

A Crash Course in Designing for Virtual Reality

Why Laser Pointers Suck and We Can Do Better



Hunter Dyar

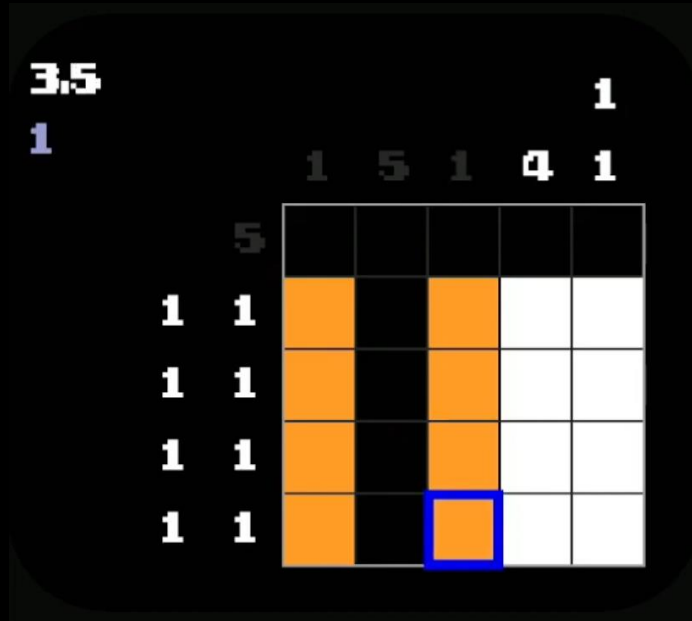
Related Talks

VR in Education & Training
Saturday 6-7pm

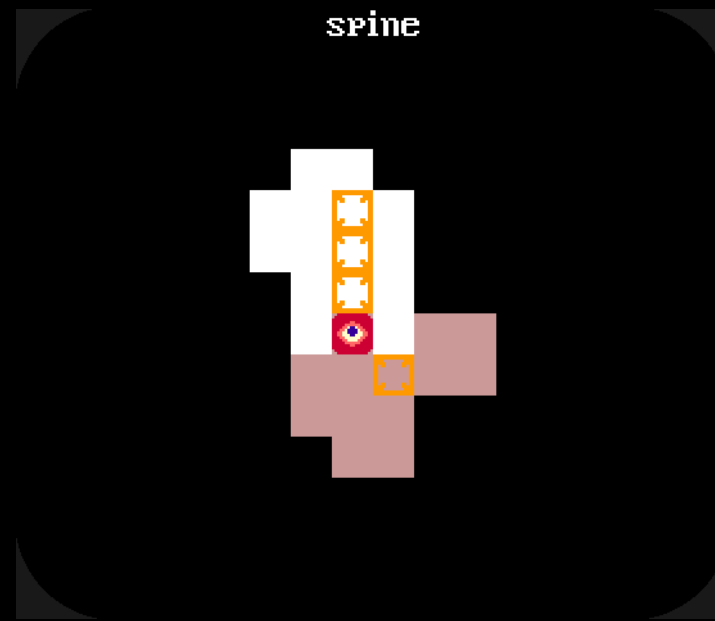
The State of Virtual
Reality in 2024 and Beyond
Sun 12:30-1:30

How to Get Into VR
Fri 6-7pm

Blender for Artists and
Developers
Thur 7-8pm



Pi-cross



Hunter's Block Puzzles



Swadge

How the Sausage is Made: The Swadge Dog Panel

Thur 5:30PM

hdyar.com/talks/vrdesign2025

Slides, Links, References, and Further Reading

I'll put this link at the end

Further Reading
In White Boxes

1. The Goal

2. Designing For Senses

3. Toolkit & Defaults

4. Why Laser Pointers Suck



The Goal

What are we trying to achieve?

Hand Gestures Transform Friend's Story Into Immersive Virtual Reality Experience

4/20/15 2:25pm • SEE MORE: LOCAL ▾



OAKLAND, CA—Noting how the expressive movement of her friend's arms fully conveyed every aspect and nuance of the event, 27-year-old Andrea Jennings confirmed Monday that her friend Rachel Carter's hand gestures had transformed an anecdote about meeting up for lunch with a mutual acquaintance into a fully immersive virtual reality experience. "From the second Rachel started moving her hands back and forth to indicate that she was talking to Julia, it was like I had put on a sophisticated VR headset and entered an incredibly realistic computer simulation of her story," said Jennings, who marveled at the way Carter's slightly raised shoulders and

We are Experience Designers

Responsible for the experience a user has

Also See: 'Human
Centered Design'

Book: "The
Design of
Everyday Things"
by Donald Norman

We are VR Designers

Responsible for Anything that affects the users' senses

- and is manipulatable via the available tools
- without being unsafe
- without violating trust
- Within the 'genre expectations'
 - (that we are also responsible for providing)

Goal: Make a VR
Experience “Good”

What Makes a VR
Experience “Good”?

What Makes a VR Experience Good, according to my students:

- It's when it's all 'wow', yeah
- When it makes me feel like... (hand gesture)
- If I am **not thinking** about my homework
- You don't want to stop
- I forget where I am but in a good way
- It just is
- It's **Immersive**
- Everything is **natural**
- Everything is **intuitive**
- When it has the 'magic sauce'
- When I can play for longer than 30 minutes and my head doesn't hurt
- Remember that one moment from Half-Life Alyx when...

The Suspension of Disbelief

- Immersion: Suspension of Disbelief for our Senses

Book: "Hamlet on the Holodeck" by Janet H. Murray

Flow

In The Zone

“...melting together of action and consciousness...”

Direct Interaction

The thing you are deciding is the thing you are doing

Book: “Game
Feel” by Steve
Swink

Good VR: Immersive!

Defining Immersion..

- Immersion: The Suspension of Disbelief of Senses
- How Willing, Able, Easy, etc. a user is able to 'Get Into' the experience
- How convincing the Experience Is
- How "real" it feels
- How natural it is to do
- How obvious it is
- How little you have to think 'meta'

Immersion

Fidelity
of Immersion

Realism
Convincing
Minimal Modeling
world, Maximum
pure
experiencing

Depth
of Immersion

Multi-Channel
'How Many
Senses'
How Reinforced

Ease
of Immersion

Little Transition
to reach immersion
Effortless
Obvious
User Willingness
"Lock In"
Attach + Calibrate
Hardware

A Good VR Experience...

- Direct Interaction/Engagement/Experience
- Be Intuitive & Natural
- Unmediated
- Designed to Encourage Flow

A Good VR Experience...

- Feels Good to Play!

A Good VR Experience...

- Does not need to simulate reality
- Does not need to be “convincing”
- Does need to design for suspension

A Good VR Experience...

- Designed For Immersion
 - Fidelity, Depth, Ease

Designing For The Senses

Or the part where I say 'We Don't Get it for Free' a lot

There's More To It
Than Shoving
Photons In Your
Face - Omer Shapira

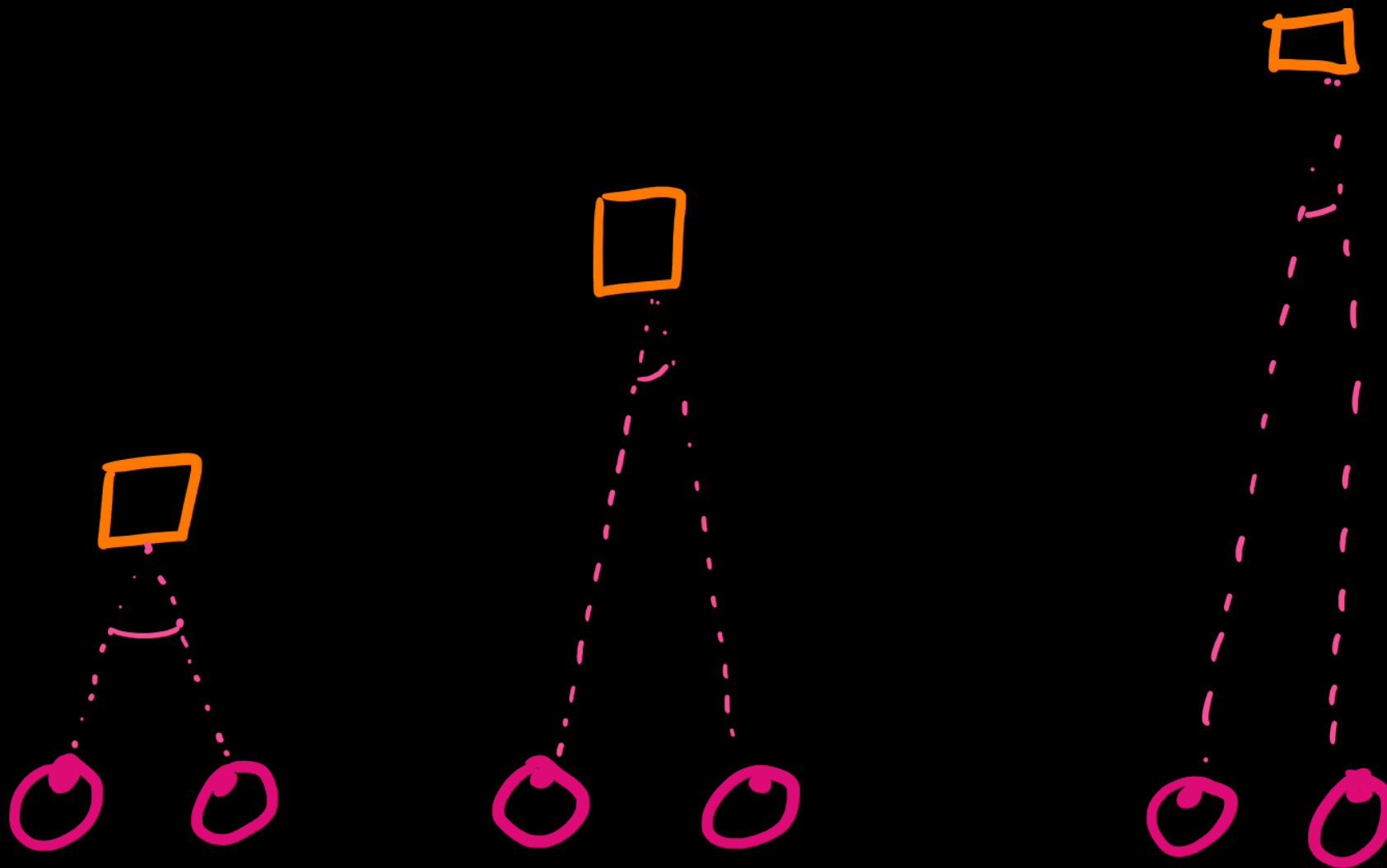
Visual Depth Cues

More than just stereo vision!

