

# 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*

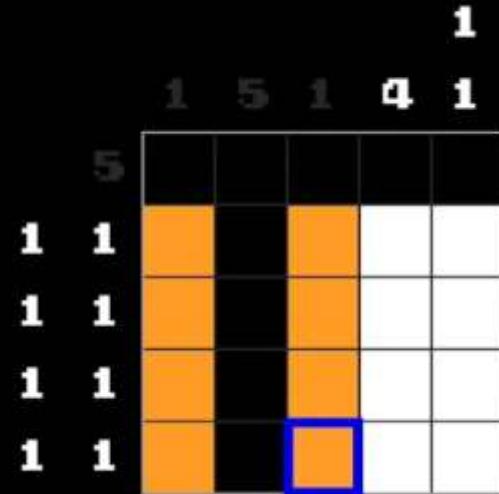
The State of Virtual Reality in 2024 and Beyond  
*Sun 12:30-1:30*

How to Get Into VR  
*Fri 6-7pm*

Blender for Artists and Developers  
*Thur 7-8pm*

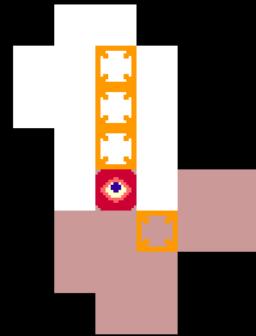
3.5

1



Pi-cross

spine



Hunter's Block Puzzles

# Swadge

How the Sausage is Made: The Swadge Dog Panel

*Thur 5:30PM*



[hdyar.com/talks/vrdesign2025](http://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...

# 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

# The Suspension of Disbelief

- Immersion: Suspension of Disbelief for our Senses

Book: “Hamlet on the Holodeck” by Janet H. Murray

# Defining Immersion...

- Immersion: The Suspension of Disbelief
- 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’

# Presence

## Builders

- Hand Presence
- Social Presence
- Familiarity
- Realistic Audio
- Proprioceptive Alignment
- Comedy

## Breakers

- Motion Sickness
- Unintuitive Interactions
- Intensity Overload
- Unrealistic Audio
- Proprioceptive Discomfort
- Lack of Identity

Book: “The Art  
of Game Design”  
by Jesse Schell

# 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

# By-product

Well Designed VR Games should be easier and faster to pick up than a comparable non-VR game

# 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

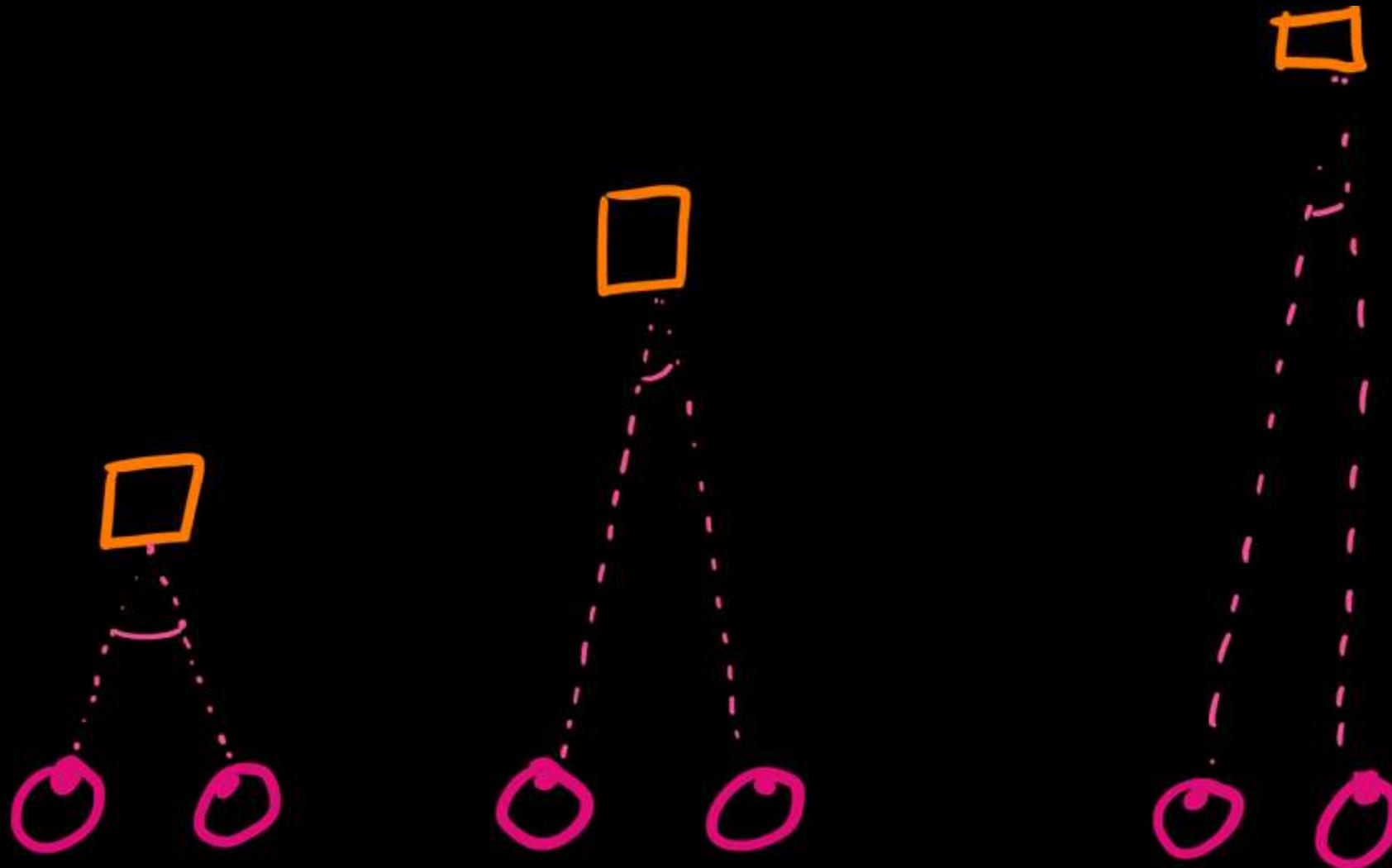
# Visual Depth Cues

More than just stereo vision!

