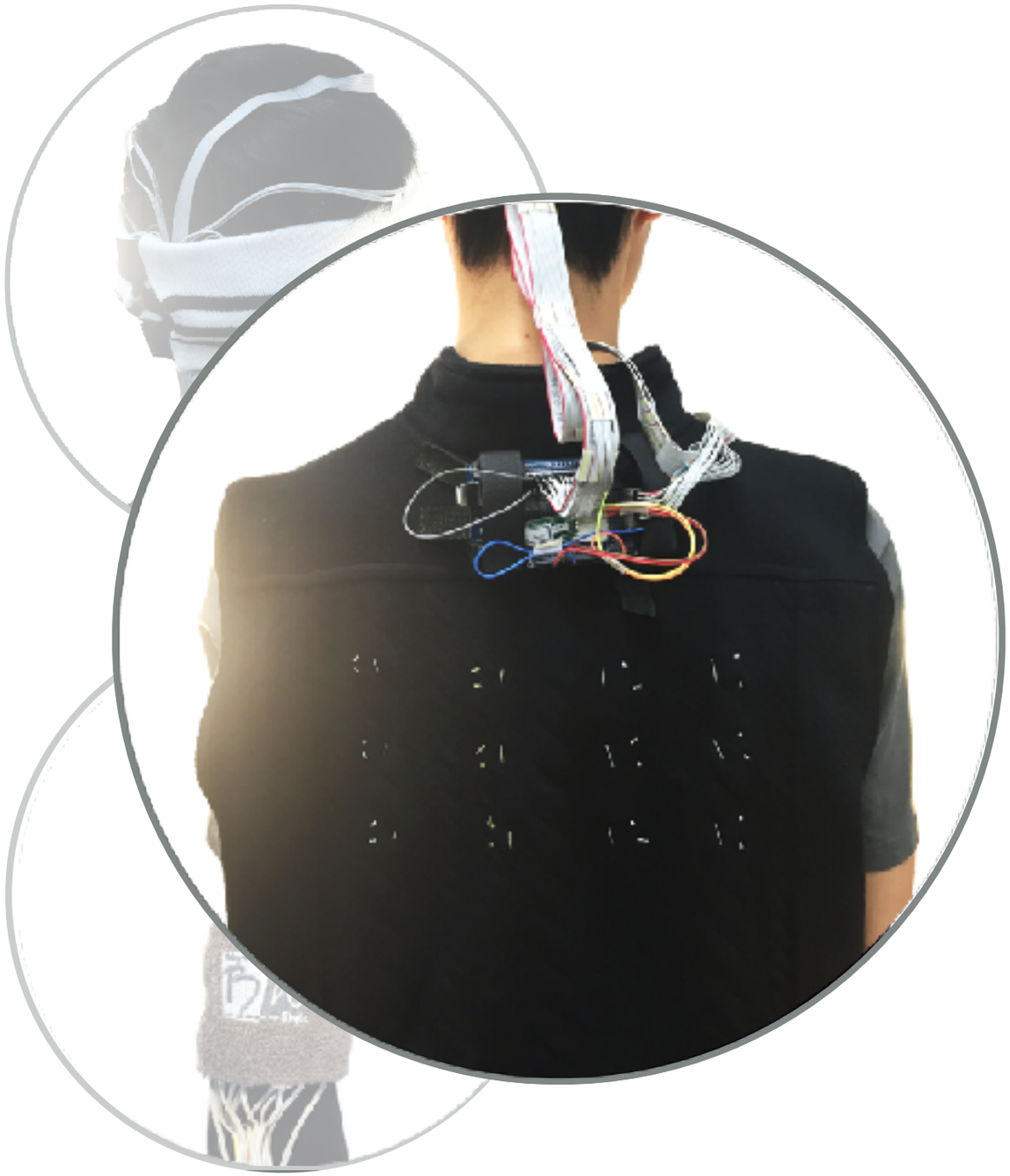
See Yourself vibrotactile interfaces

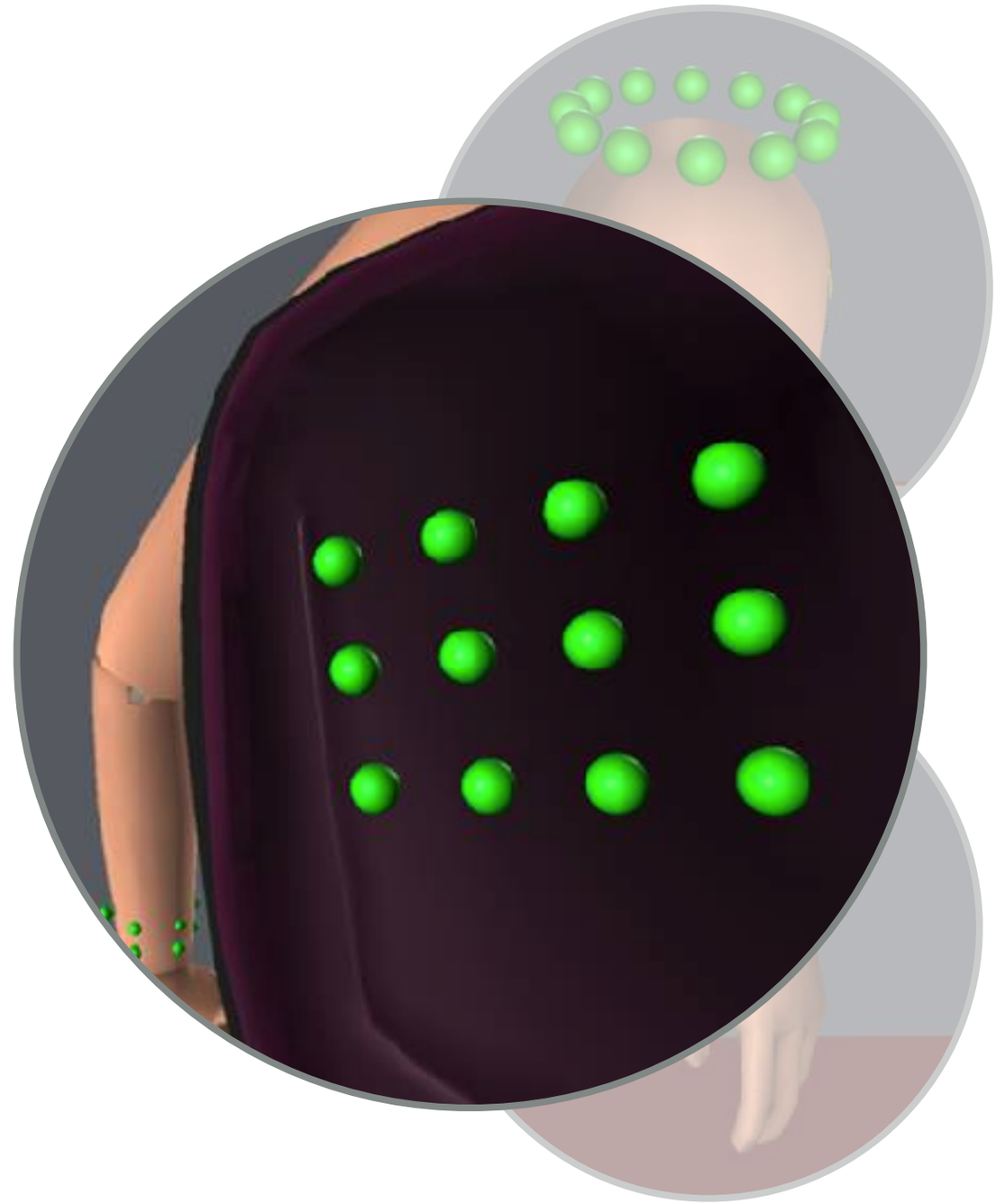


Physical Space

Virtual Space

See Yourself vibrotactile interfaces