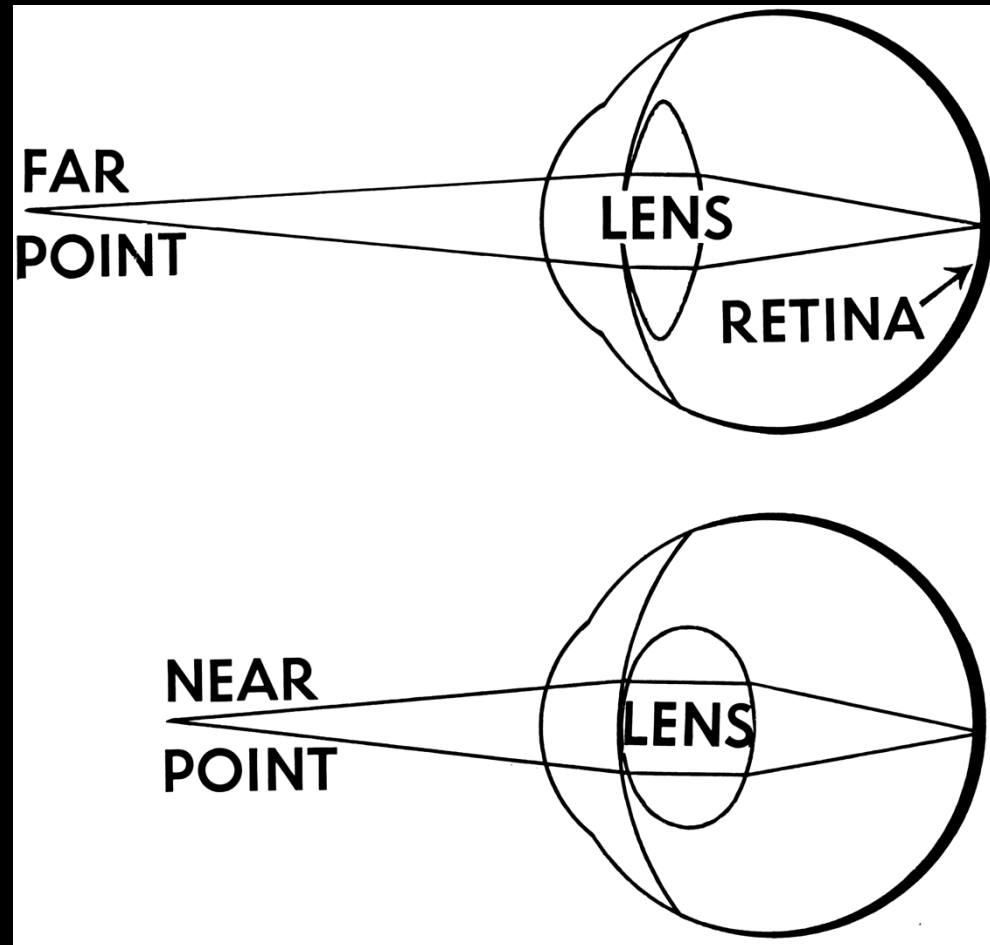
Stereo



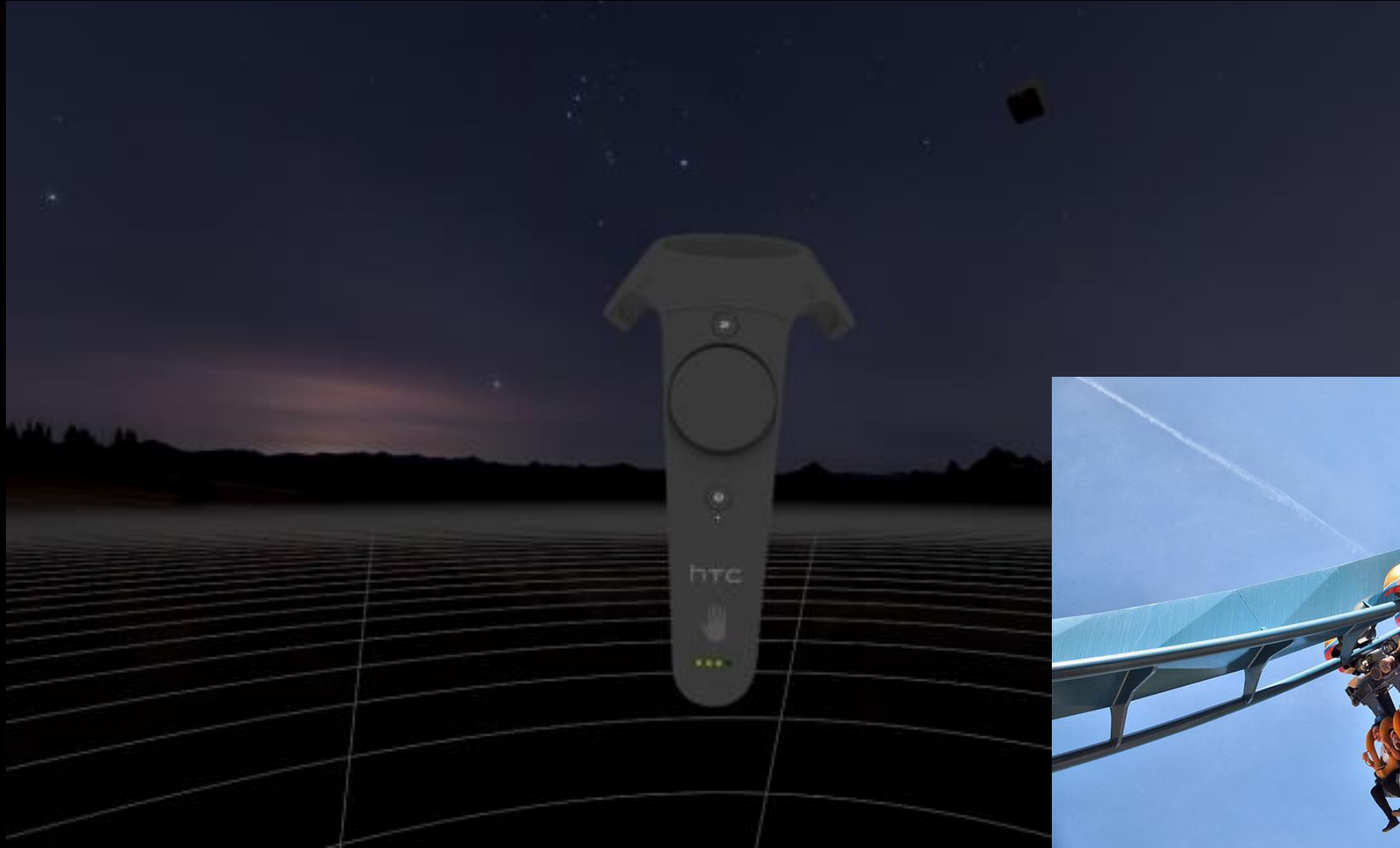
Convergence



Accommodation

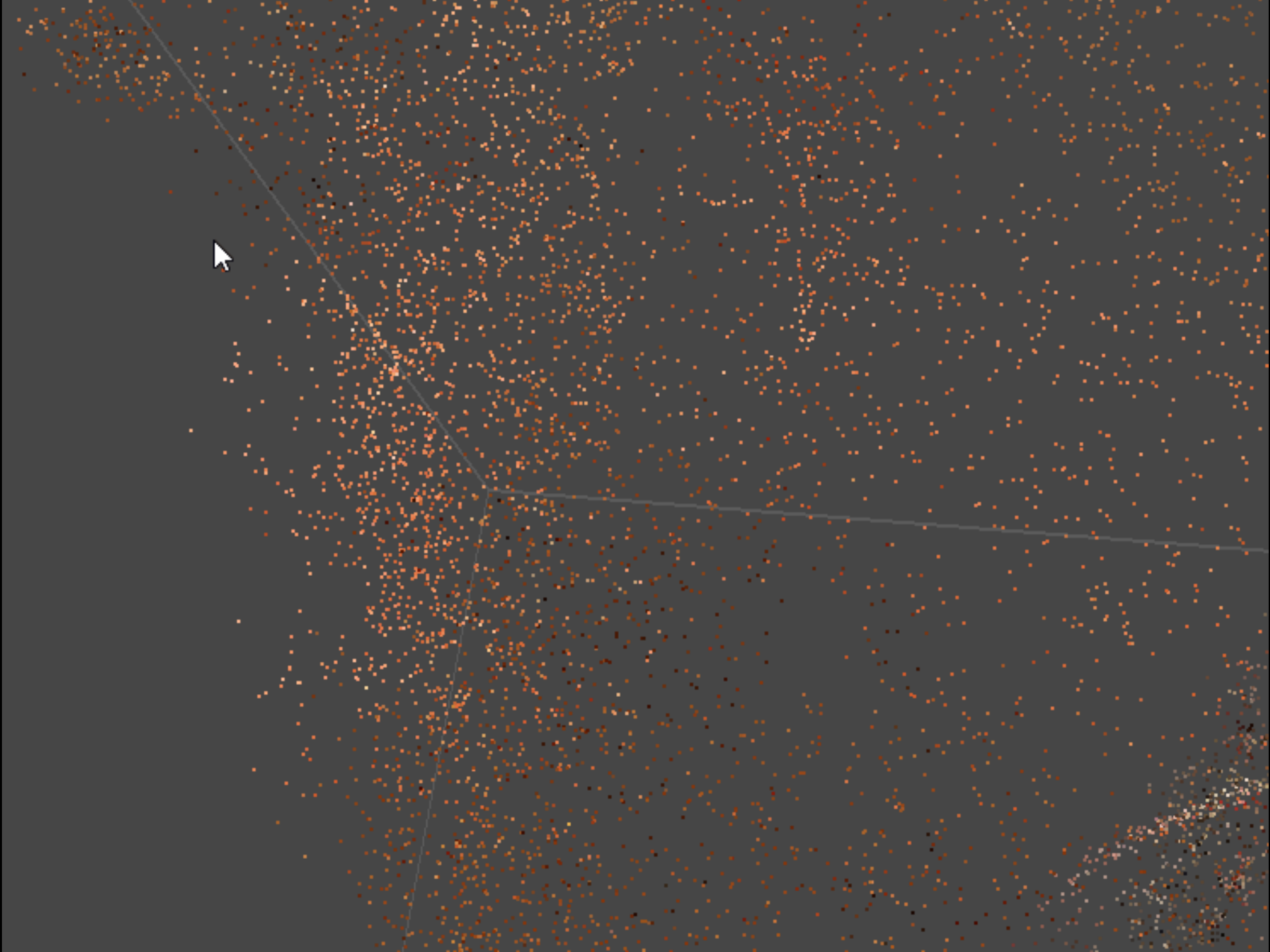


The Ground Plane

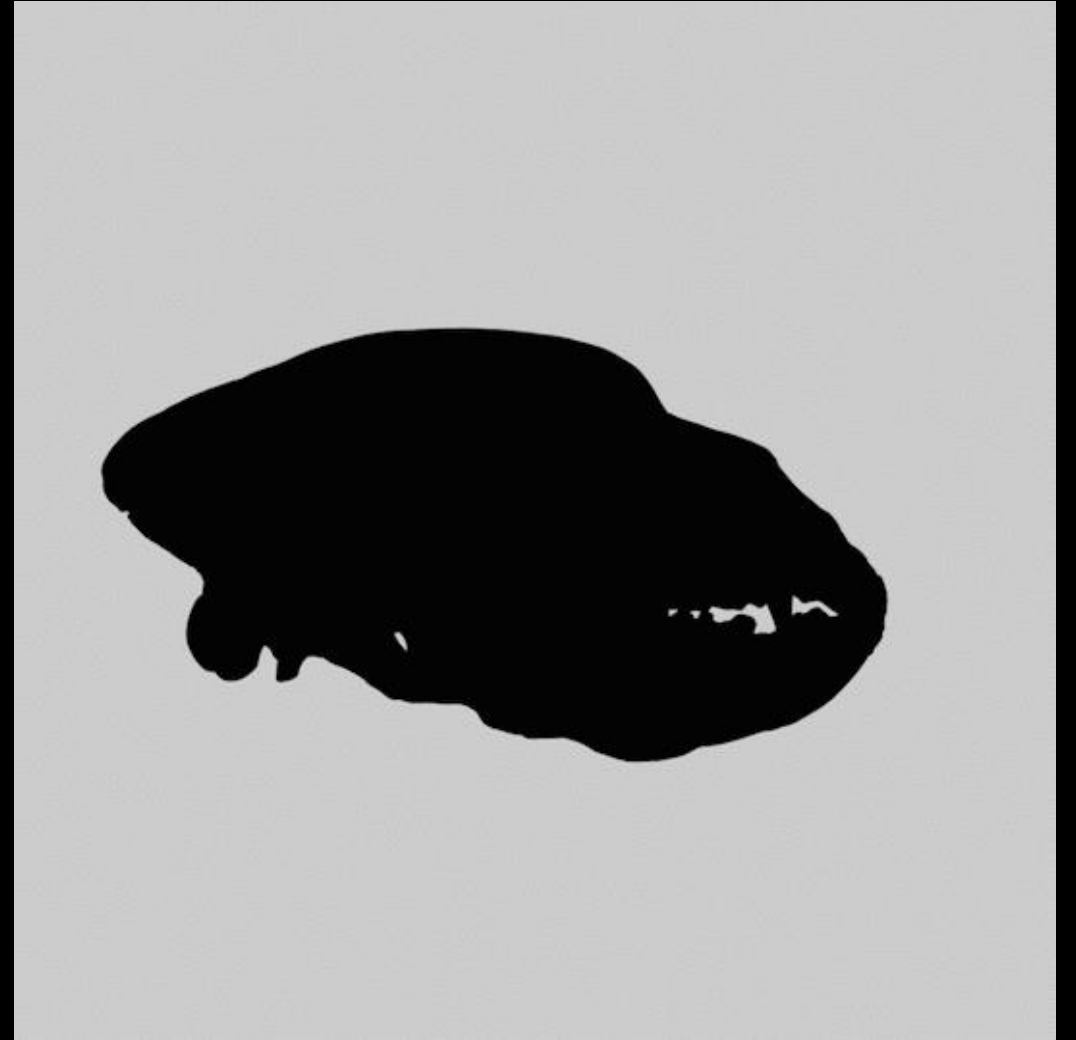


Motion Parallax

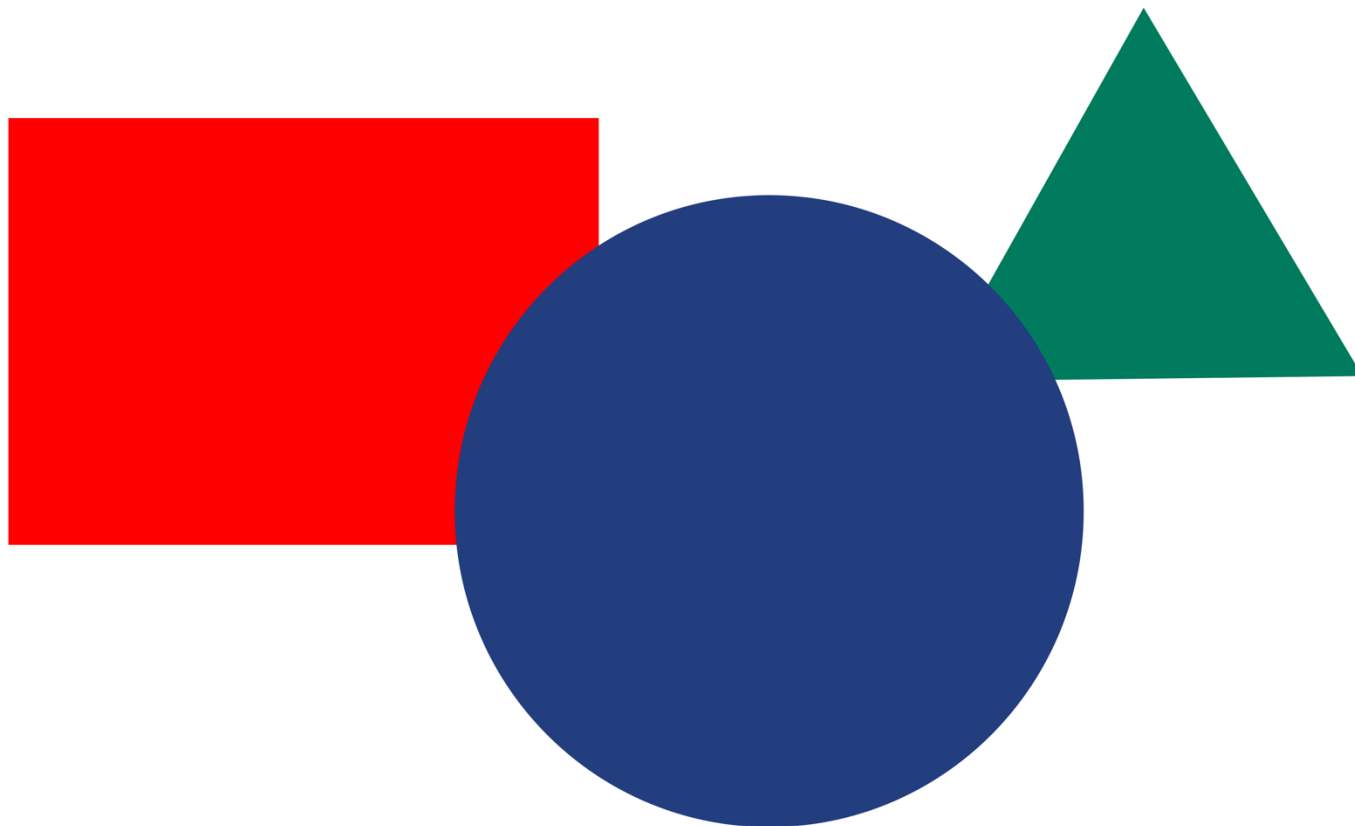




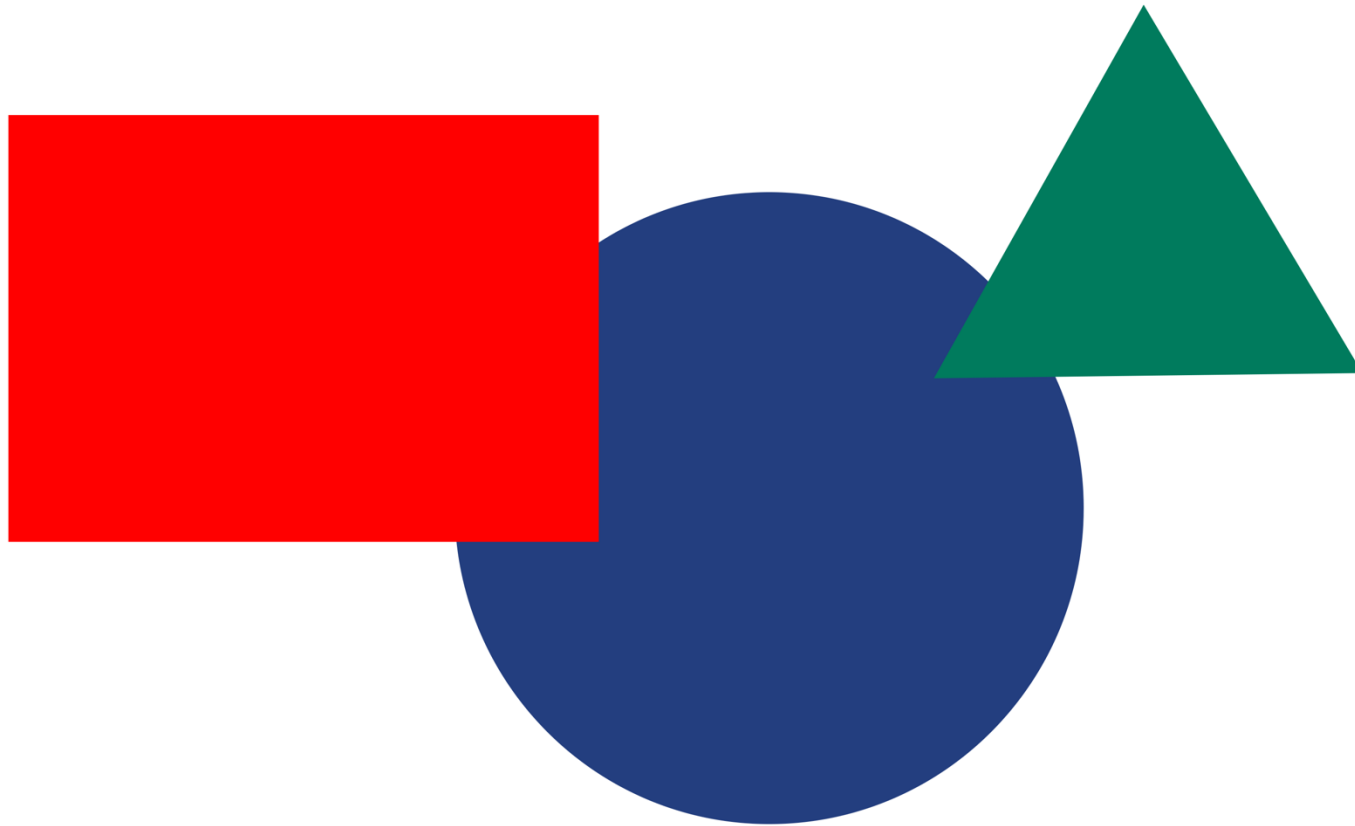
Kinetic Depth Effect



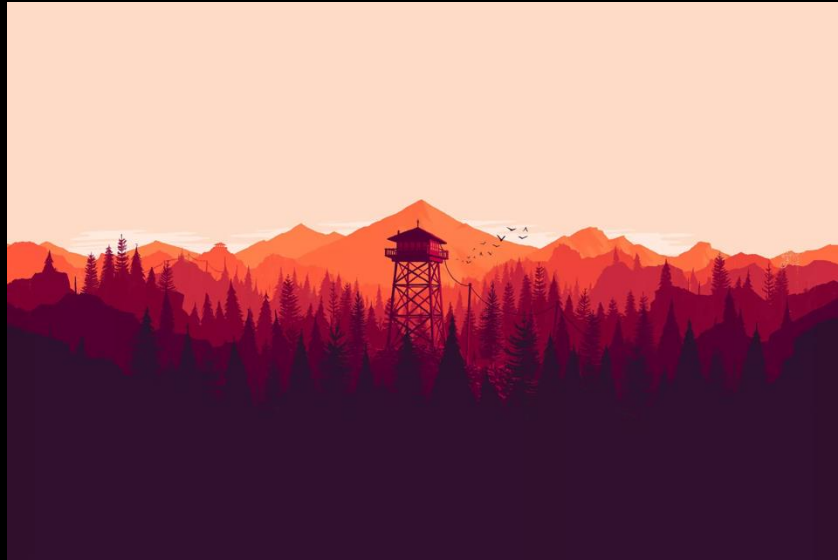
Occlusion



Occlusion

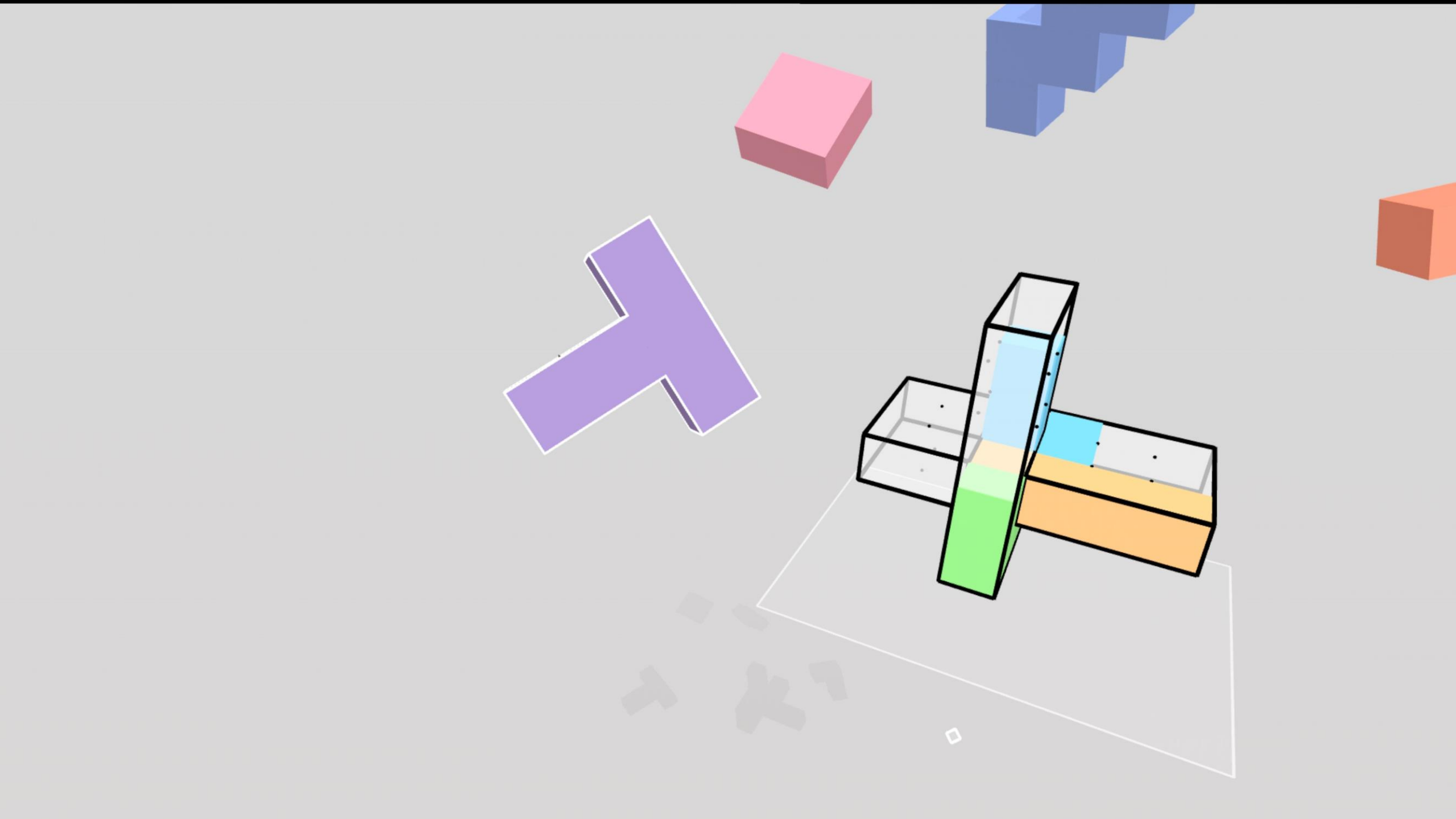


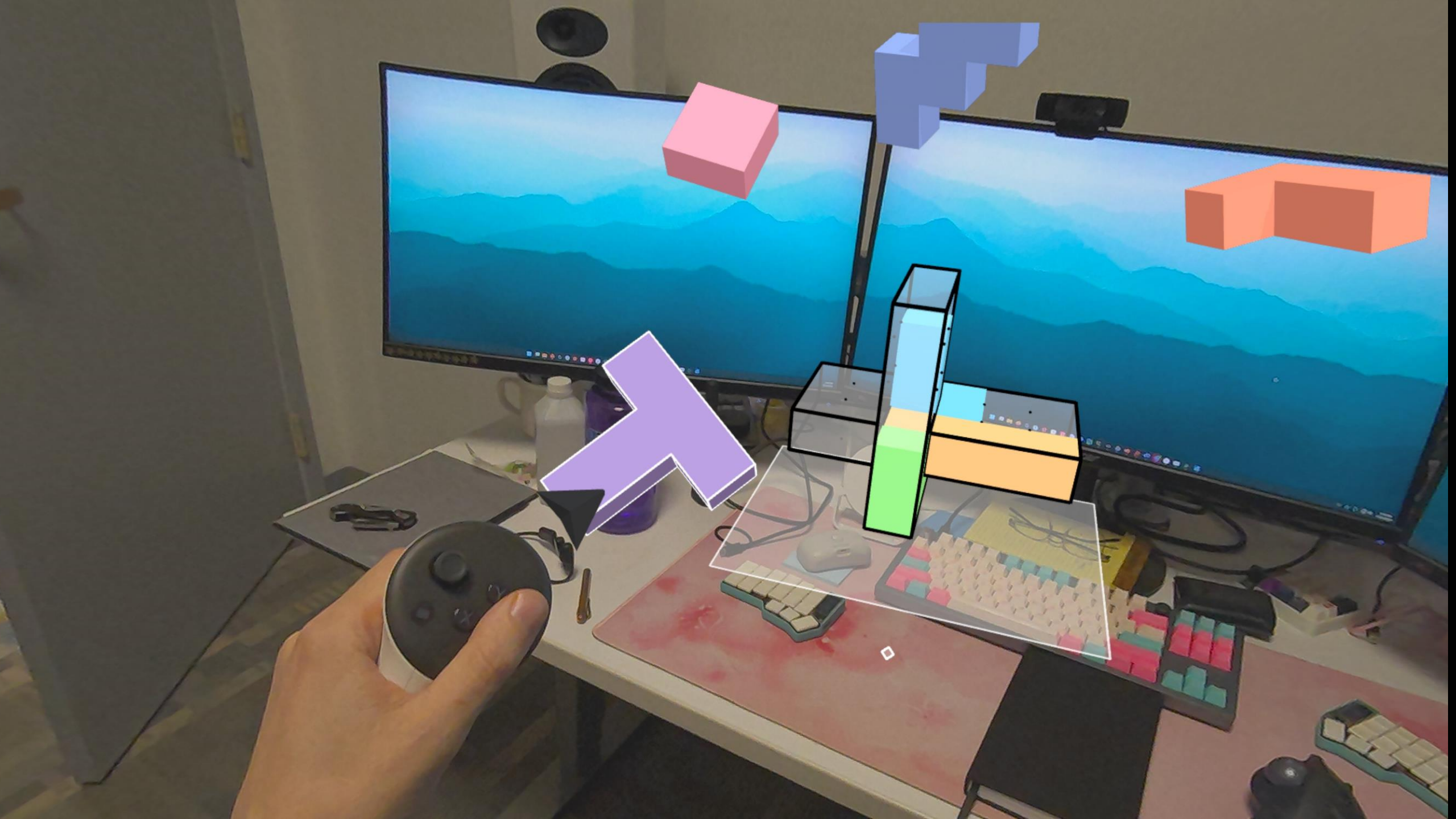
Atmospheric Gradation



Familiar Size










CHA

SCORE:


2,624,008