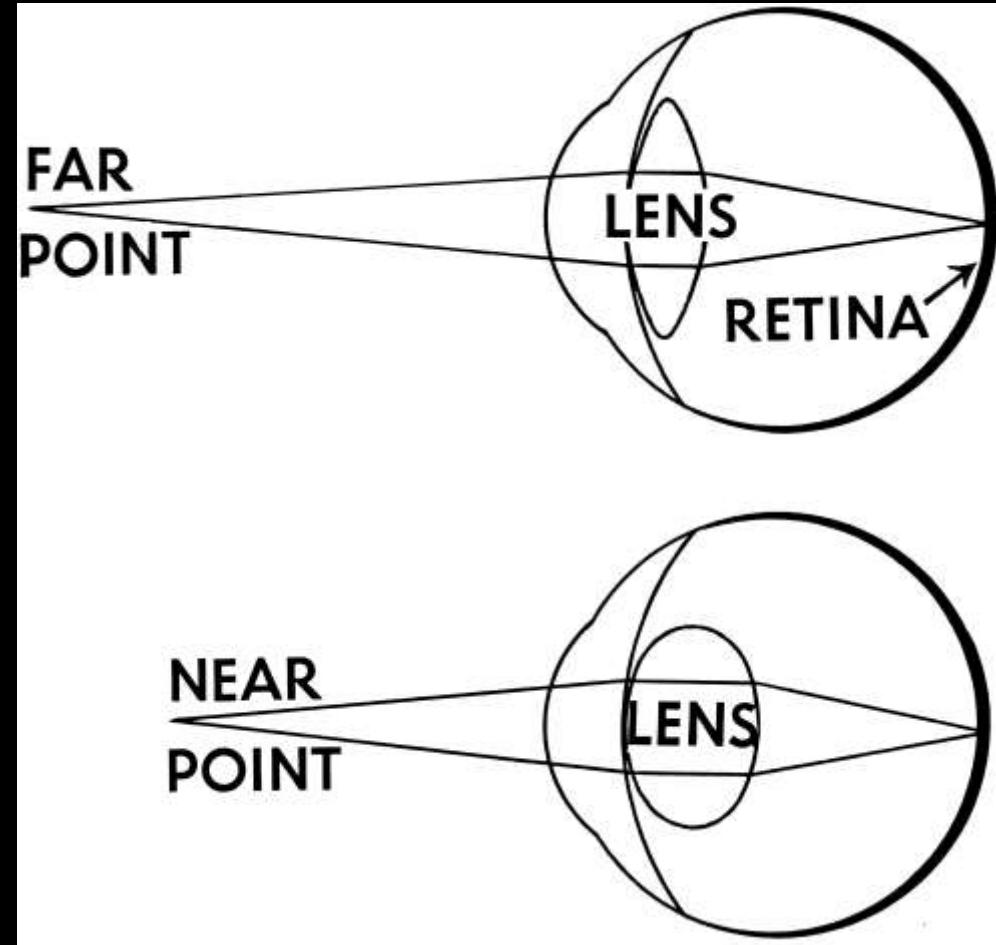
# Stereo



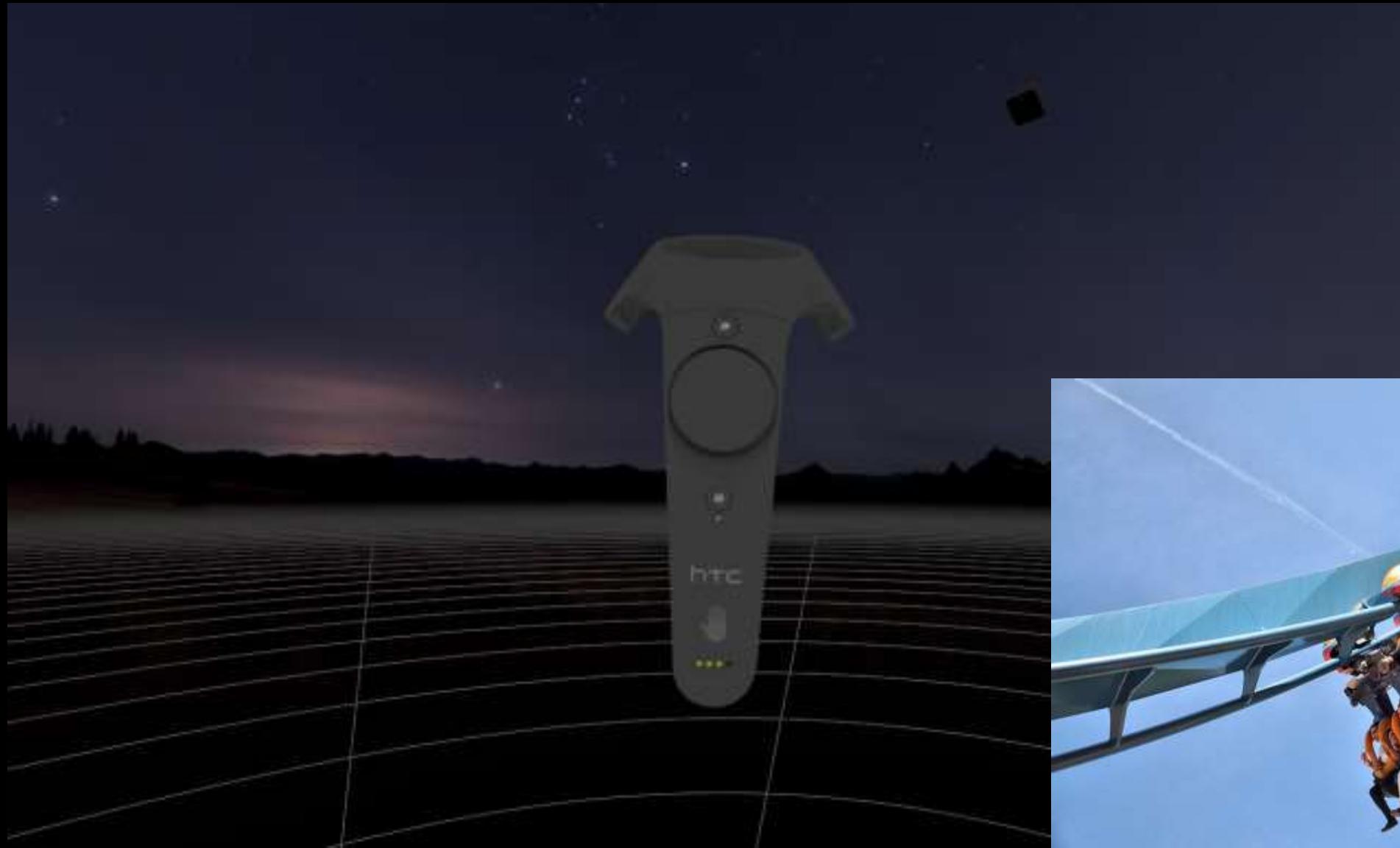
# Convergence



# Accommodation

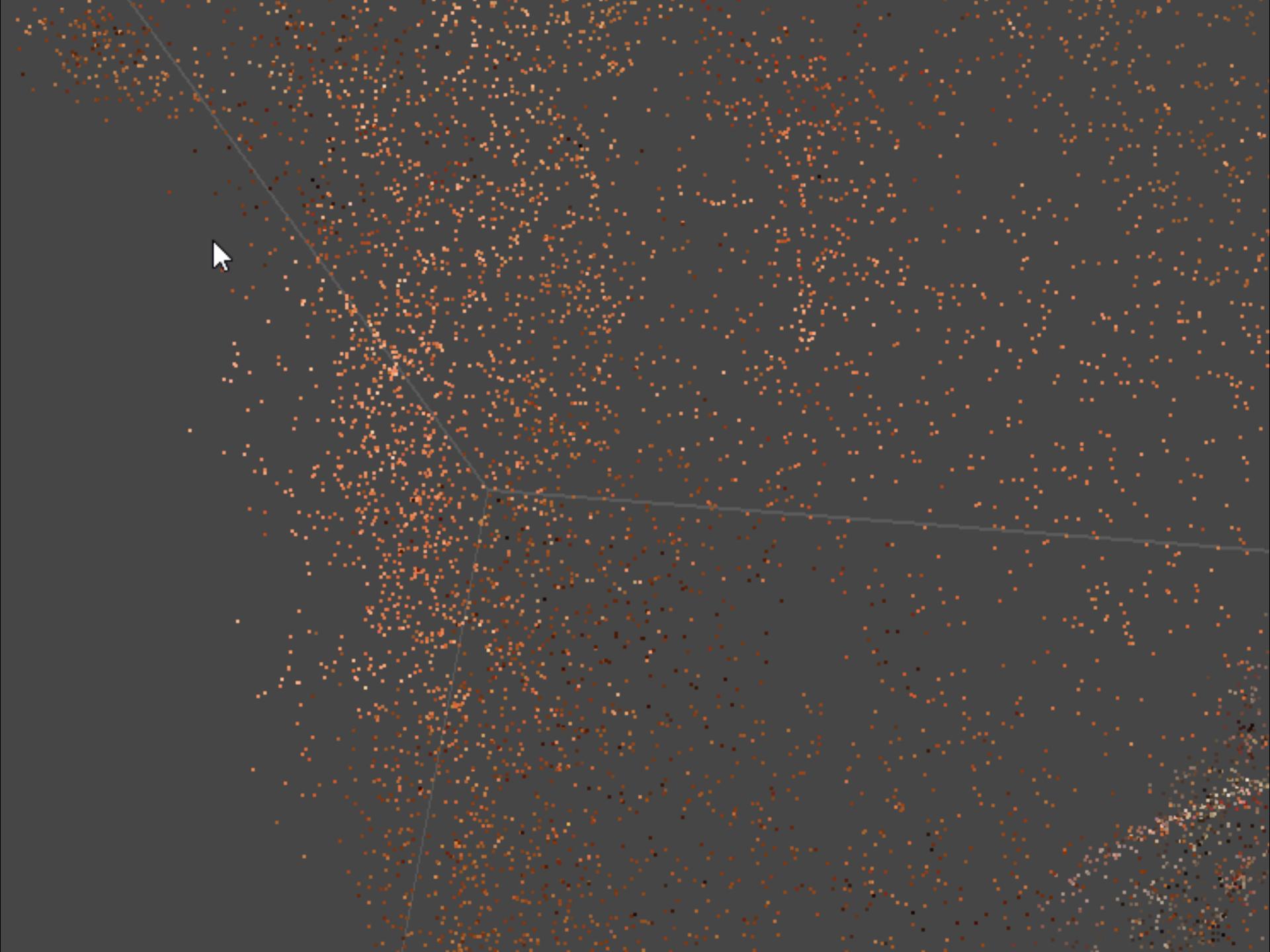


# The Ground Plane

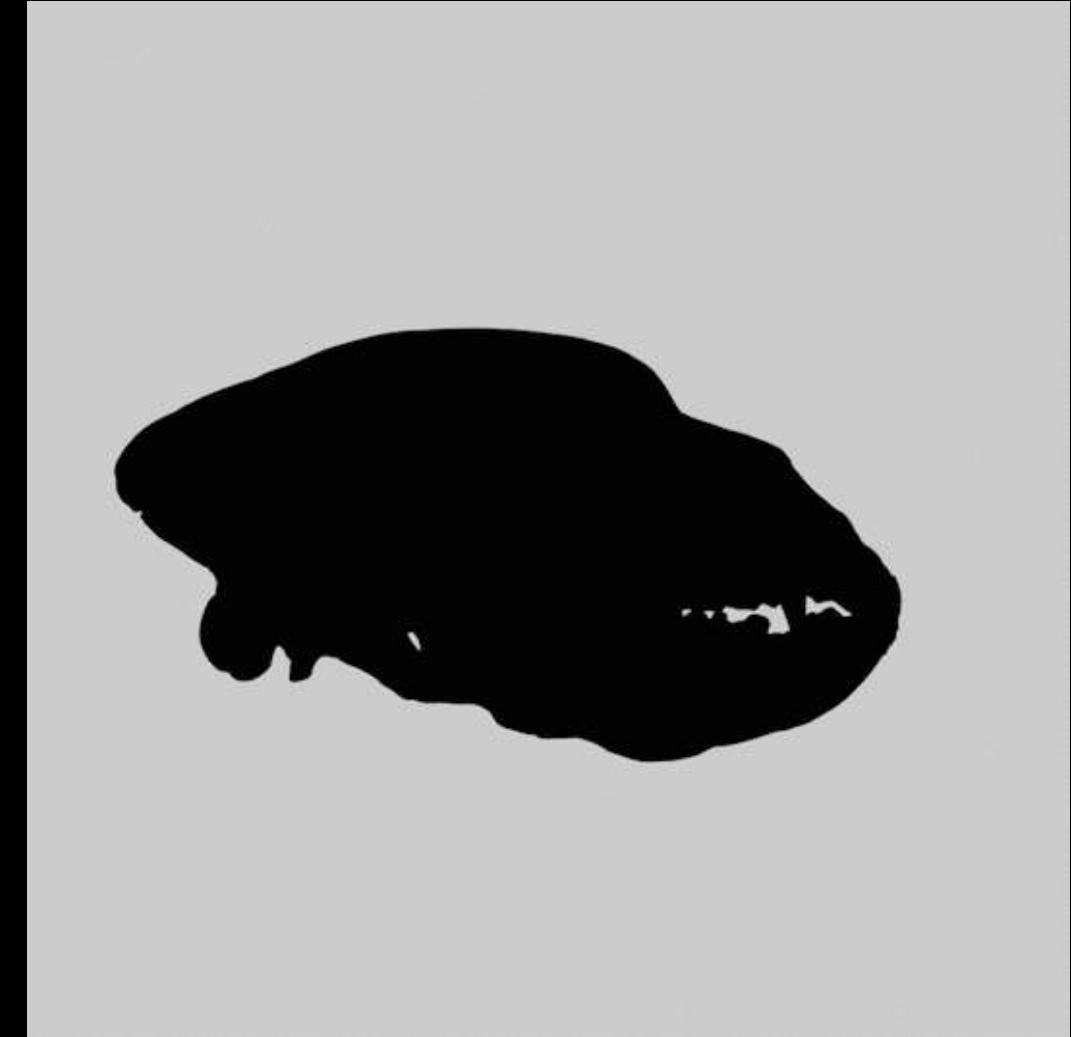