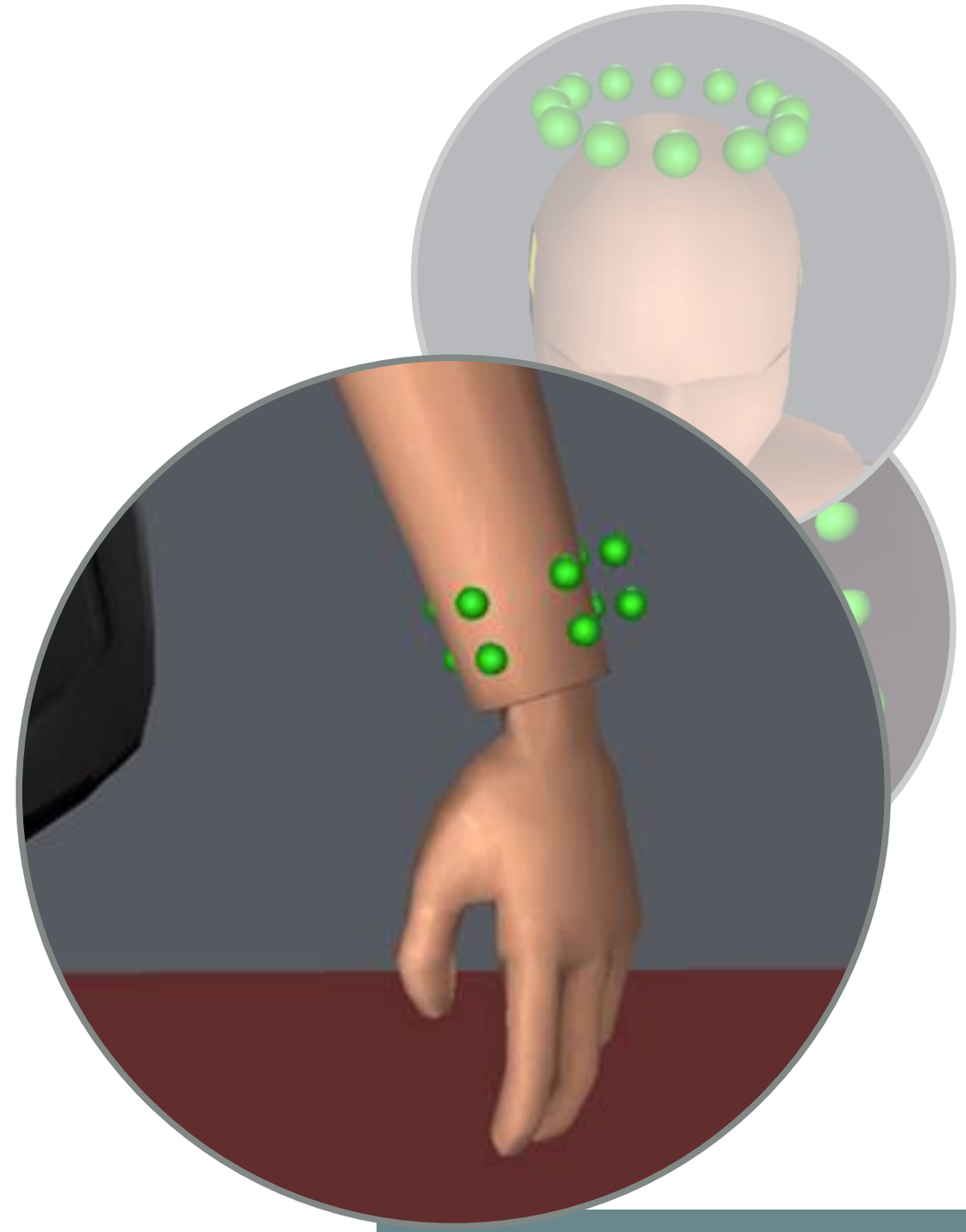


Physical Space

Virtual Space

See Yourself vibrotactile interfaces

Physical Space



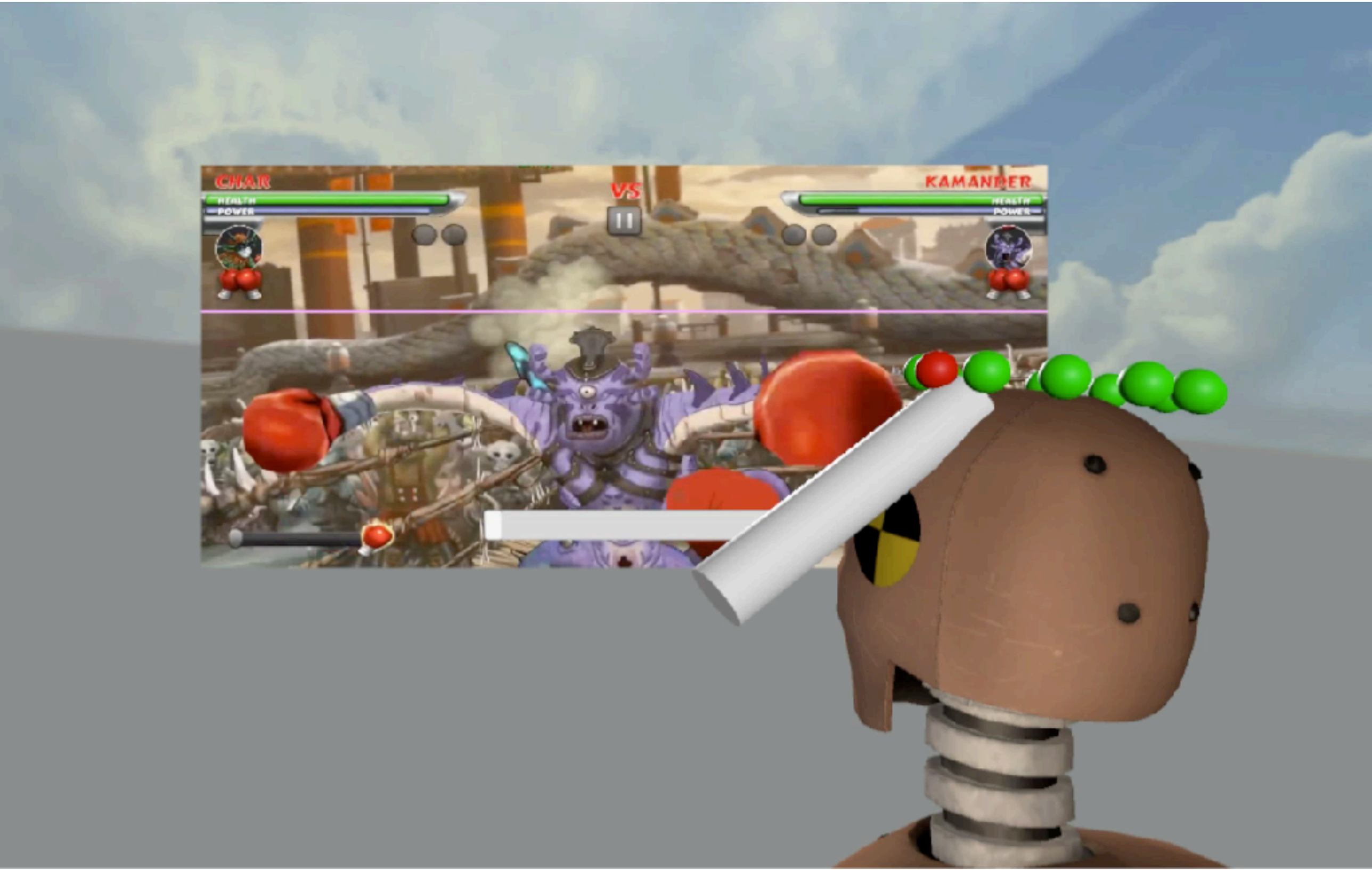