LARGEST COMBO: 15


NICE
1X




Gym
Destination
0



METDONALD'S
5.4K were here today · Destination
In Meta Horizon Worlds
0



WILD QUEST
Destination
0



PIZZA KITCHEN
6.1K were here today · Destination
In Meta Horizon Worlds
0

Cloud Gaming (Beta)



Moss

Meta Quest 3/3S Update



Resume

Quit

Search

All

Applications

Worlds

Meta Quest+

Downloads

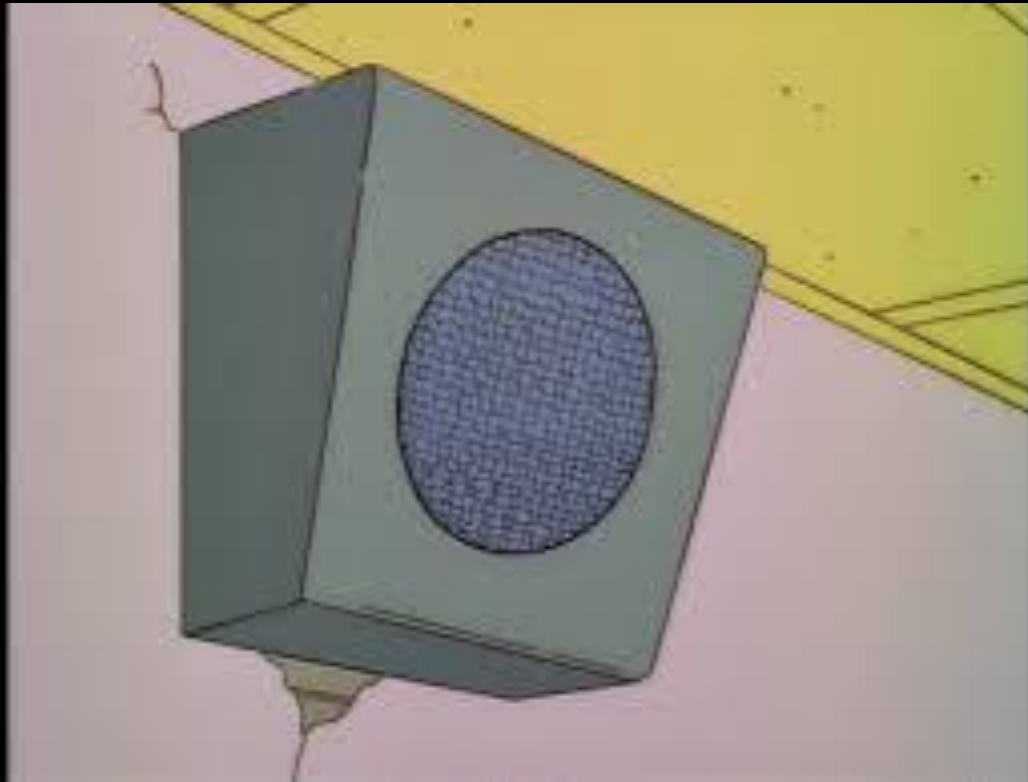


 3:52    

Spatializing Audio

Give The Audio a Source



Skipped for Time:

- Audio Level
- Time Delay
- Head Shadow Effect
- Reverb
- Binaural Audio and the shape of our ears?!?