# Motion Parallax

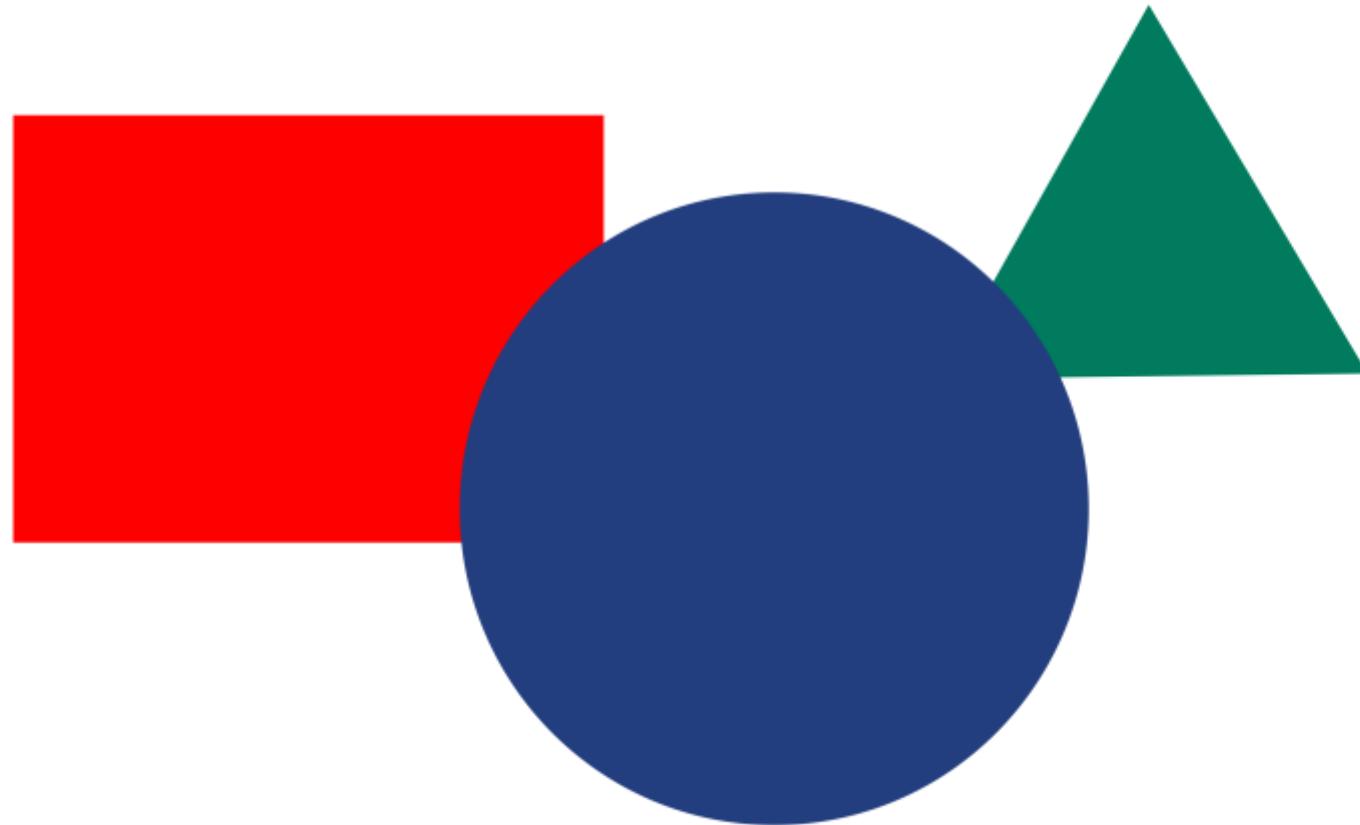




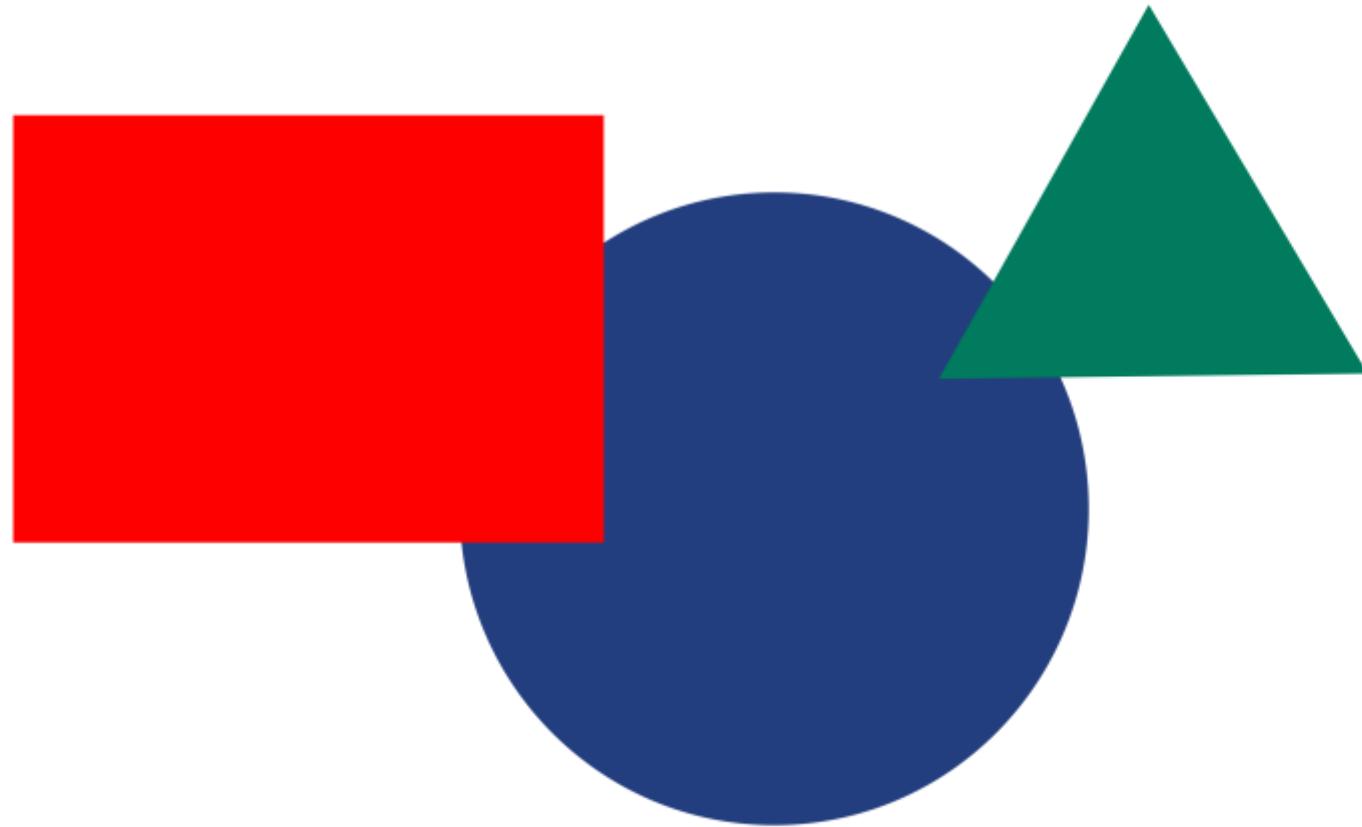
# Kinetic Depth Effect



# Occlusion



# Occlusion



# Atmospheric Gradation

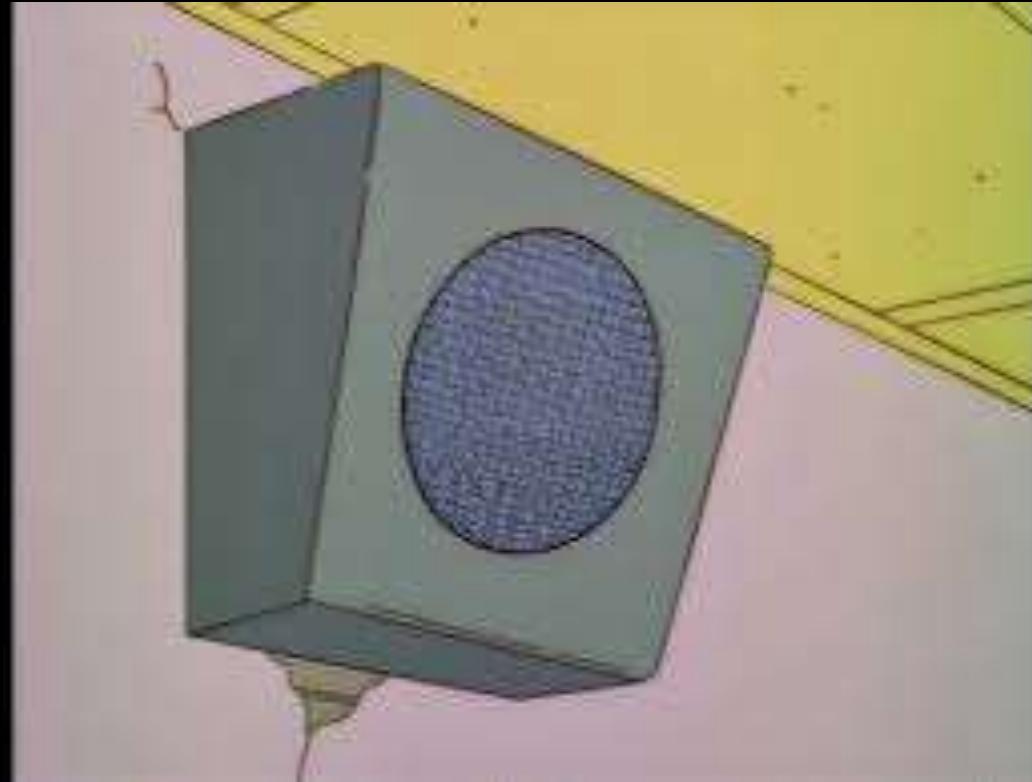


# Familiar Size



# 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

Introduction to  