Virtual Space

Using Physical Objects

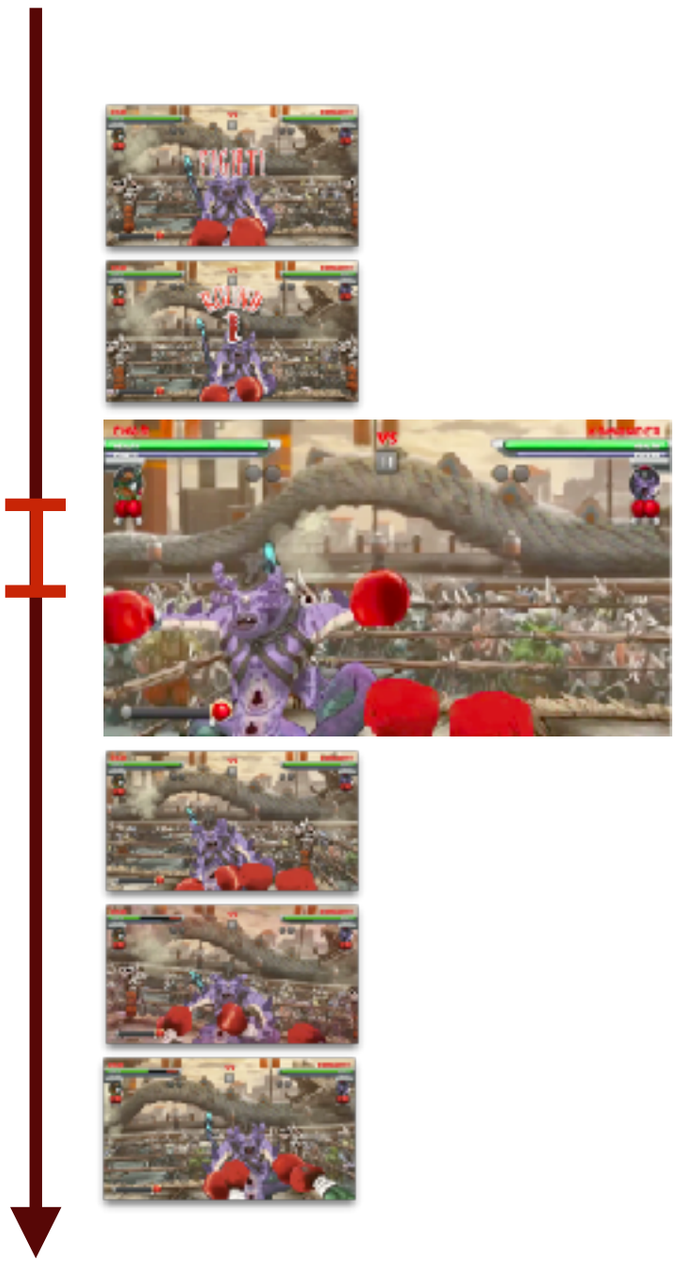
Selecting Virtual Objects

Using Virtual Objects

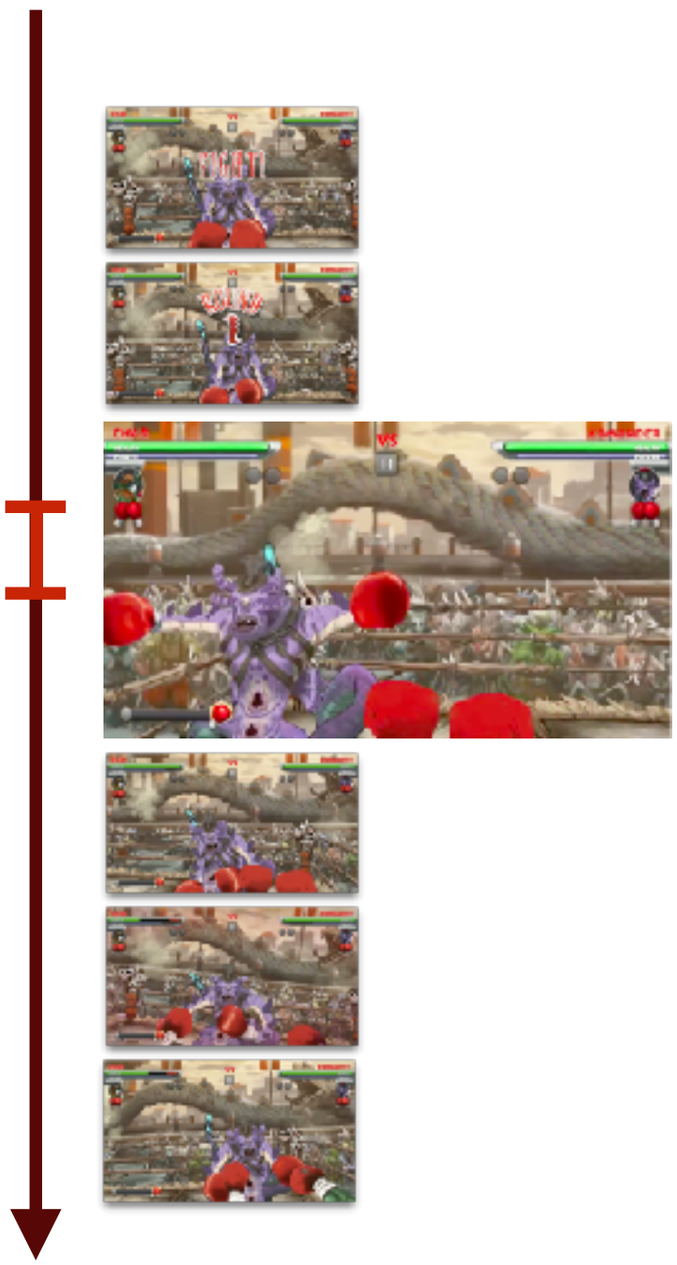