- Why Annoy-a-Tron's Work

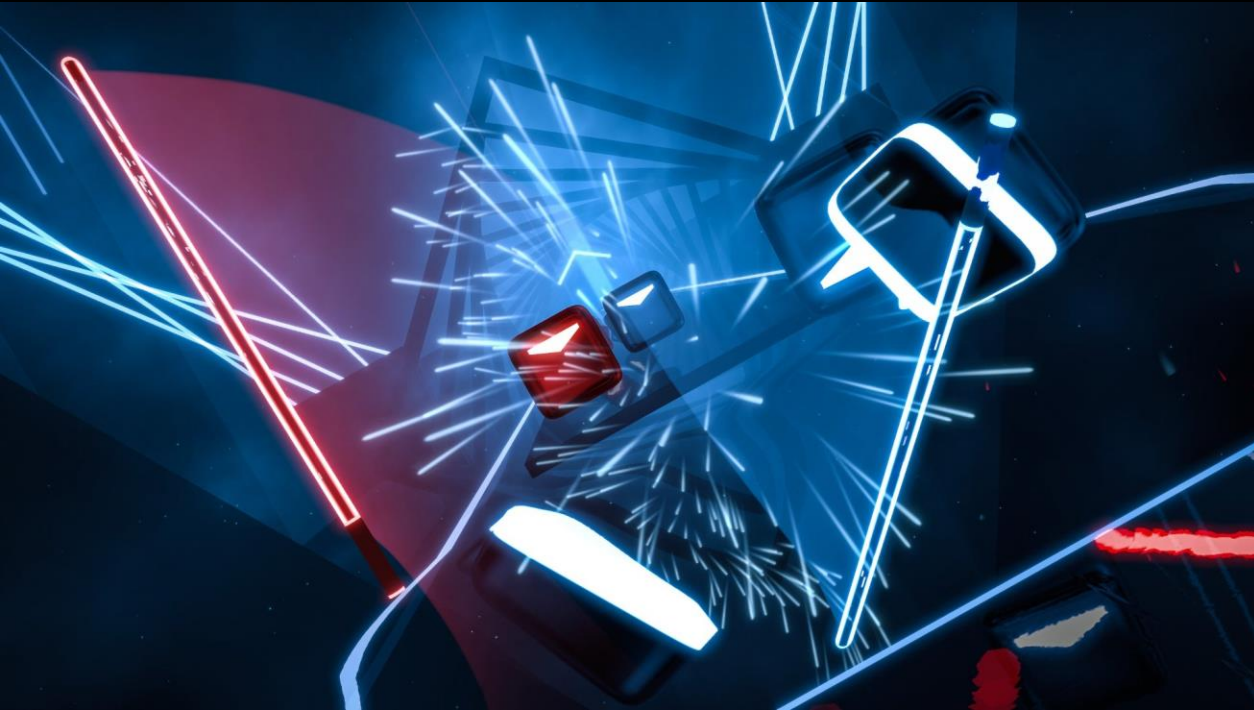
Haptics

(Haptics of Starship Home are top-notch.
Good job Carson Custer!)

Voices of VR #1282:
Gameplay Innovations &
Design Insights from
“Starship Home” Co-
Directors Mark Schramm &
Ashley Pinnick

Proprioception & Kinesthetics

Repeatable Movements



Body Shortcuts

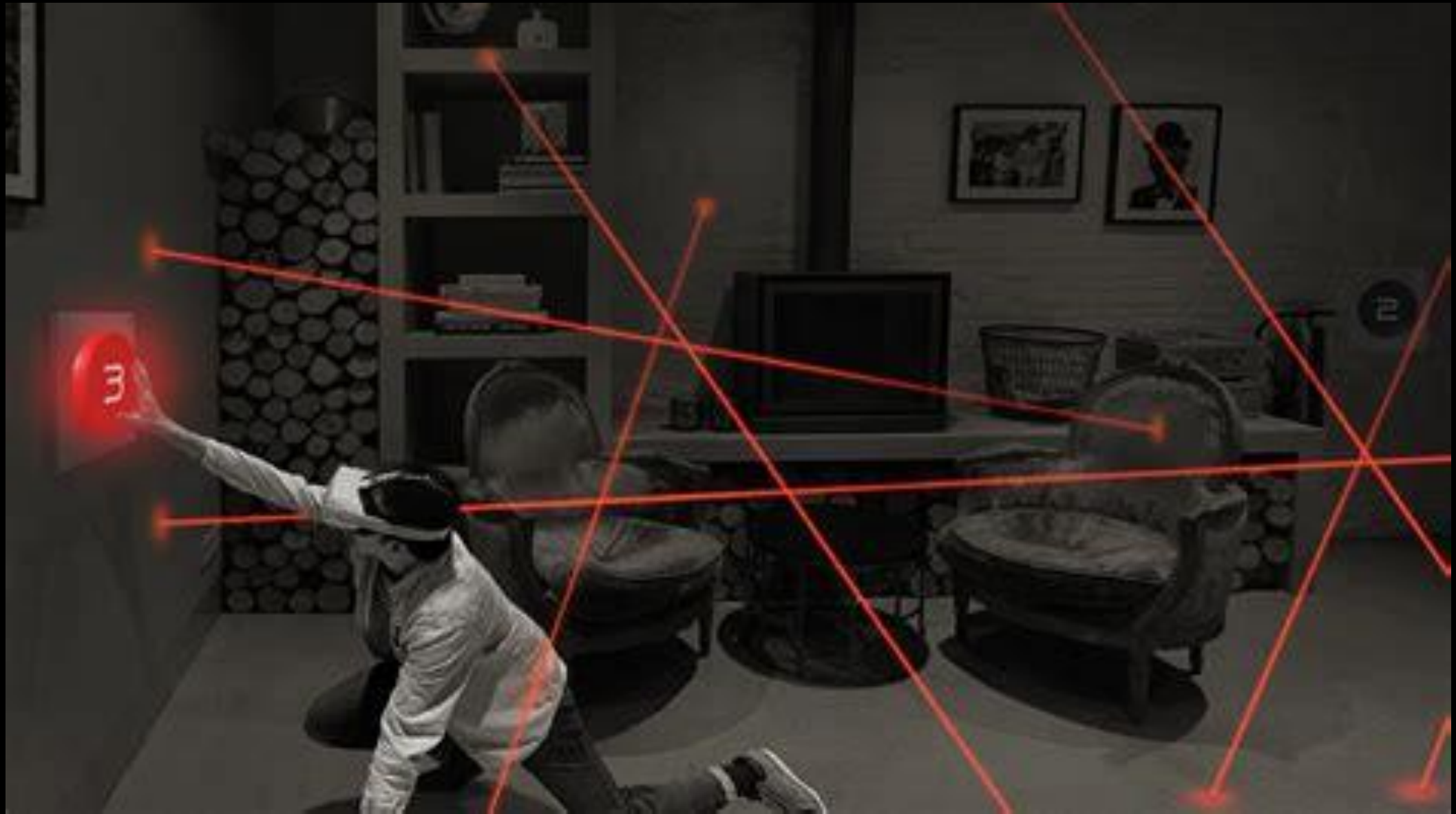
Fantastic Contraption and
Why VR Menus Suck – GDC
Talk 2016 – Colin Northway

This Is another

Speed and Execution of Movement



Pose and Feel





Encourage Your Users!