Sound Design for  
Virtual Reality  
Games – Julius  
Nuora

# 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

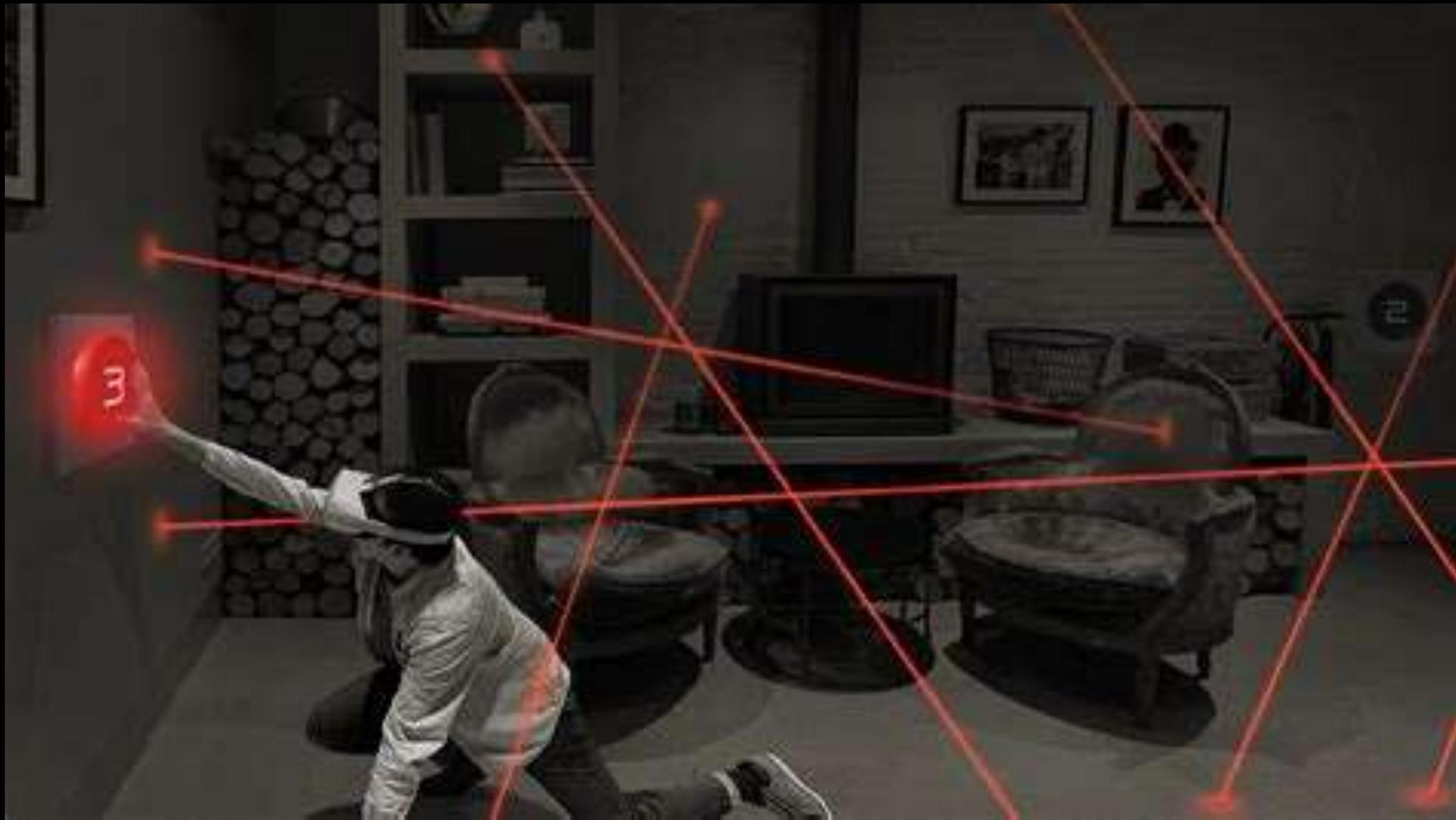
Fantastic Contraption and  
Why VR Menus Suck – GDC  
Talk 2016 – Colin Northway