Interface

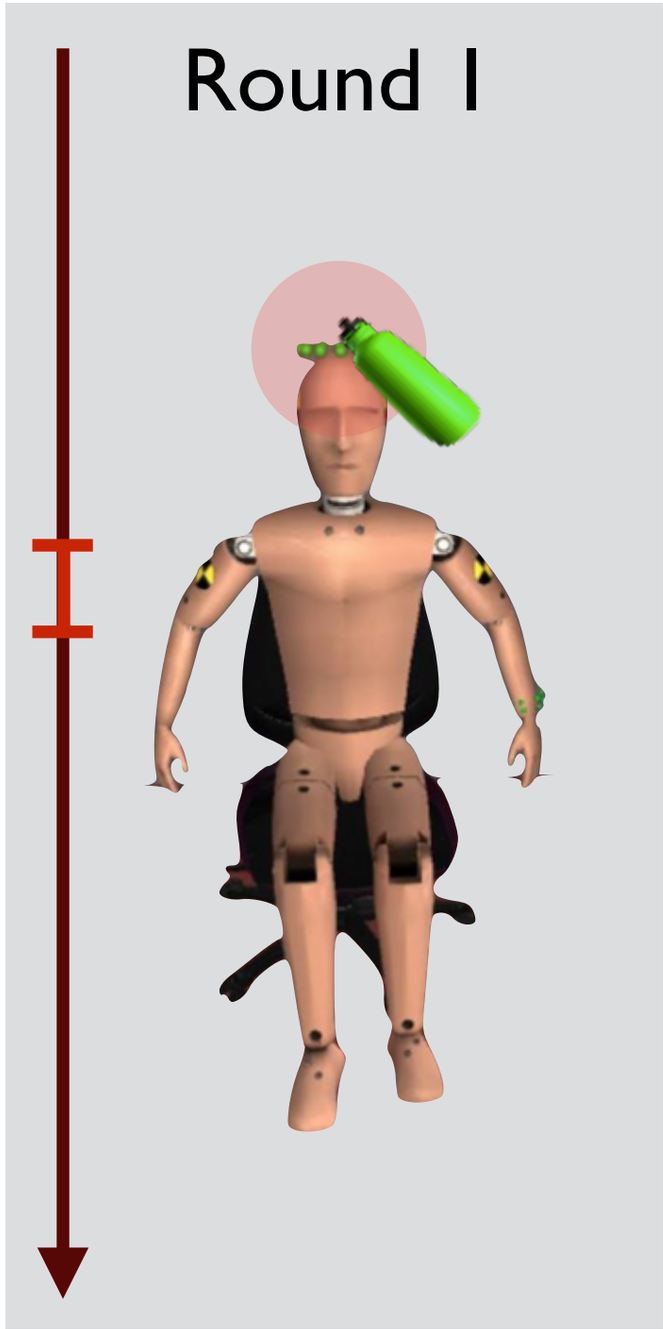


Mixing Loop



Mixing Loop





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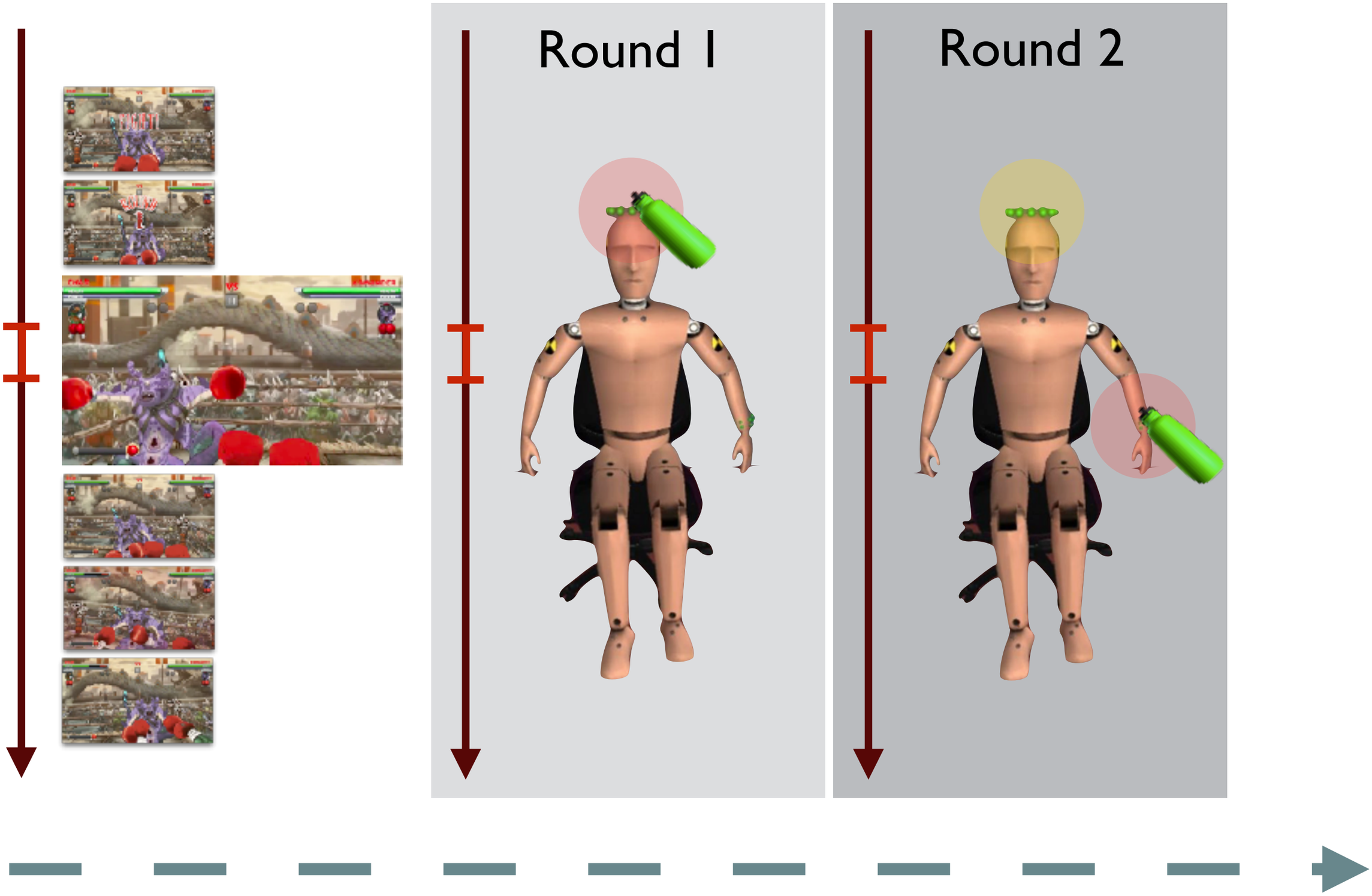