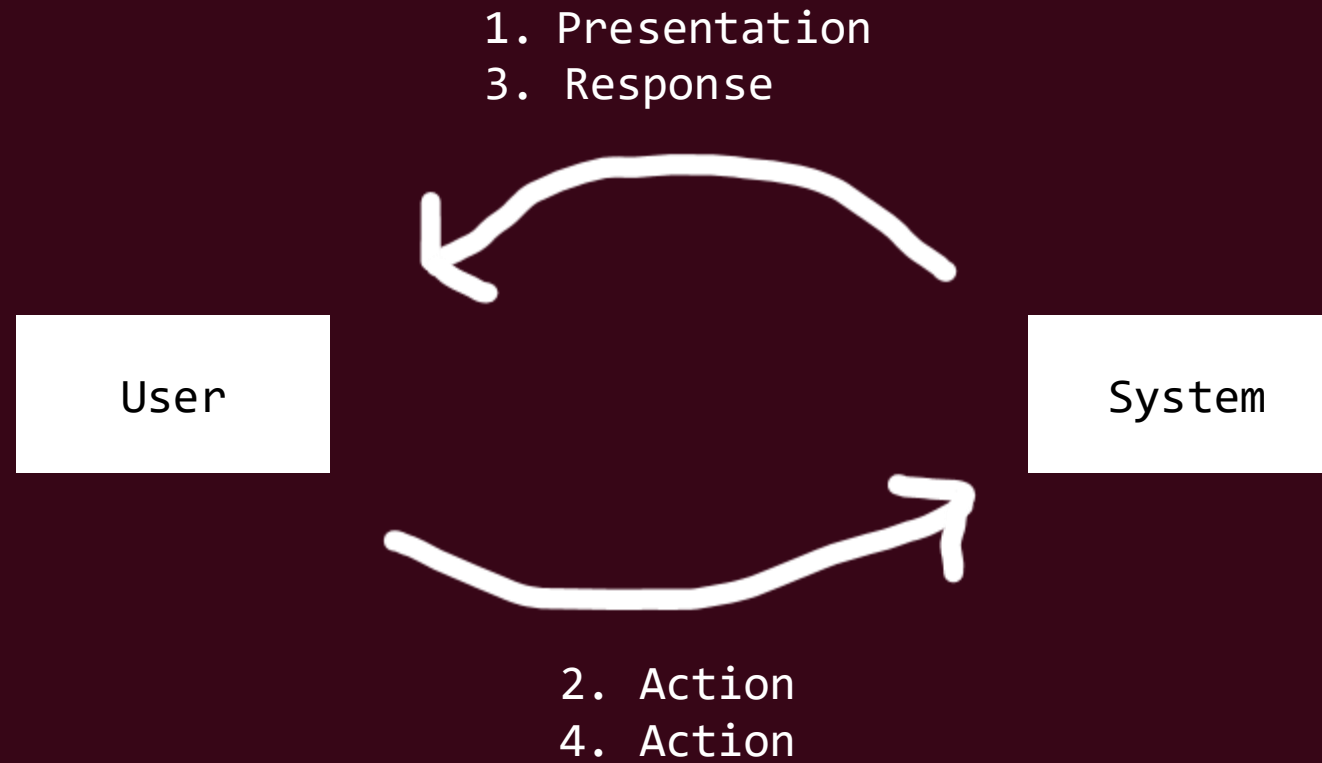
Toolkit & Defaults

How to Design for VR

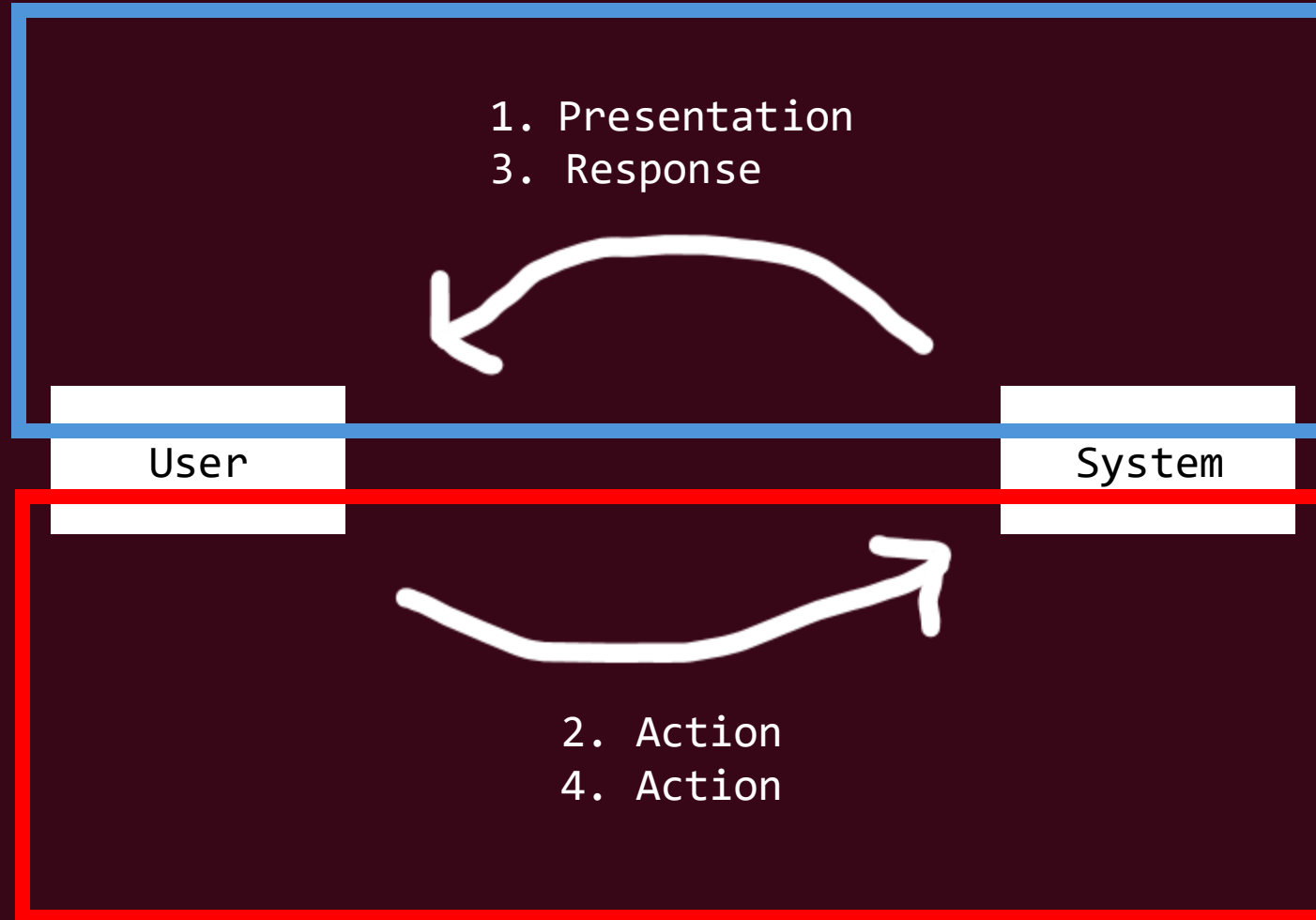
Topics in No Particular Order

1. "Why VR"
2. Core Interaction
Emphasis
3. Zones of Intimacy
4. Diagetic/Non-Diagetic
5. Constrained Tangible
Interfaces
6. Environment Layout Tips
7. Adjustable Height
Surfaces
8. Depth Communication
9. Locomotion
10. Toilet-Ready
11. Color Choice
12. Floor-Scale VR
13. Hands
14. Make it Goopy
15. Brownboxing

“Why VR?”



“Why VR?”



VR is Good at this!

But Bad at this!

SPEED LV
6
LINES
14/48



TIME
01:05
AREA SCORE
3,320

Core Interaction Emphasis

- Remove every verb that don't matter
 - Noise isn't Immersive.
 - Immersive does not mean “More”
-
- (Stop just using the features baked into your dev toolkit)