This Is another

# Speed and Execution of Movement



# Pose and Feel





# Encourage Your Users!



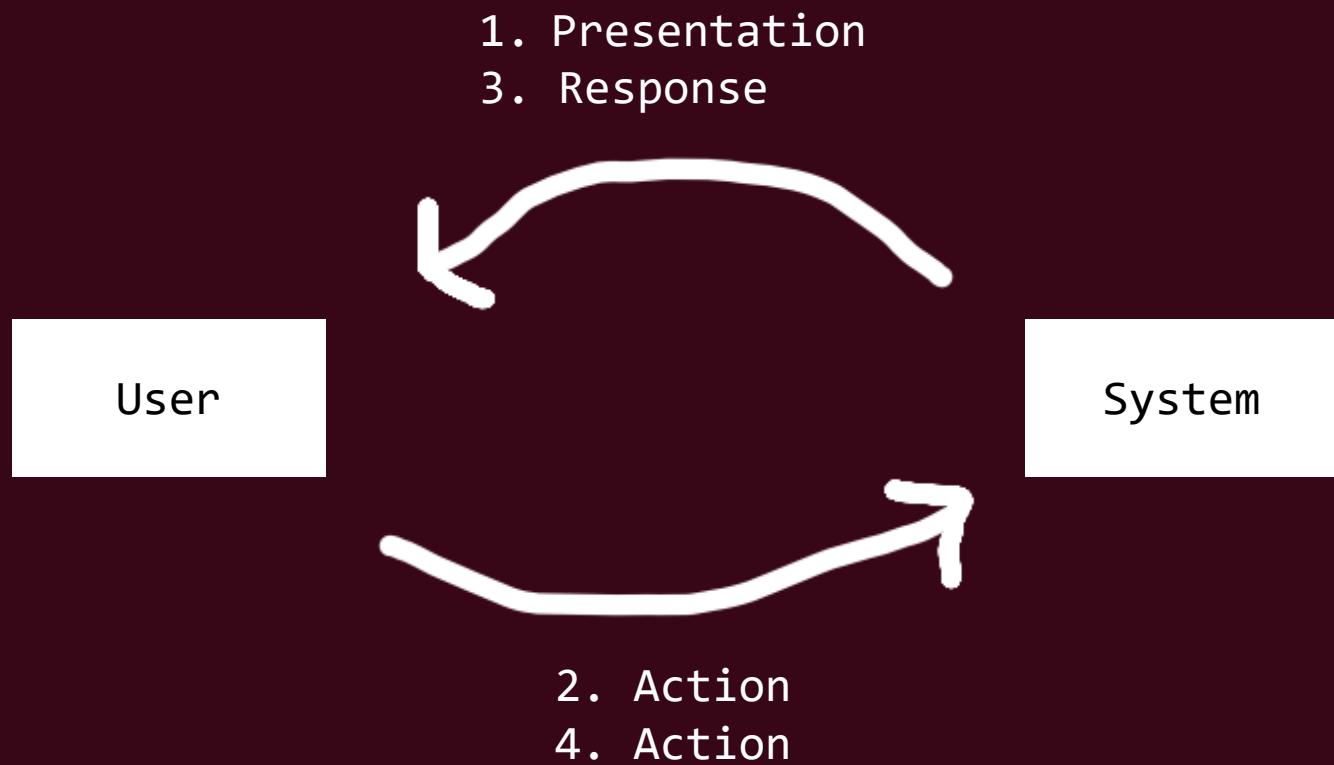
# Toolkit & Defaults

How to Design for VR

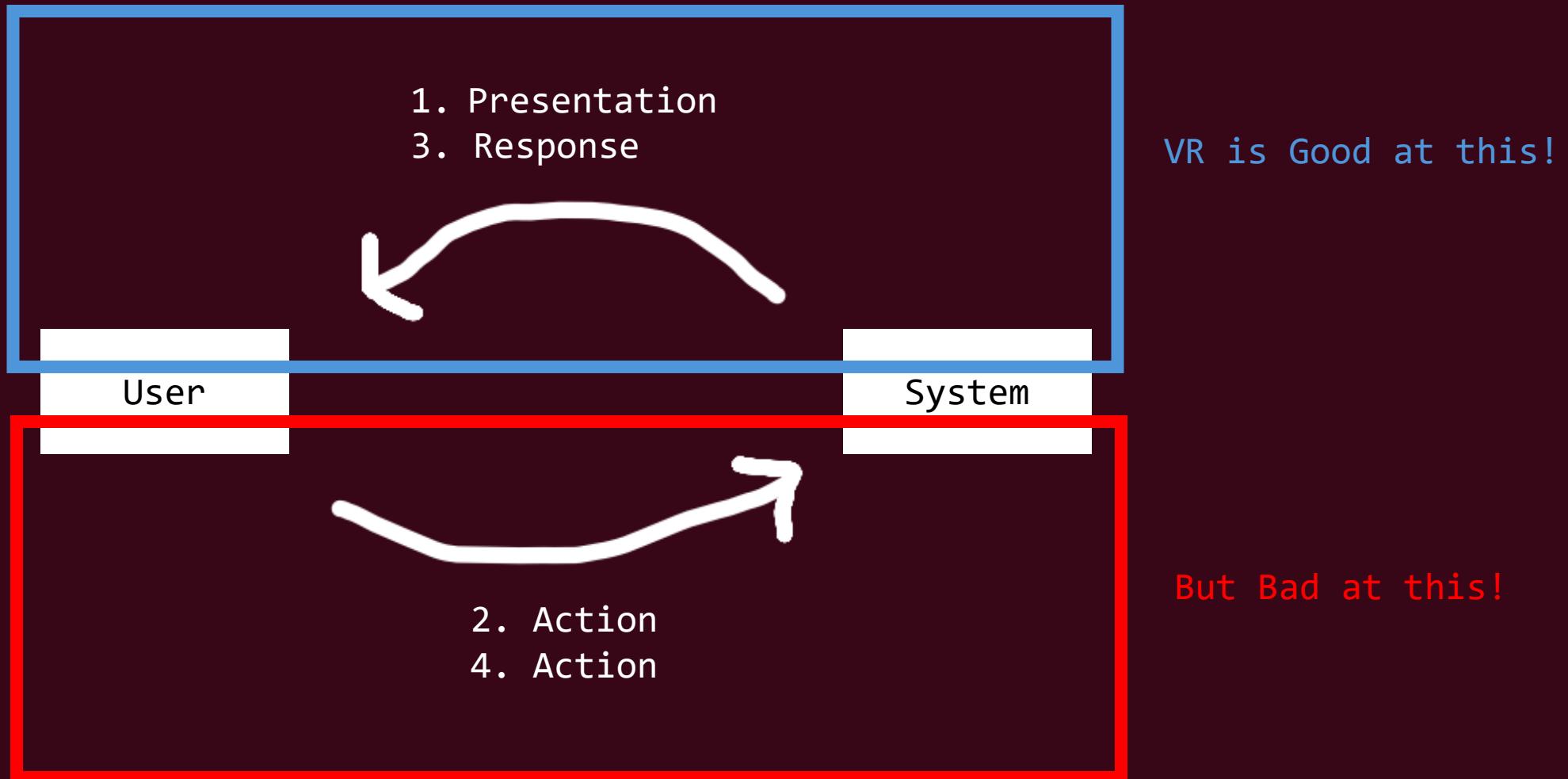
# Topics in No Particular Order

- 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?” (“



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

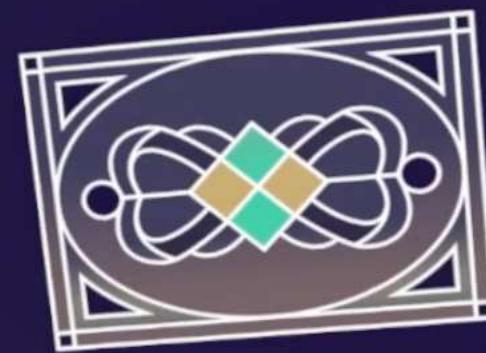