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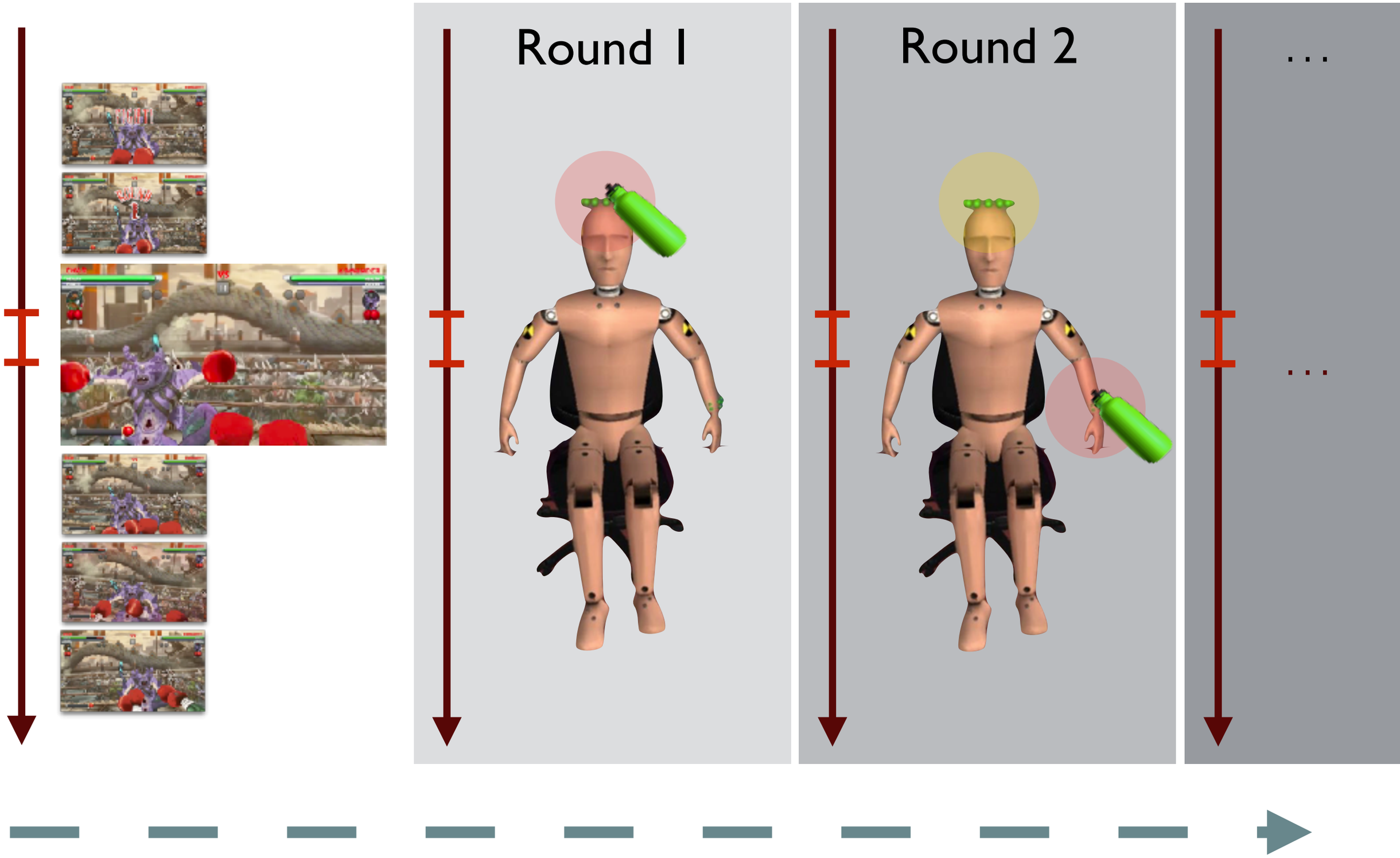