2 Players Online
35 Players In Lobby
PARTY CODE
FA71E



PLAY

LOADOUT NEW

SEASON PASS

TRAINING

SETTINGS

HDYAR



3 2

Hide Menu



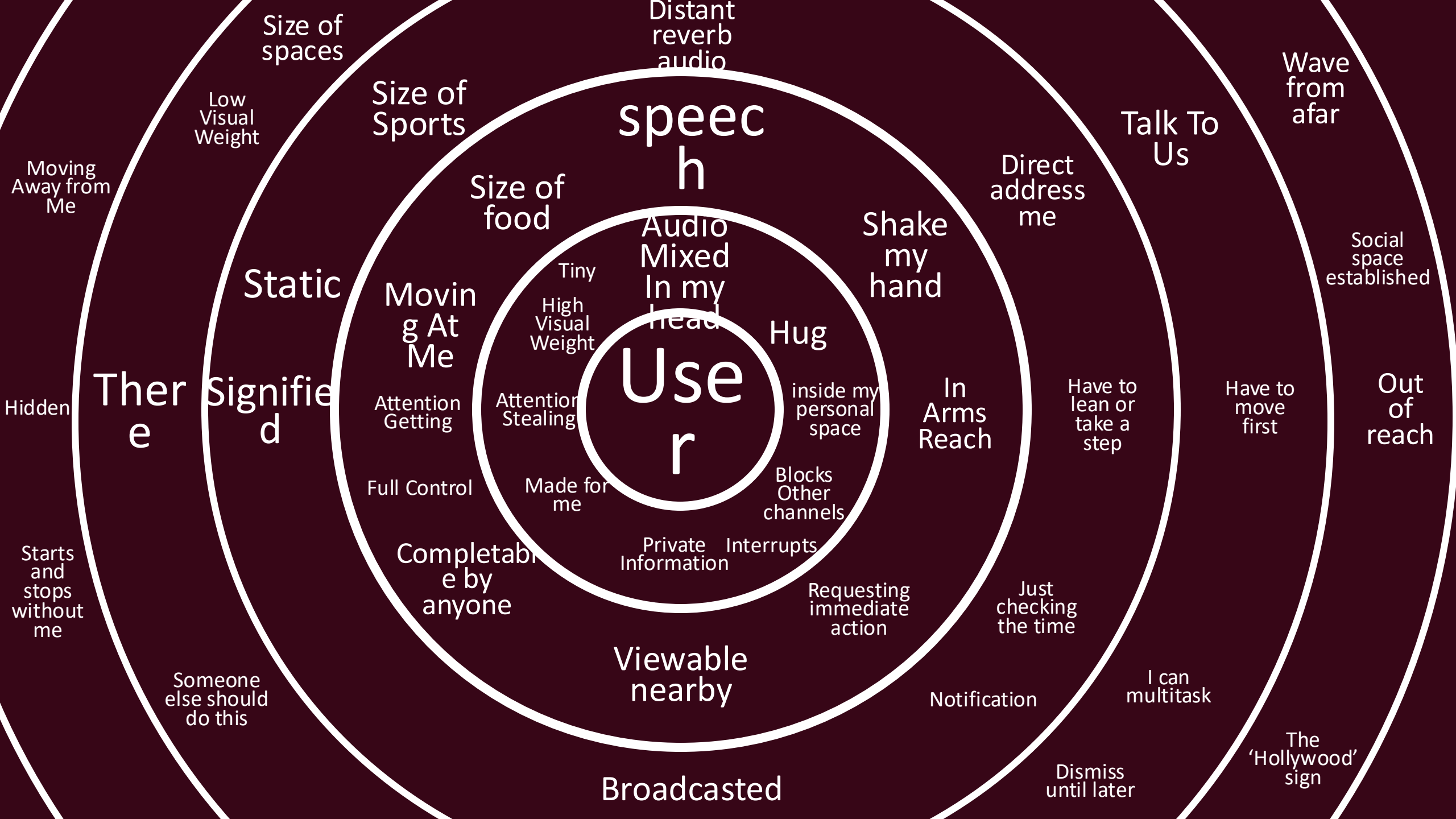


Zones of Intimacy

- Here, Near, Far
- Map Importance and Intimacy Together



User



Non-Diagetic

- Background Music
- Non-spatialized Audio
- HUD
- Flat Screens
- Subtitles



Diagetic

- A Musician
- Talking Robots
- Speaker Playing Audio
- A Television Screen



STOP TRYING TO MAKE VR HUD HAPPEN

IT'S NOT GOING TO HAPPEN

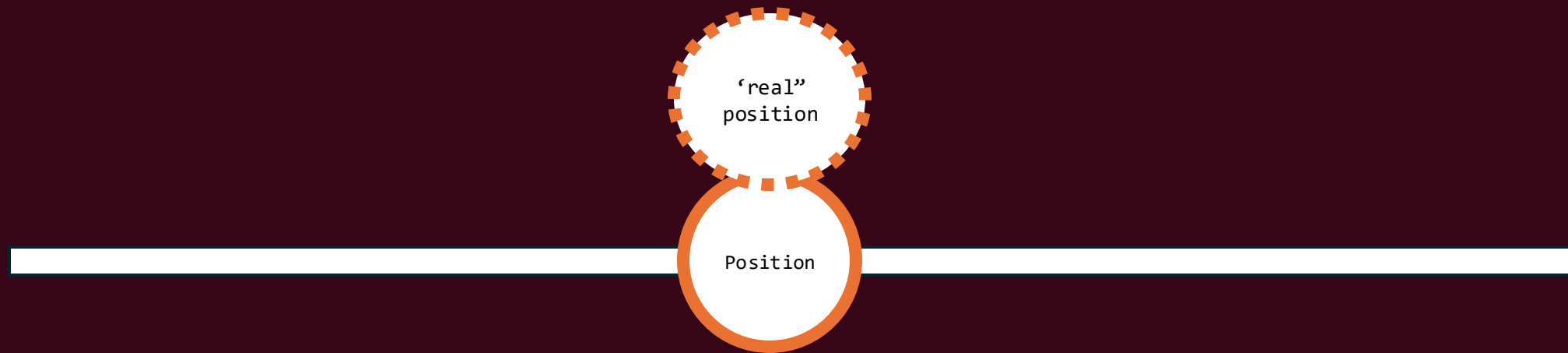
Spawn Pillar

Page
Selector

Dase Ghost

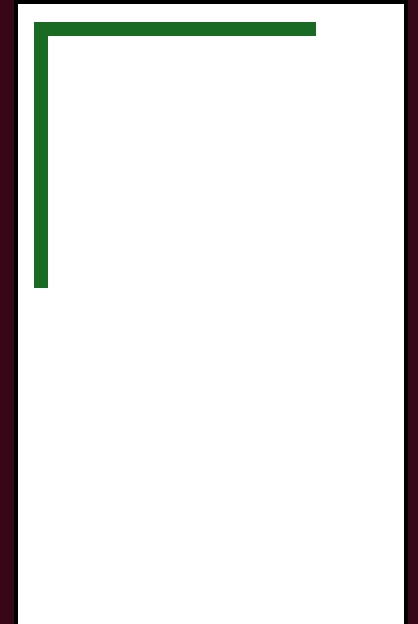
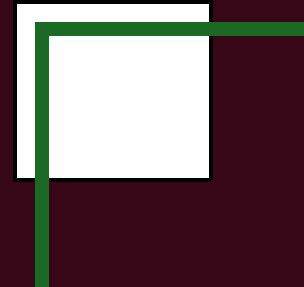
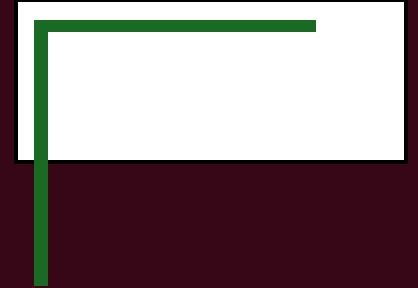
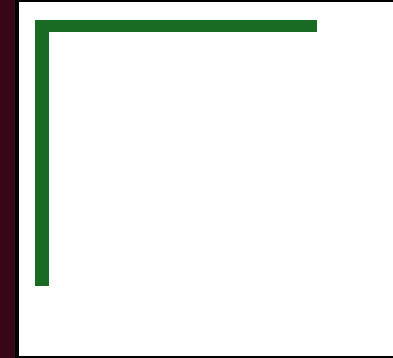
Constrained Tangible Interfaces

- Turn free (3D) hand movement into linear control movement
- Don't require precise user accuracy
- Apply snapping and assistance liberally



Environment Layout Tips

- Avoid Symmetry
- Avoid Radial Symmetry
- Use Landmarks
- Don't make rooms, make corners.
- 2 walls for primary interactions
- Make your environments smaller
- Add Windows (more visible depth)







Adjustable Height Surfaces

- “I have made a magical experience where anything can happen and you can live your dreams...
Unless you have short arms”

Locomotion

Locomotion

- ...Don't?



Locomotion

- Stop shoving video game levels into VR
- Zone vs. Granular
 - Teleport the room area, not the avatar
- Snap vs. smooth Turning, Slide vs. instant vs. blink movement: All of the above

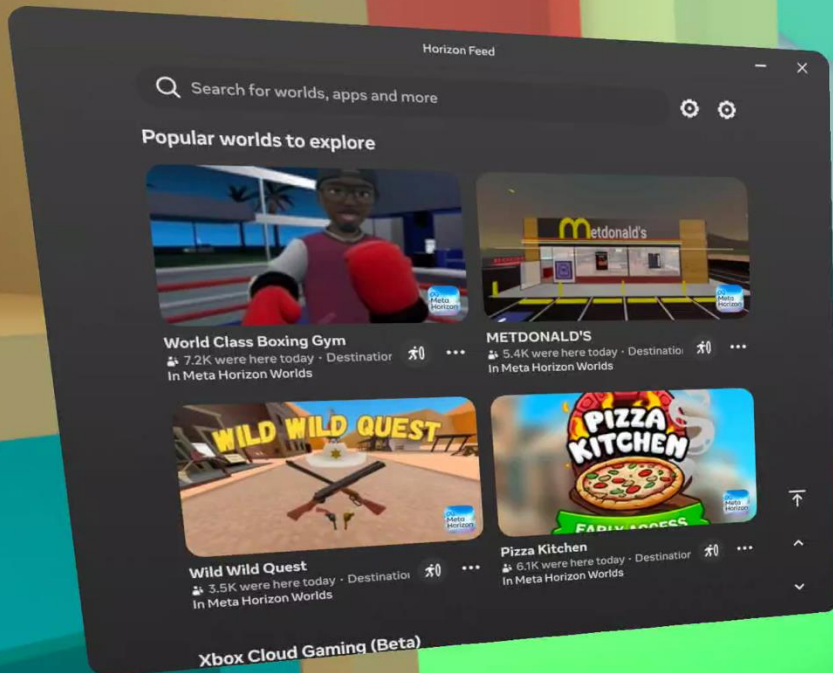
Job Simulator to
Vacation Simulator:
Advanced
Interactions for
Room-Scale VR - GDC
Talk - Owlchemy Labs

Hunter's Default for Teleportation:

- Zone Based
- Head Target
- Preview user destination in the zone

*(Copying Tea For God is hard,
copy Vacation Simulator instead)*







Toilet Ready VR

- You don't have to spin 360



Let Users Choose Colors



Floor-Scale VR



Hands

- Controllers are a tool we are holding.
- Just show the controllers
- If you show skin color, the user should be able to change that color







13 Players In Game

PARTY CODE

FA71E



BOW HAND



PULLBACK HAND





Library

Store

Multiplayer

Settings

? Controls

Tutorial

× Exit

Select

Profile

Profile 3 / Profile 4

JOIN OUR
Discord

154.2-600 // connected



Pointing: press trigger half way
Pulling / Grabbing: fully press trigger



Moving:
hold both buttons and move controllers



Pushing Pieces back to Shelf:
push joystick forward



Back to Menu:
hold button for 2s

Switch Shelf:
push joystick



Group:
Organize
into the



Peek:
Peek into
the pe



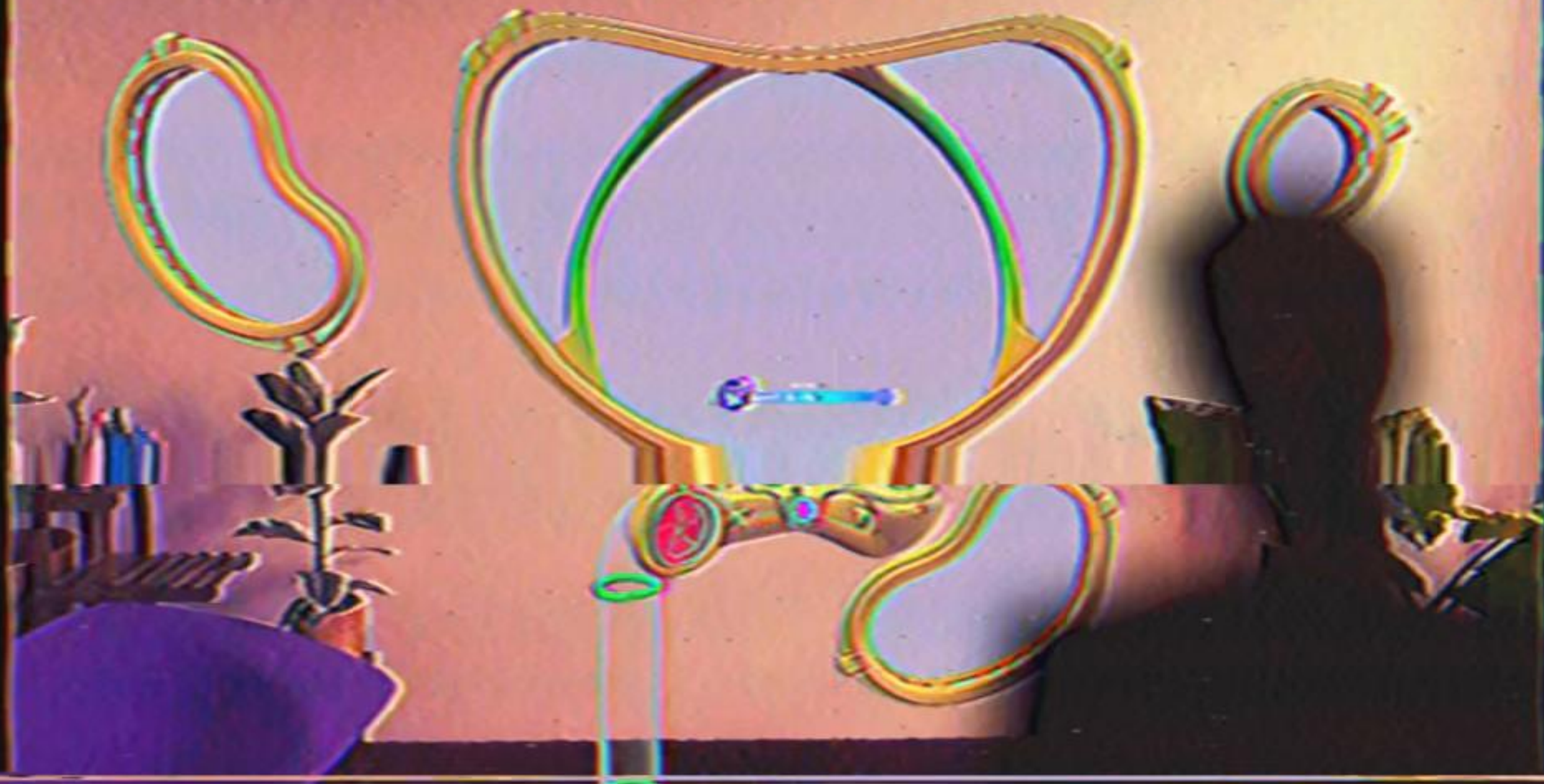
Back to Menu:
Point at
the



Make It Goopy

- React to users in some way
- Doug North Cook on Starship Home Design Goals:
“...full of vibrancy, magic, goopyness, adventure,
and ...”