HDYAR



3 2

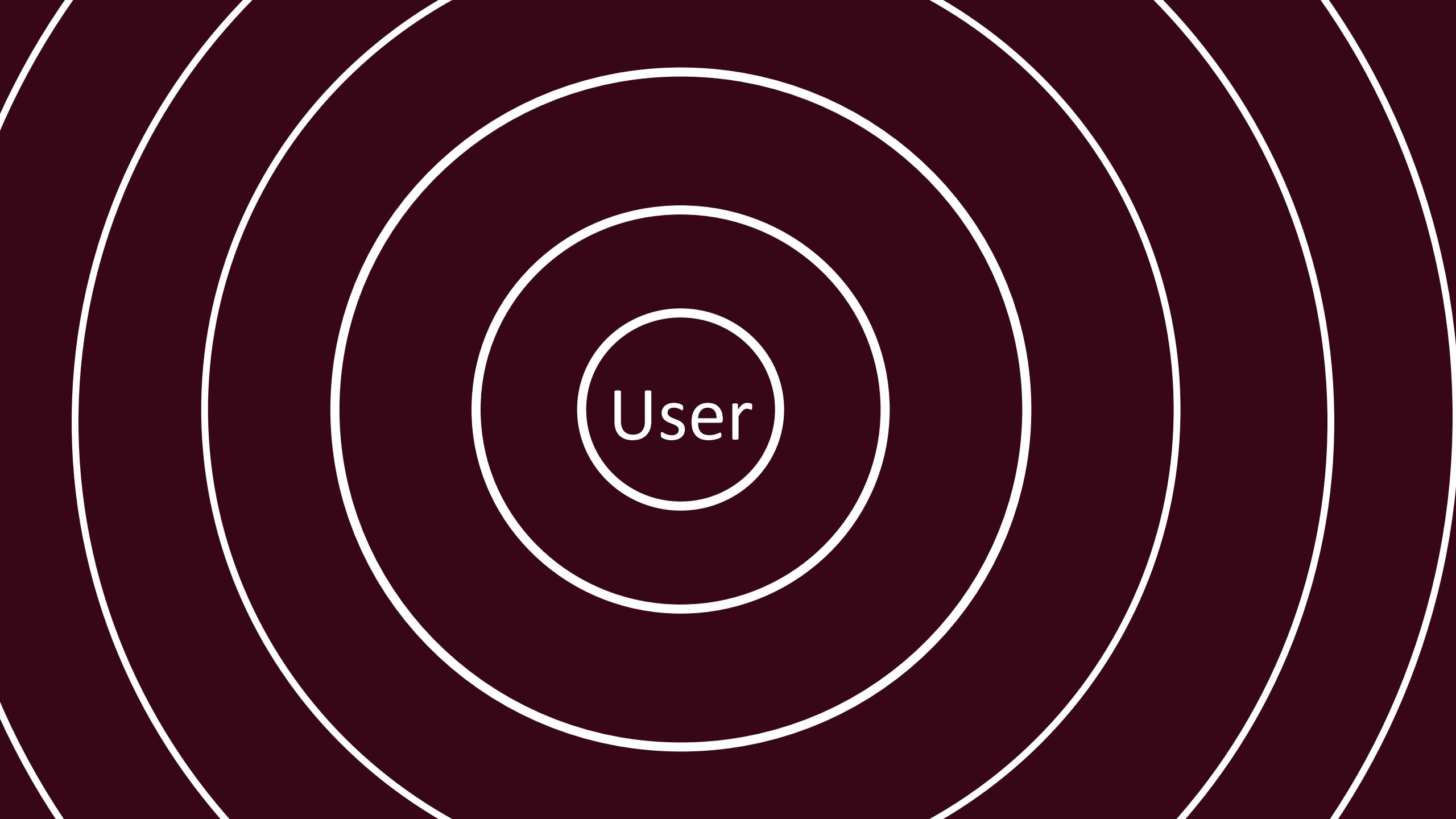
Hide Menu



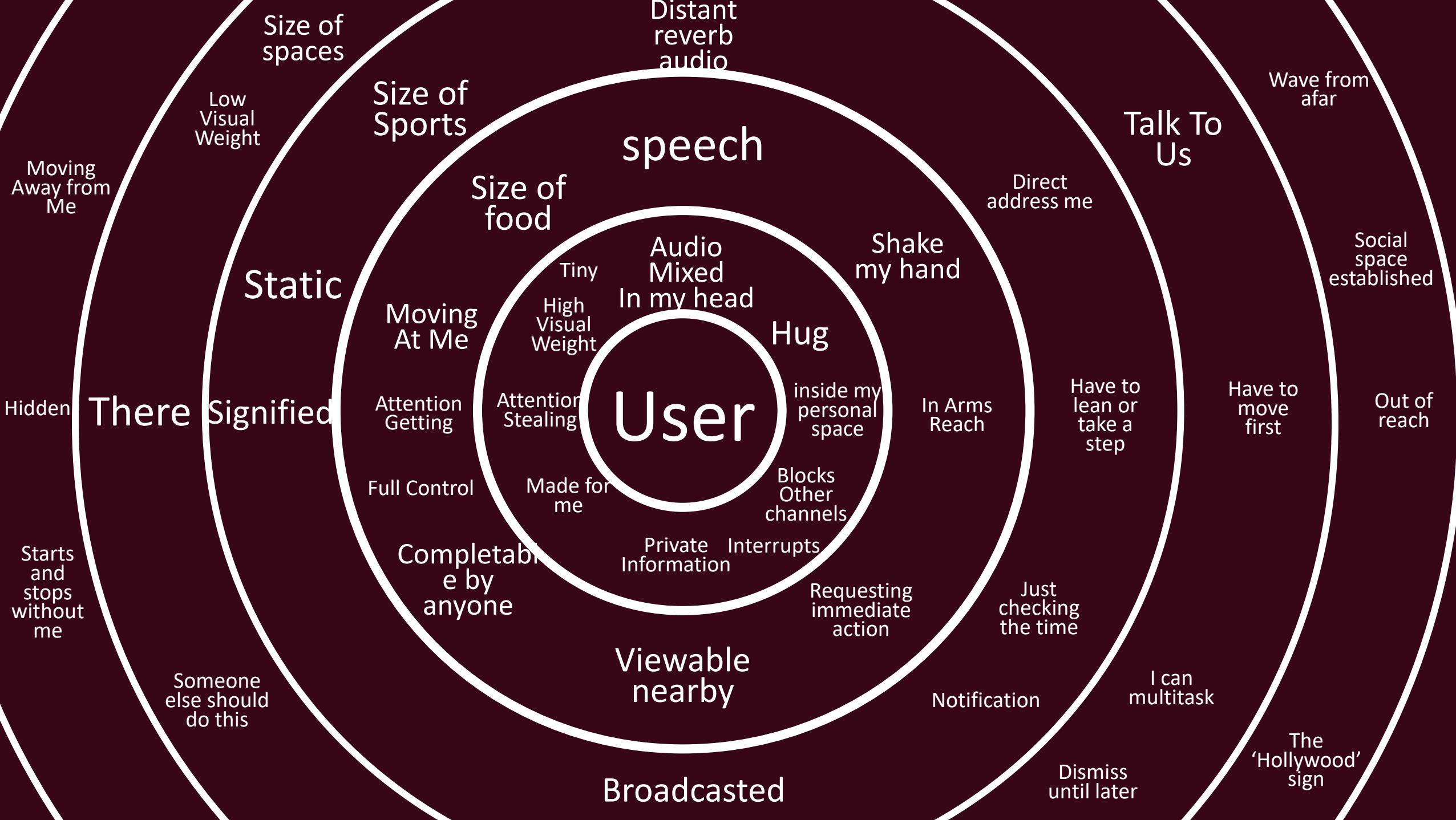


# Zones of Intimacy

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



User



# Non-Diagetic

- Background Music
- Non-spatialized Audio
- Physical Interactables
- A HUD
- Flat Screens



# Diagetic

- A Band In The Scene
- Pop-up text box
- Audio with a source
- A Television Screen