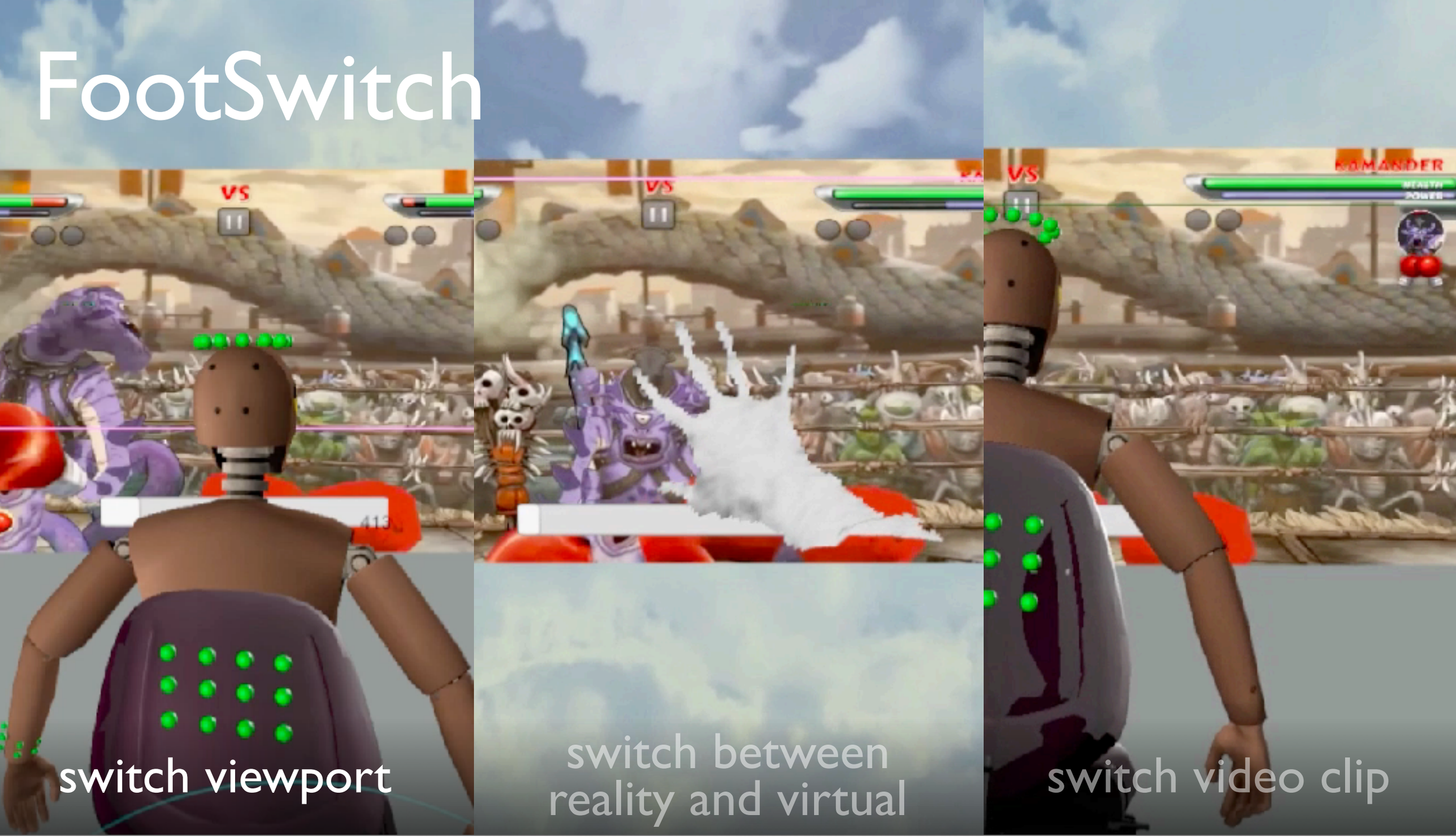
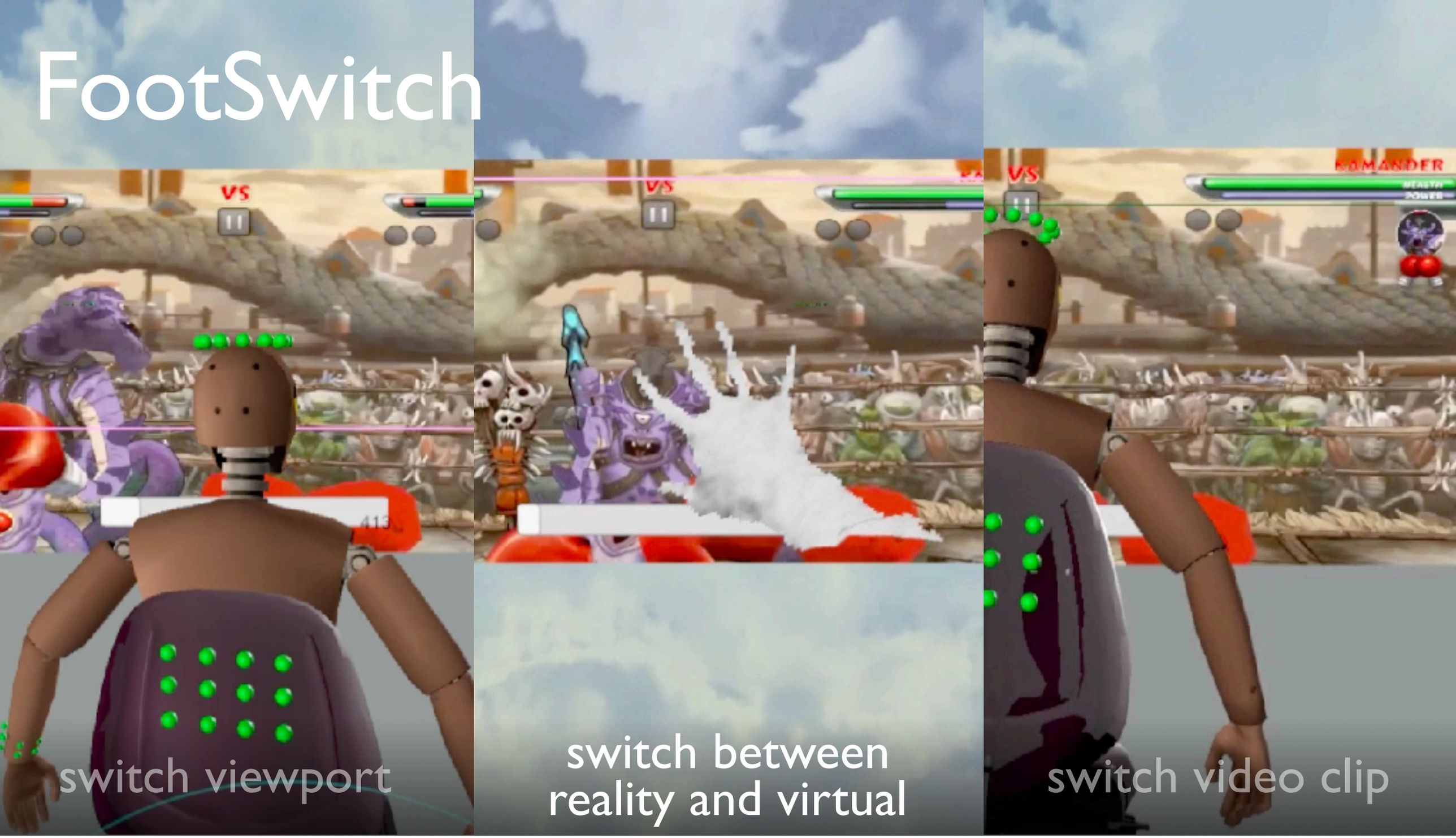