Starship Home and
the Future of Mixed
Reality – Doug North
Cook



Brownboxing



“Playtesting VR:
Brownboxing,
Spycams, and
Fuzzy Rugs” –
GDC Talk – Shawn
Patton

Why Laser Pointers Suck

Putting it all Together

Tutorials

Erfahre, wie du die VR optimal nutzt



Erste Schritte in VR



Deinen Avatar erstellen



Mit Freunden in der VR verabreden



Tutorials



Releases



FAQs



Meta Quest-Anleitung

17:38





Skeuomorphism



Reality



Virtual Reality

Screens

Reality



Virtual Reality

Screens

Reality



Virtual Reality

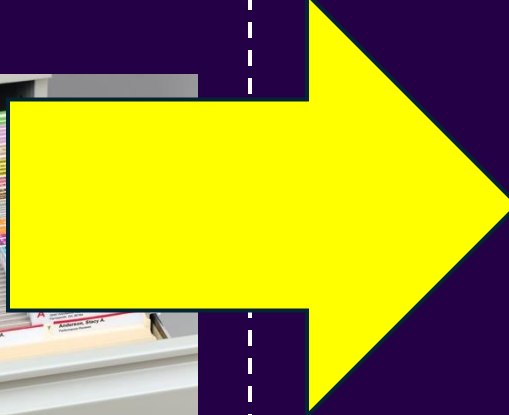
Screens



Reality



Virtual Reality



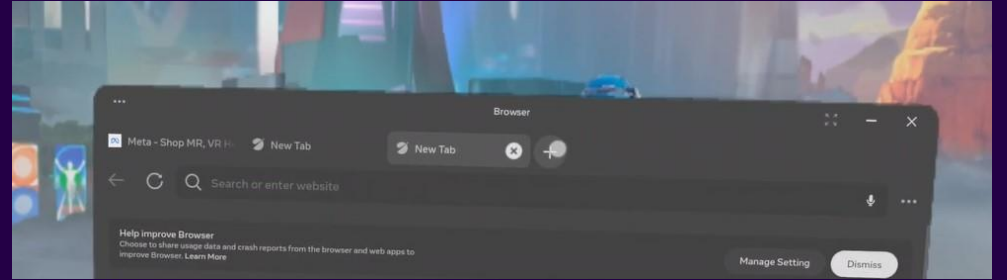
Screens



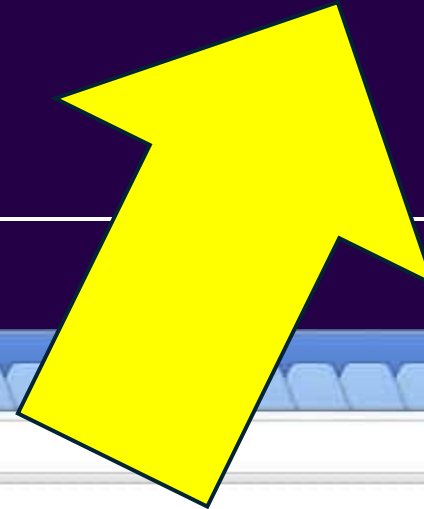
Reality



Virtual Reality



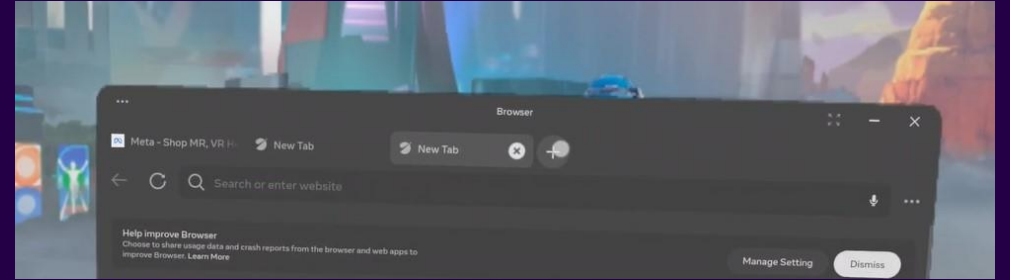
Screens



Reality

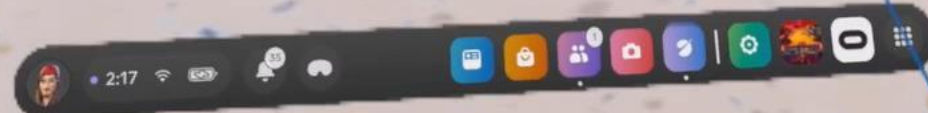
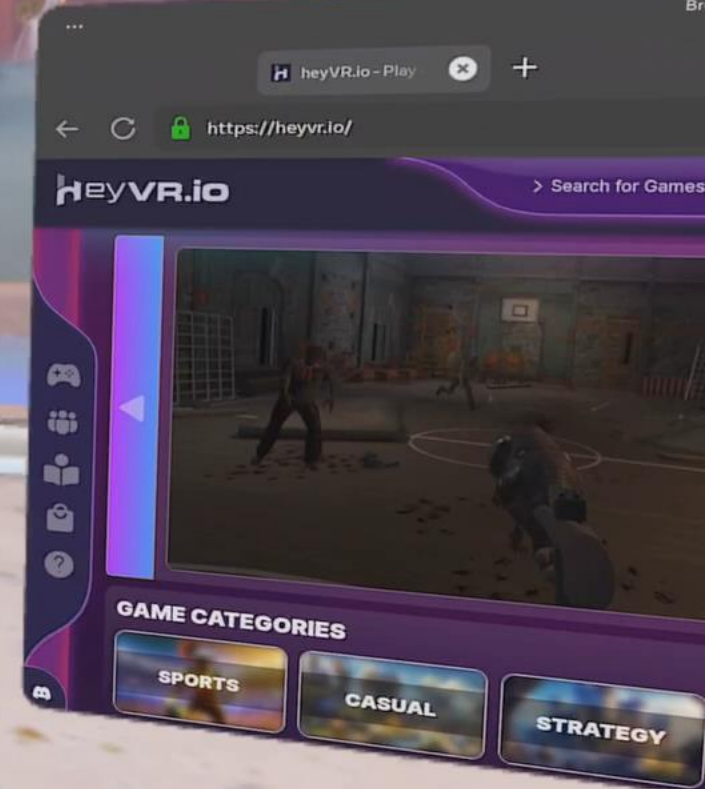
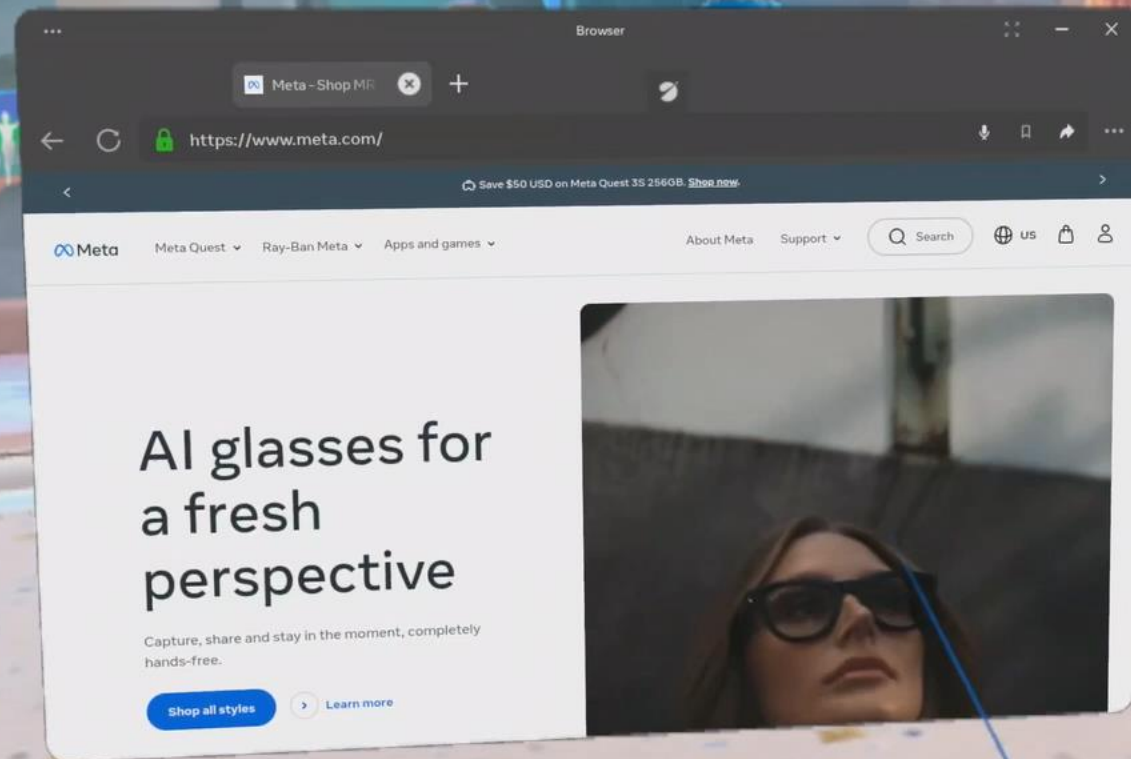


Virtual Reality



Screens









There is No Such Thing
as “Click”

Mental Models

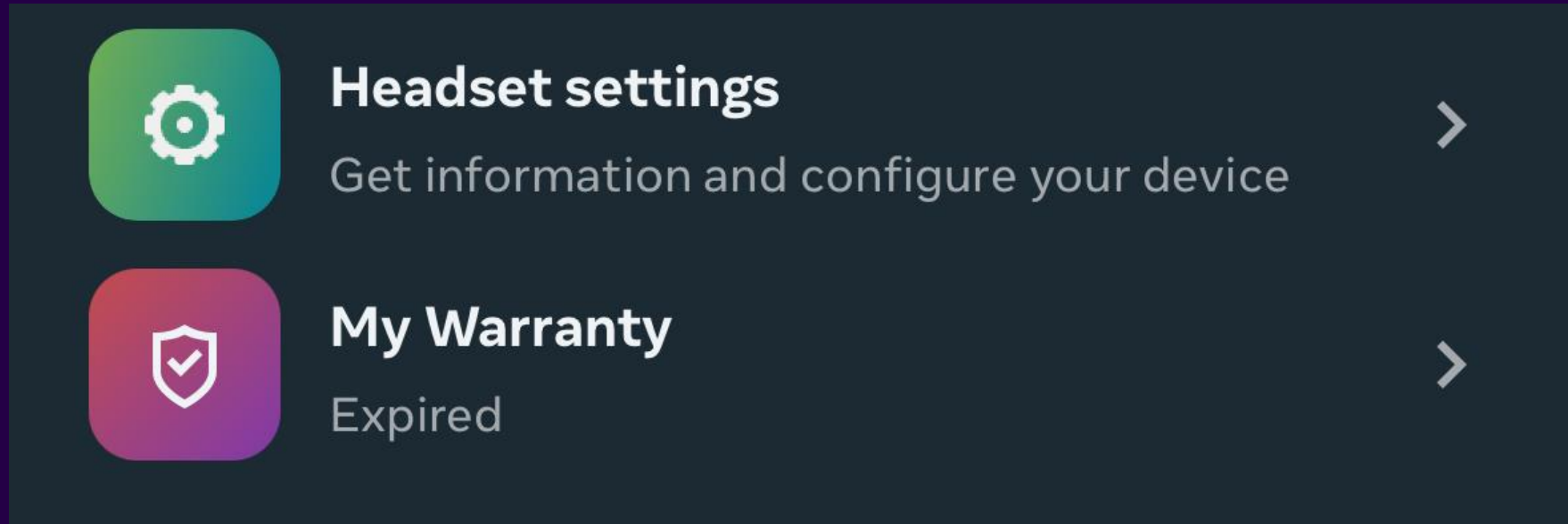
- That rectangle is a computer screen
- The dot is a computer mouse
- Your controller is a hand
- Controller is like a tool
- The tool is a laser pointer
- The laser pointer is a mouse

Chains of Models

- One concept that you have to use to understand another model that you have to use to understand another model that you have to use to understand another model that you have to use to understand another model



Let's Consider Quest OS Buttons



Buttons





Cadenza



Barista Express



Above Par-adowski Mini Golf



Ski Fit 365 (Bringing the Mounta...



Spatial Fusion



Flap Frenzy



f60



Asteroid Storm



Archery Dungeon



mr NOT - enough IS enough



Jumpy Balls



RAW Emotions Unite Us



To play with hand tracking, first enable it in the system settings and then put your controllers down.