**STOP TRYING TO MAKE VR HUD HAPPEN**

**IT'S NOT GOING TO HAPPEN**

# Spawn Pillar

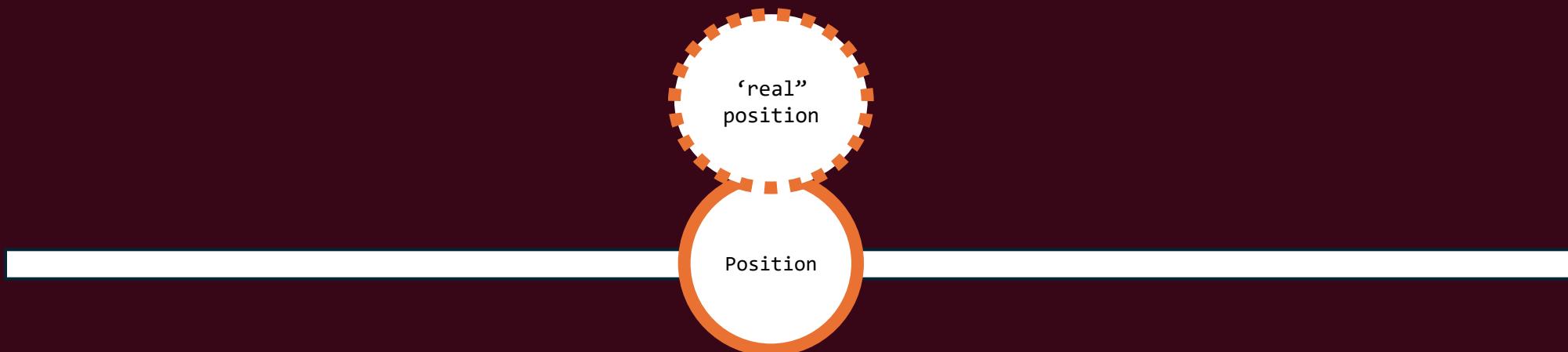


Page  
Selector

Pose Ghost

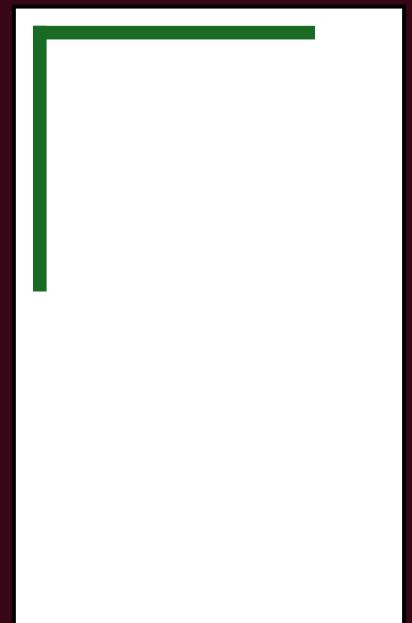
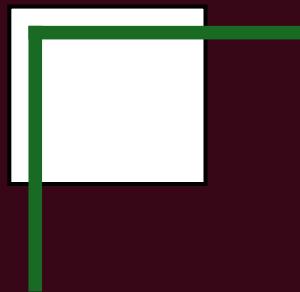
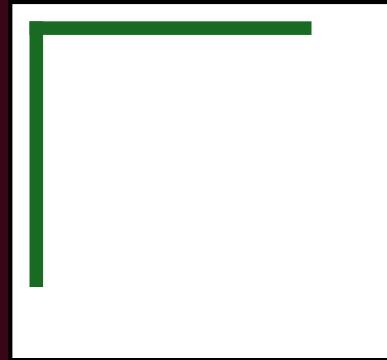
# Constrained Tangible Interfaces

- 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

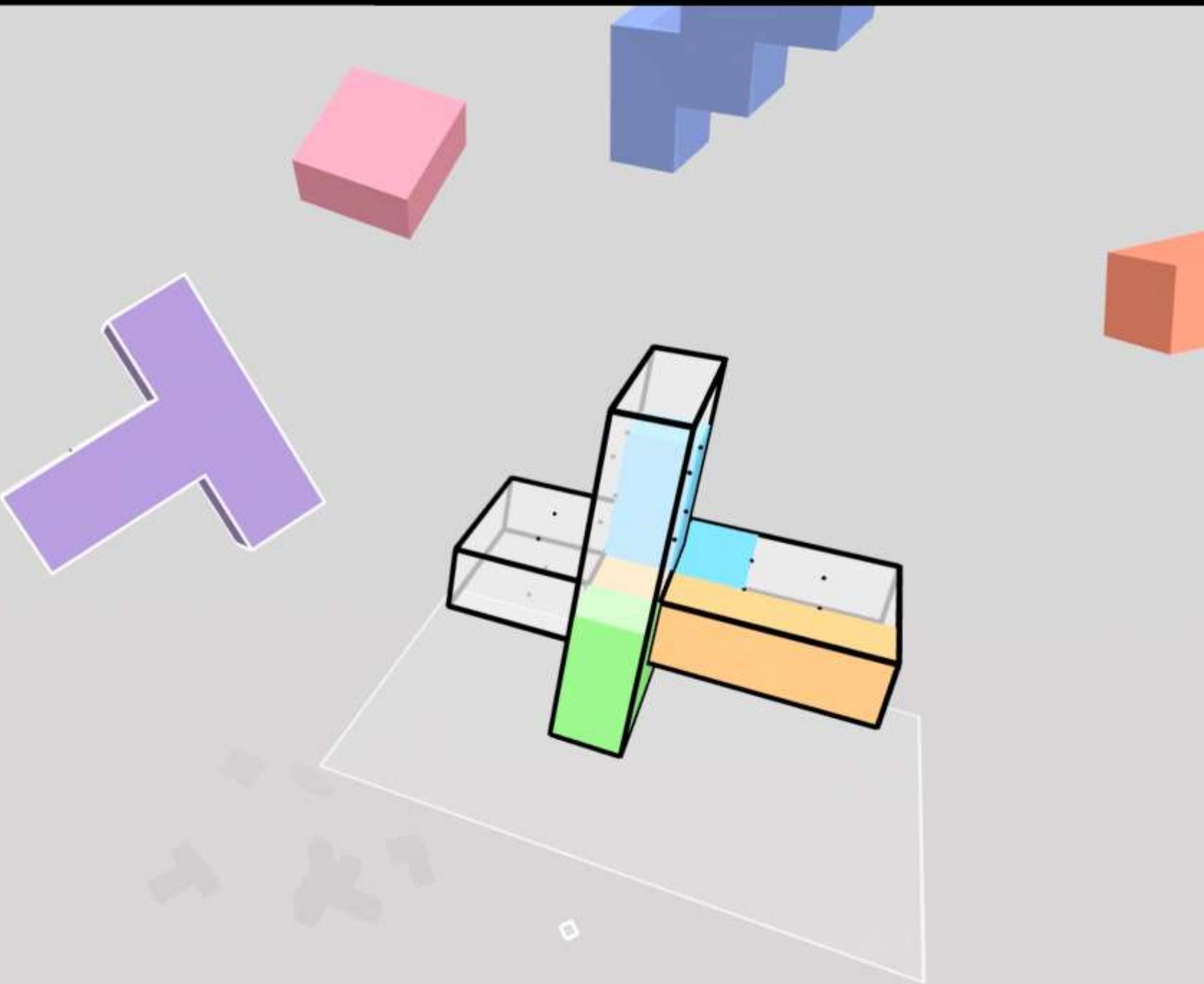
- “I have made a magical experience where anything can happen and you can live your dreams...”