FootSwitch


VS
switch viewport
switch between
reality and virtual
switch video clip

Foot Switch FS3-P
Foot
Switch

FootSwitch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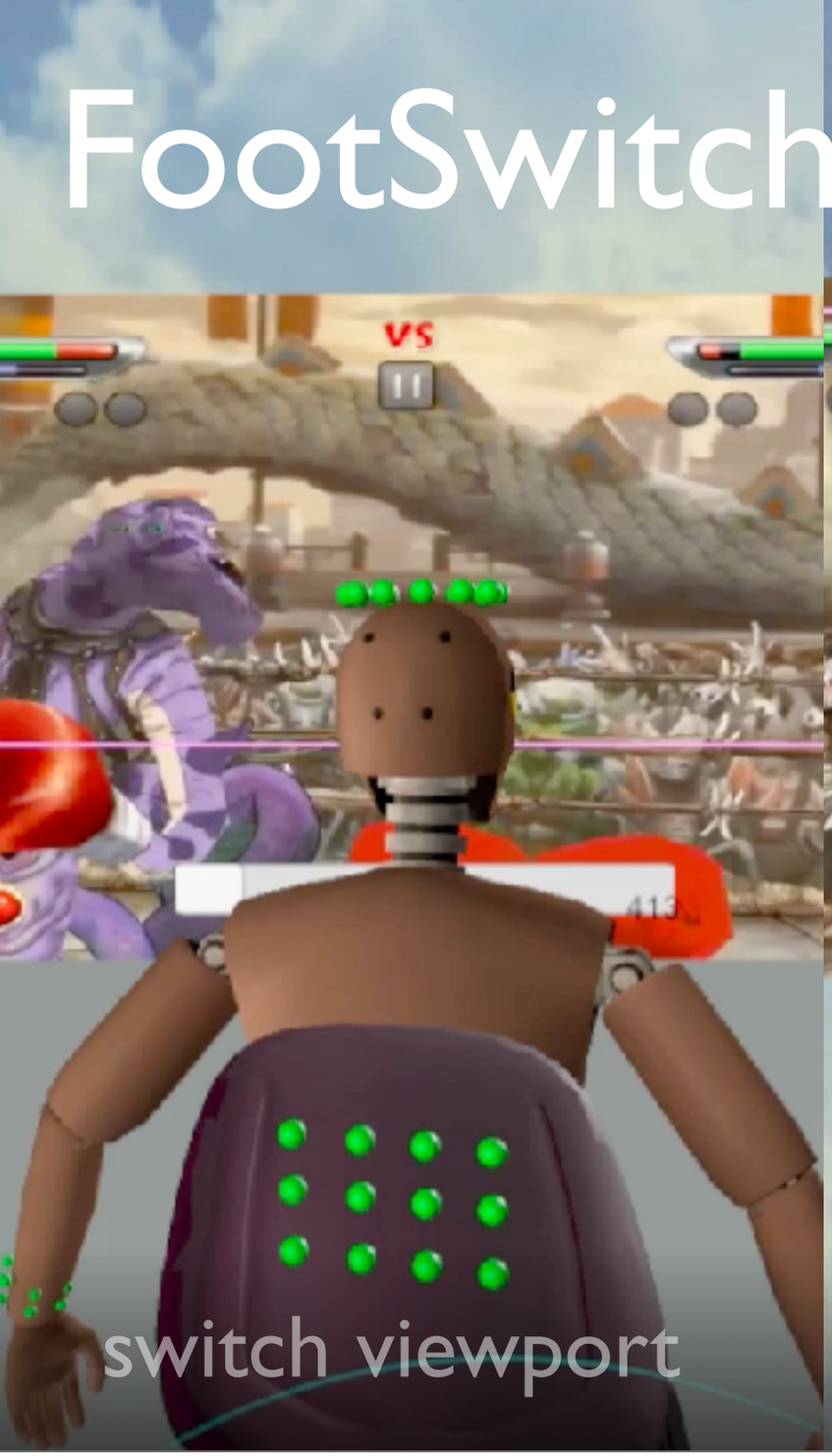
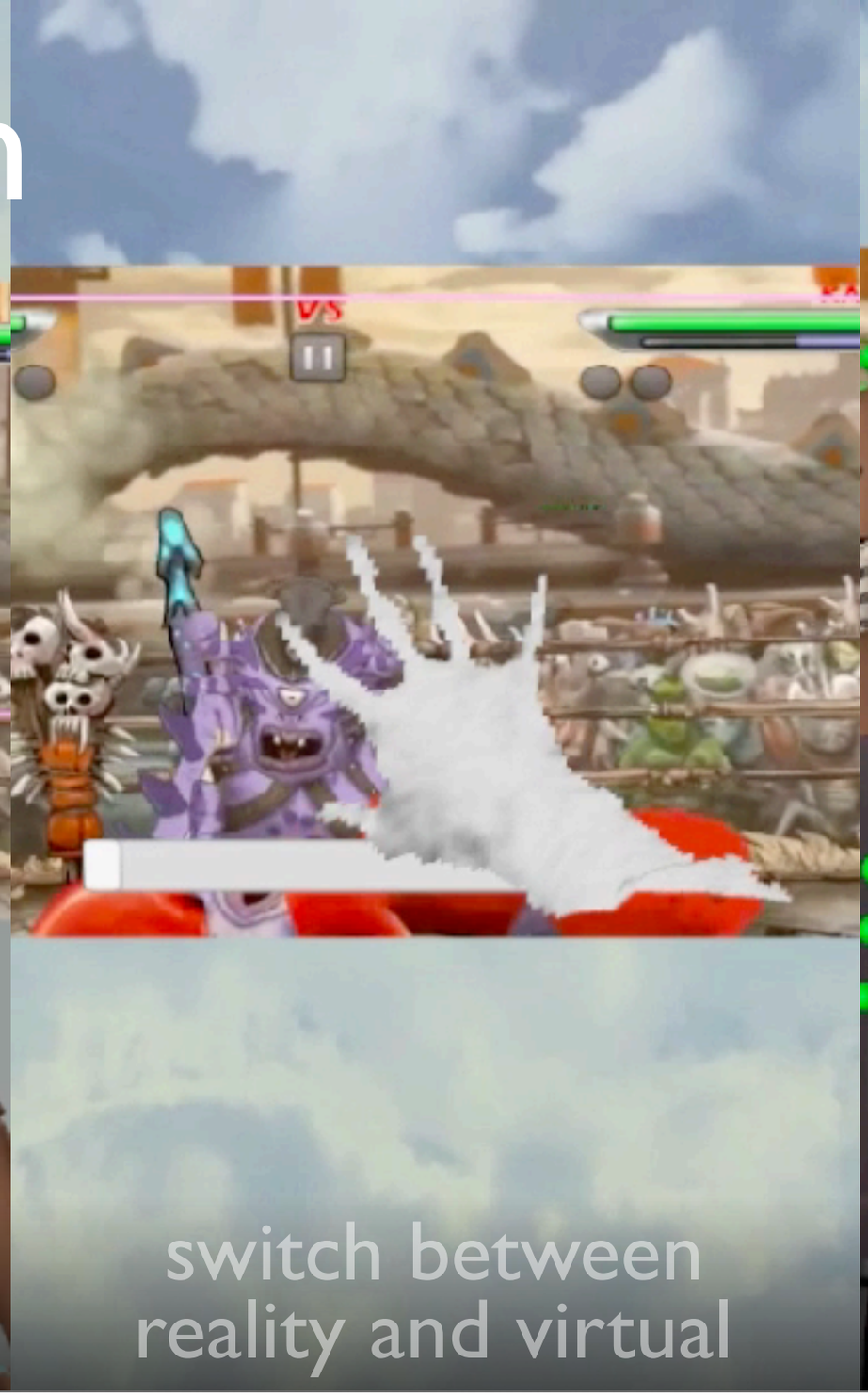