Settings



music



comfort cage



camera rotation

< snap >

rotation speed

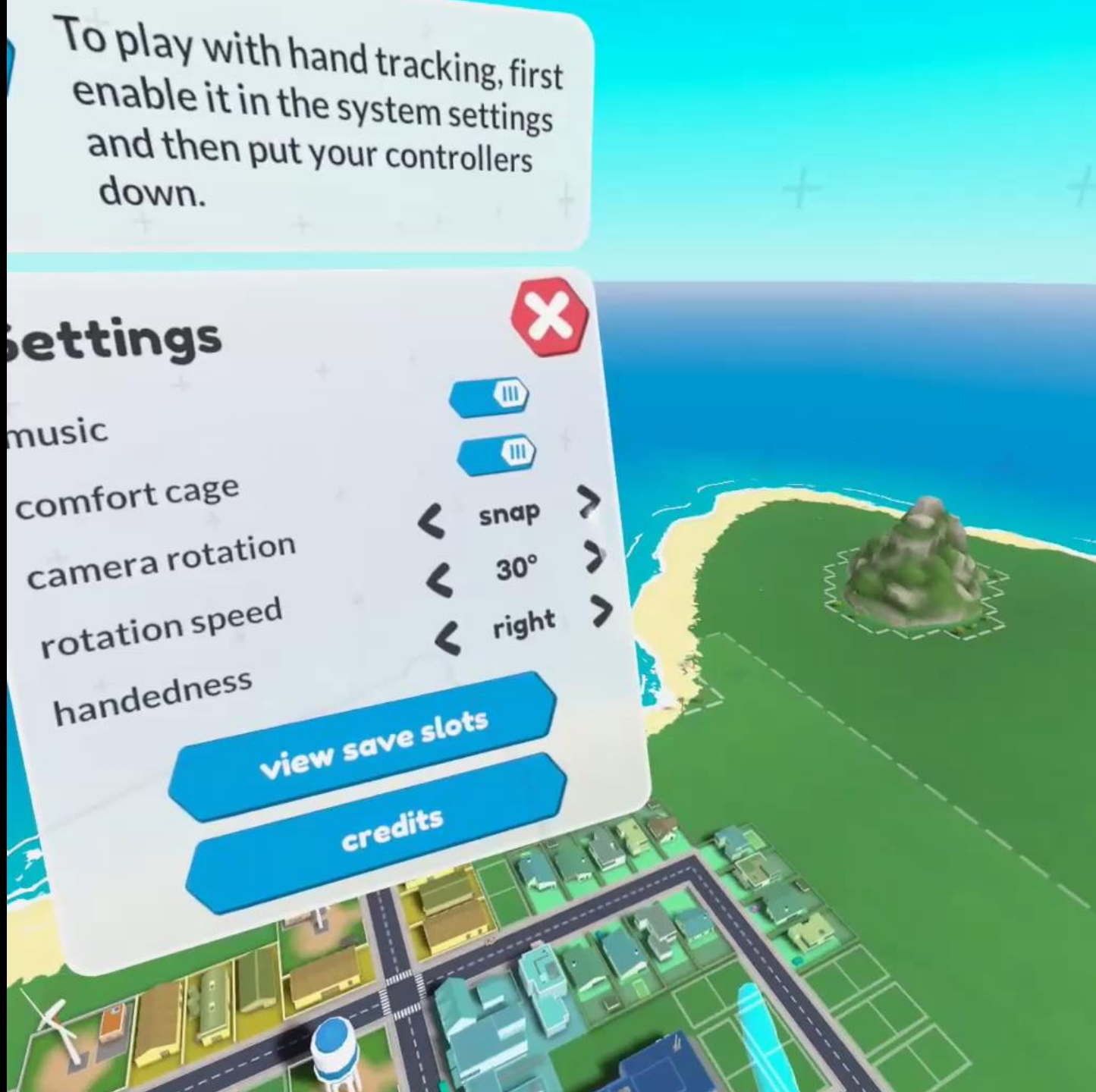
< 30° >

handedness

< right >

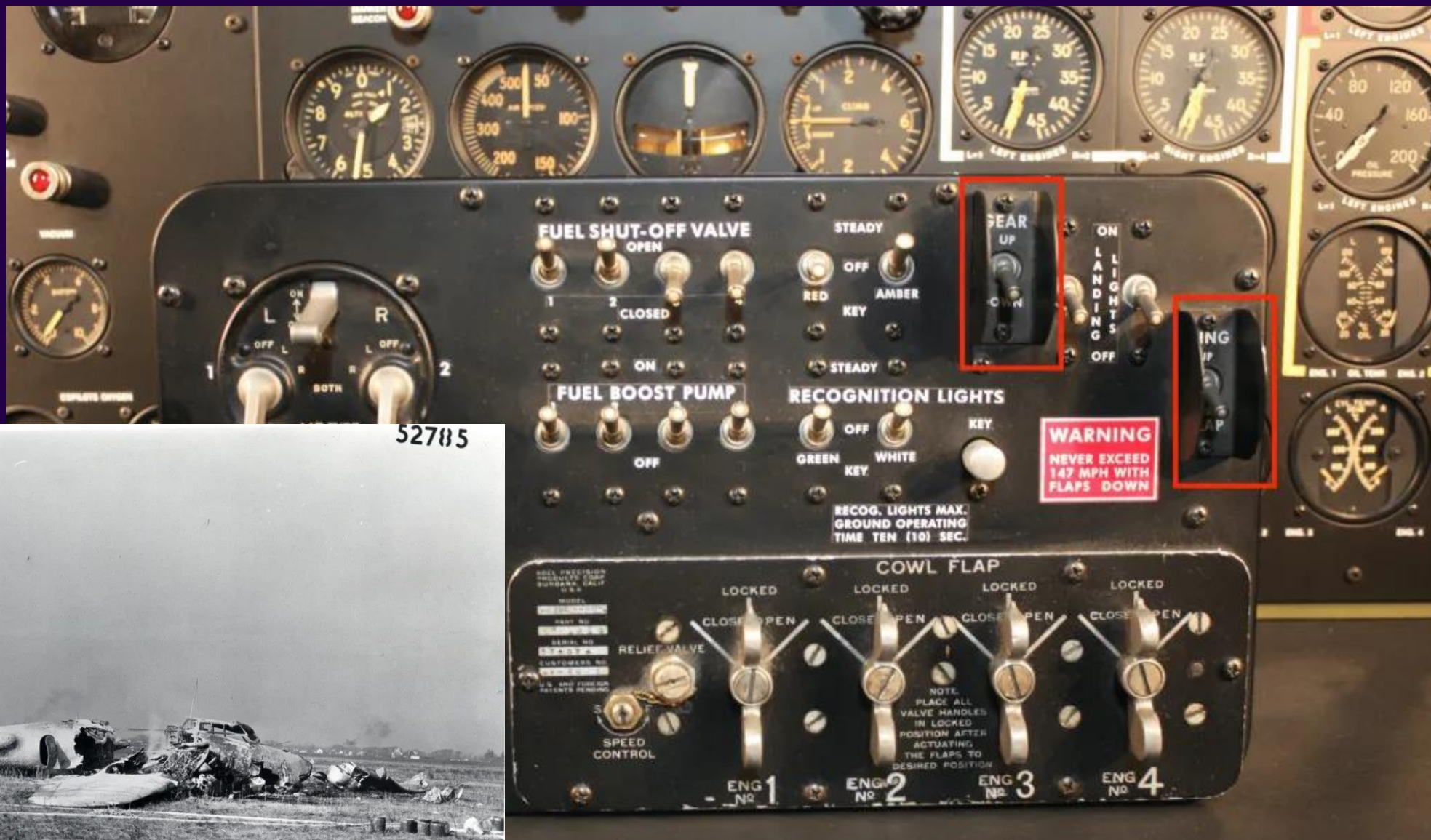
view save slots

credits



Abandoning Immersiveness





52785







“But laser pointers and screens are understandable and recognizable?”

“You don’t have to teach it?”

Why is this just a bad screen?

Hint: Because Quest is a phone running android

We can have it both ways

- A Floating panel that is disconnected from the environment in every way....
- We can do whatever we want with the environment!
 - *LIKE MAKE IT A COOL DIAGETIC INTERFACE*



What do we do instead?

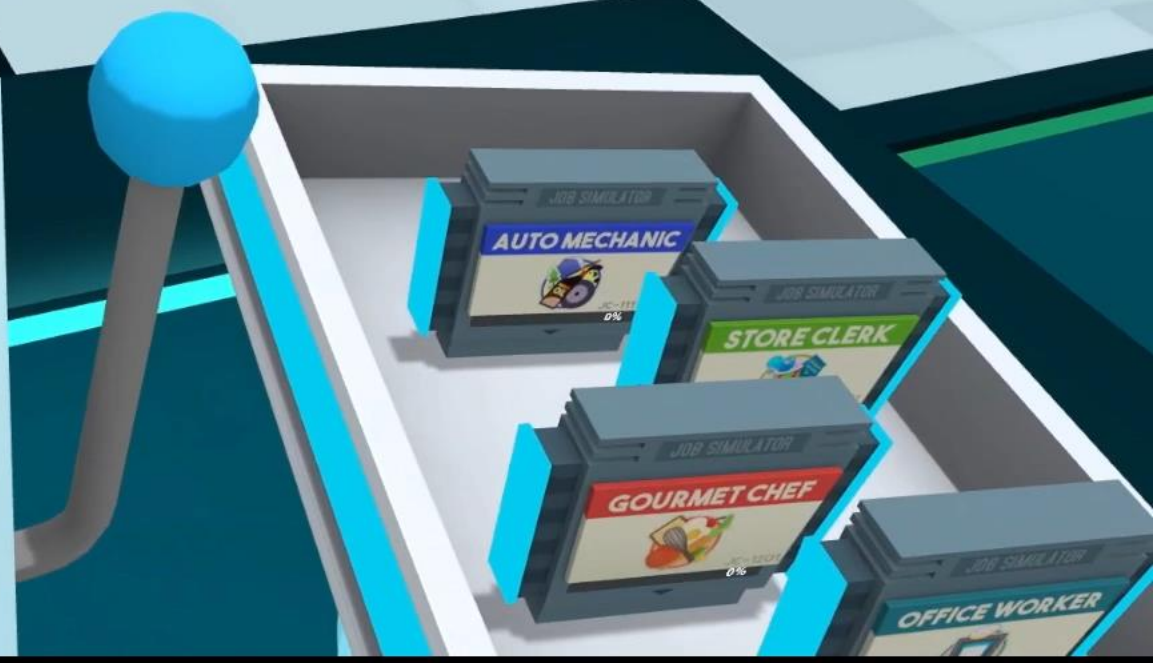
BOT
JOB EXPRESS
BOTCARD
BOT NETWORK



THE JOB SIMULATOR 3000



PERFECT CARTRIDGE



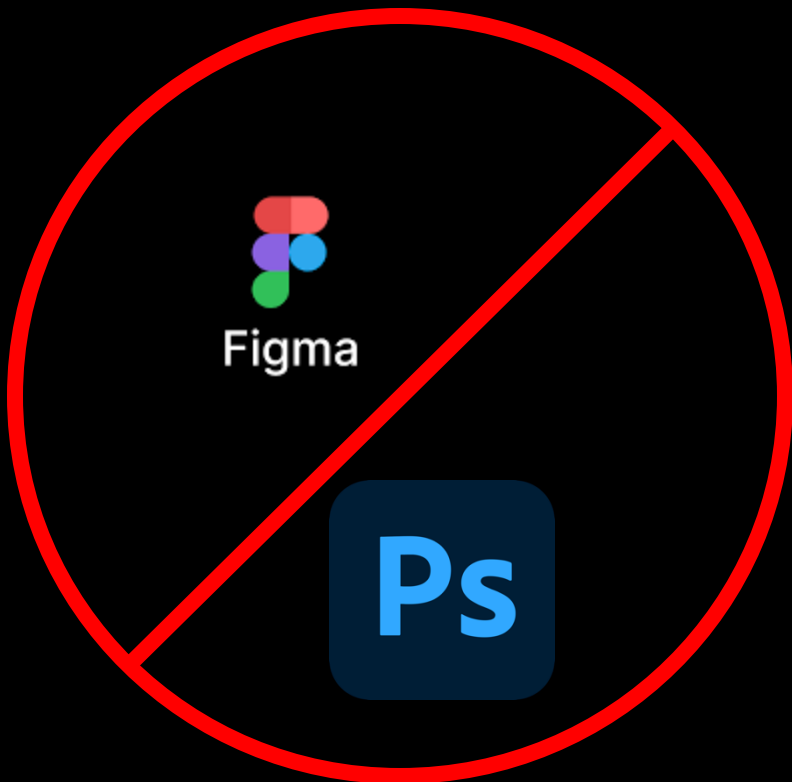
Stick





In Conclusion

- Use **Depth Cues** to make the game more **Immersive**, which makes everything else about the game better



Slides, Links, References, Follow-up

hdyar.com/talks/vrdesign2025