switch viewport



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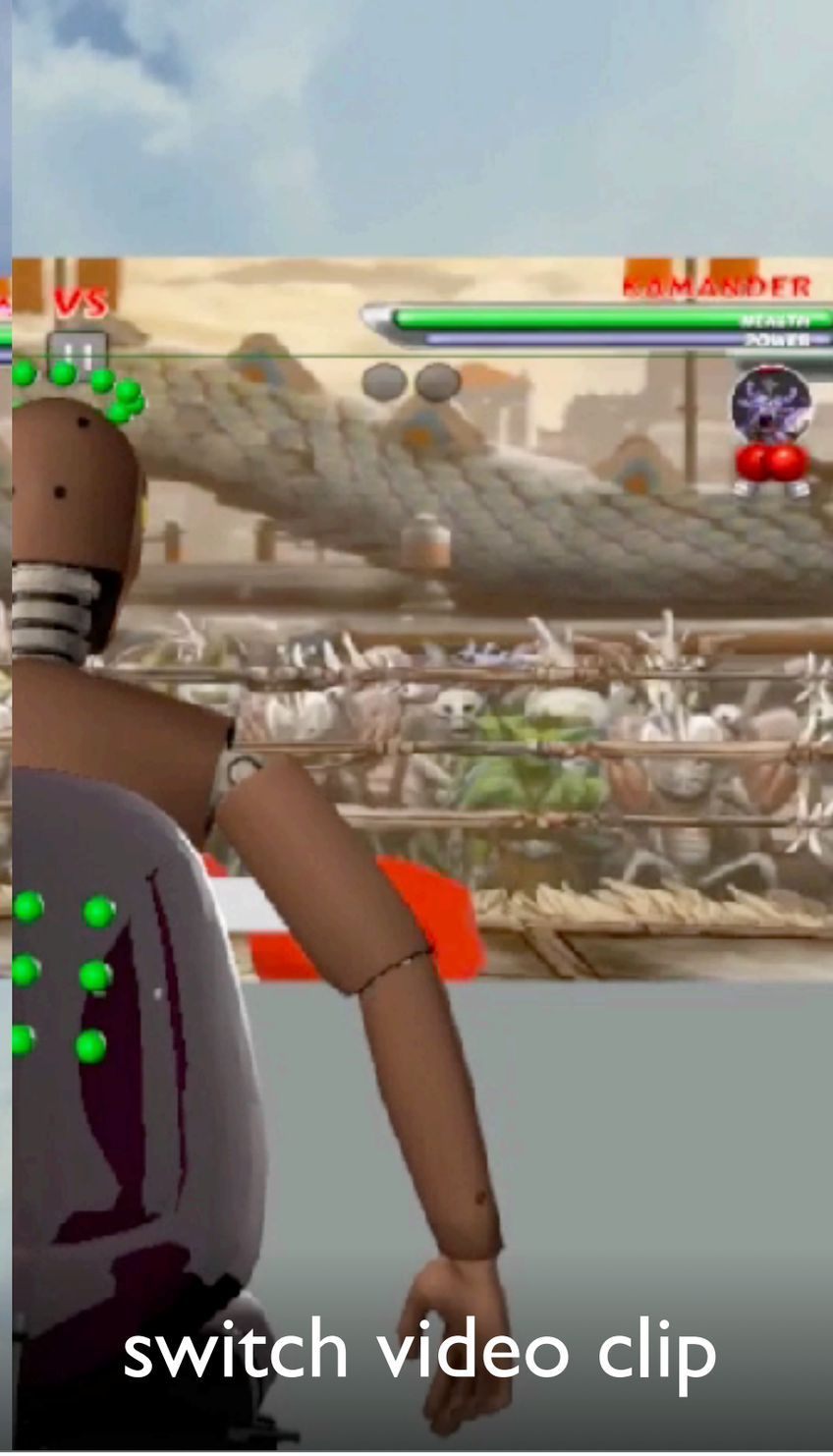

switch video clip

Physical Objects

Virtual Objects

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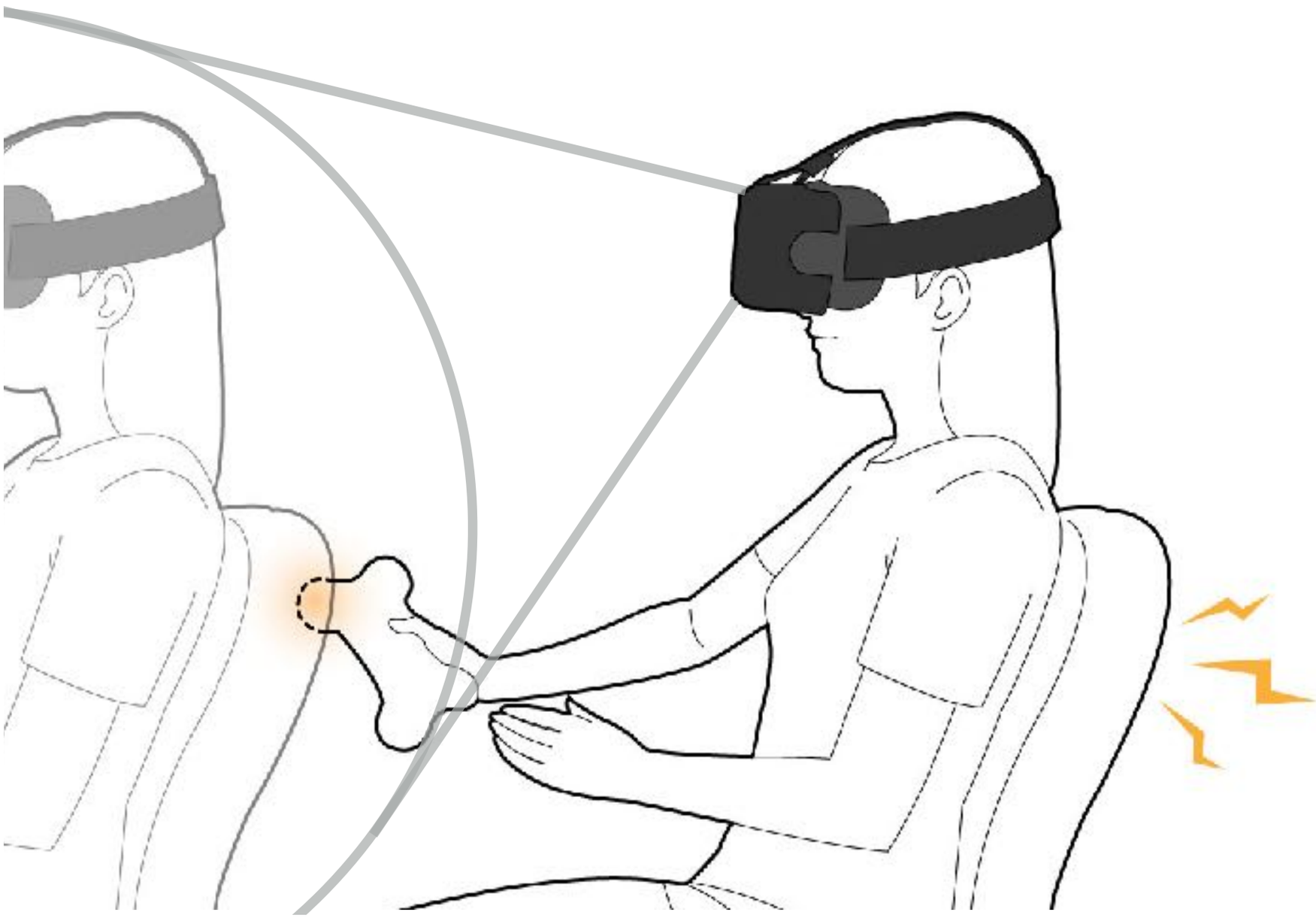

Keio University