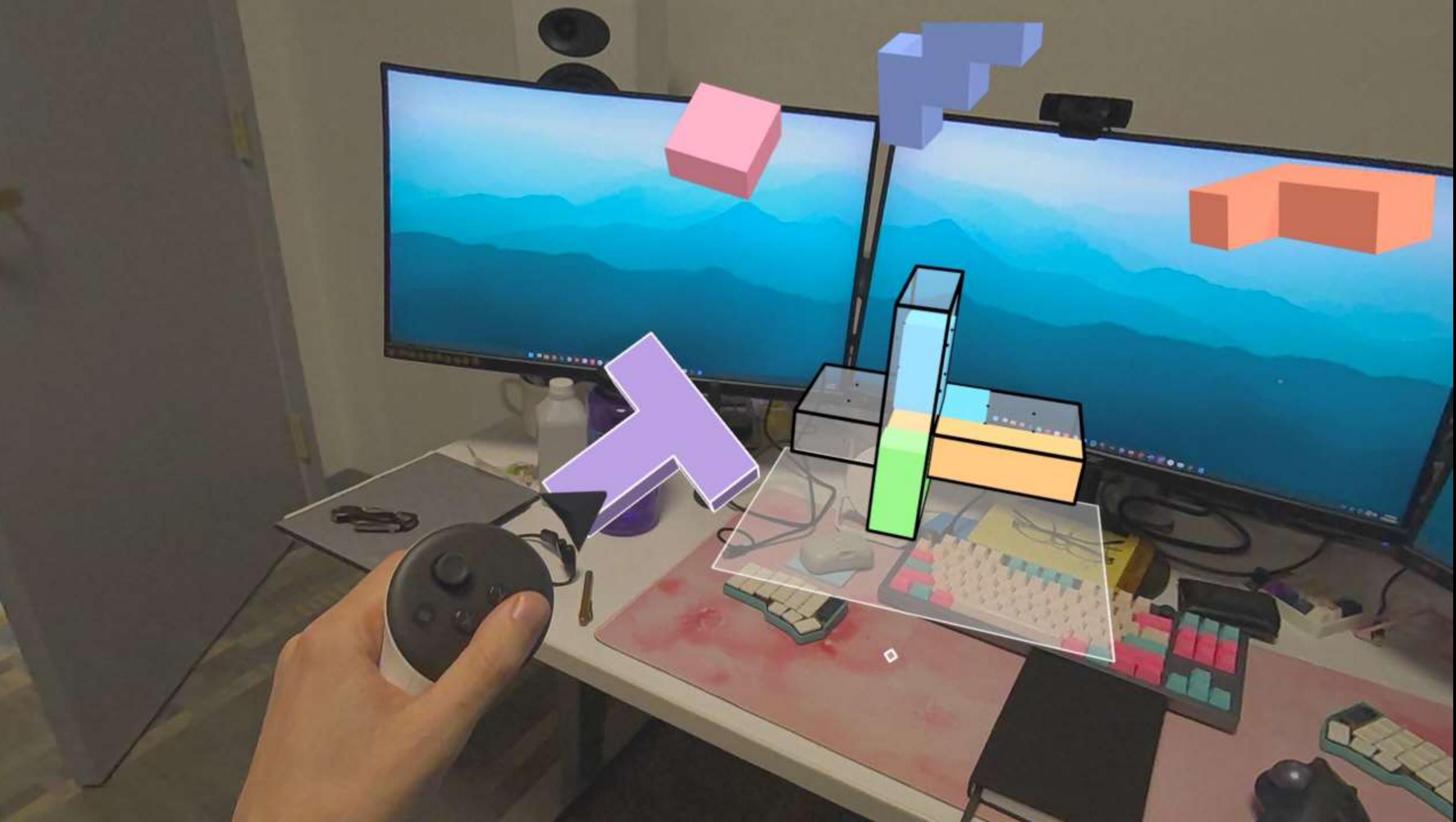
*Unless you have short arms”*



# Communicate Depth Everywhere

- Texture on Flat Surfaces
- Familiar sized objects (repetition!)
- Occlusion
- Light Falloff
- Atmospheric Gradation (lil' fog)
- Can't add anything? Do it anyway with dust motes!







SCORE:  
**2,624,008**

LARGEST COMBO: 15

NICE  
1X



Applications



Worlds



Downloads



# 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

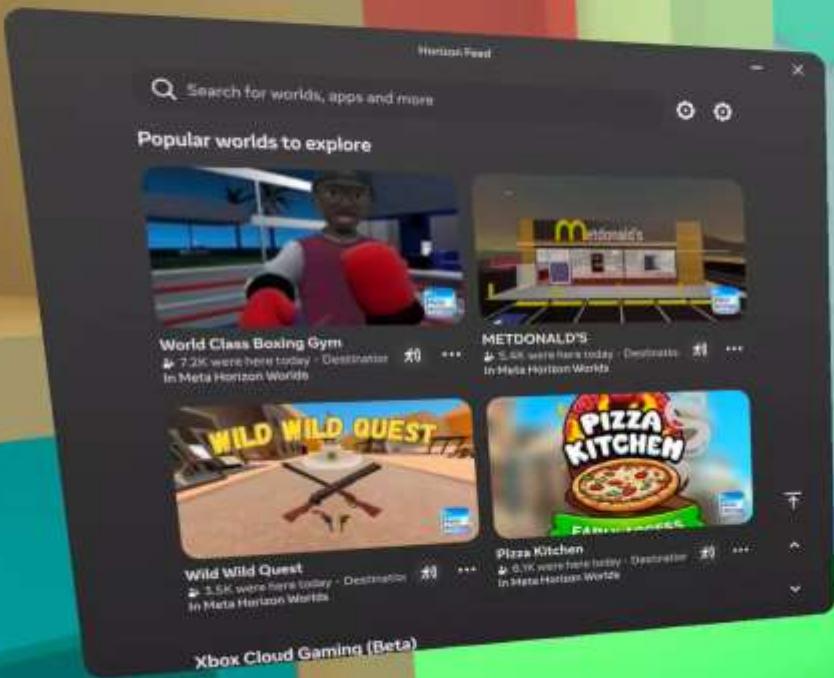
Job Simulator to  
Vacation Simulator:  
Advanced  
Interactions for  
Room-Scale VR – GDC  
Talk – Owlchemy Labs

# 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)*





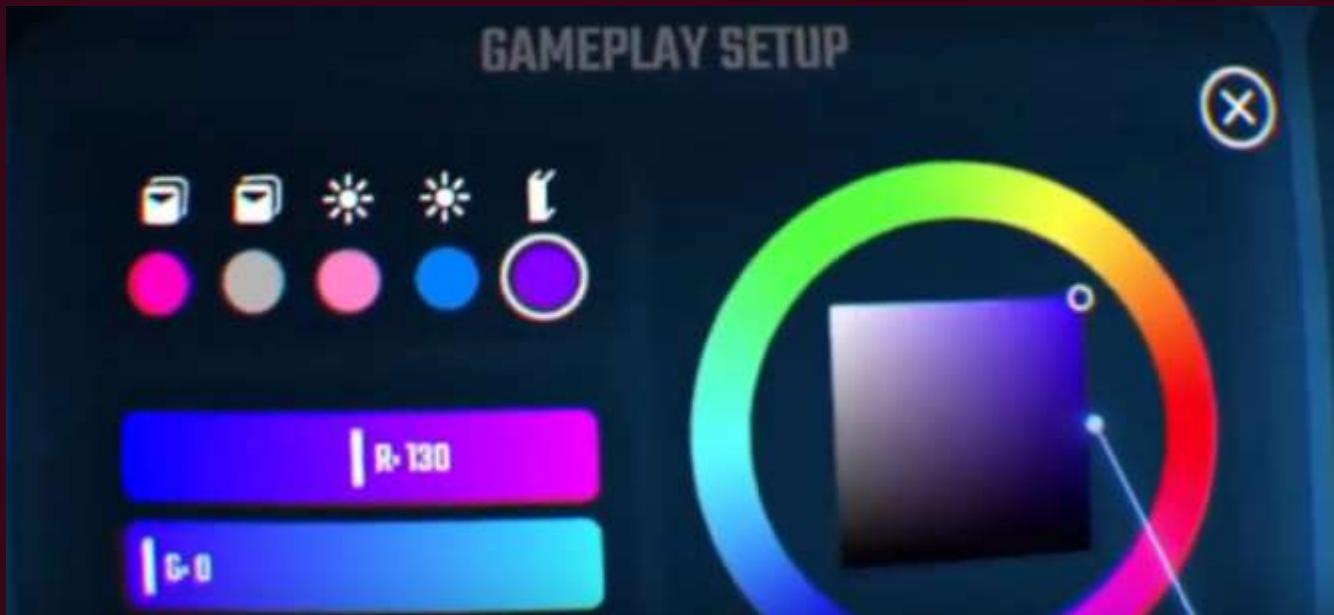


# Toilet Ready VR

- 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



PAUSE

MOVE

SCOREBOARD

PULLBACK HAND



PULLBACK  
ARROW

MOVE

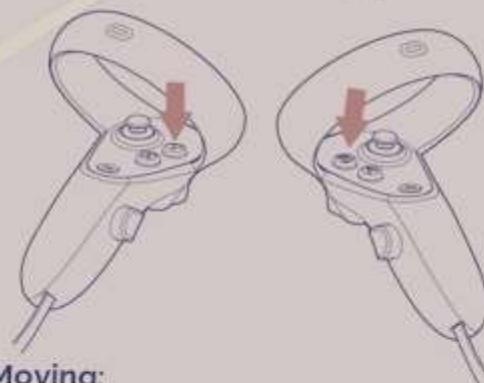
TURN

BLOCK ARROW  
while arrow is in flight



**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 SH**  
push joyst



**Group**  
Orga into t

**Peek**  
Peek i the pe



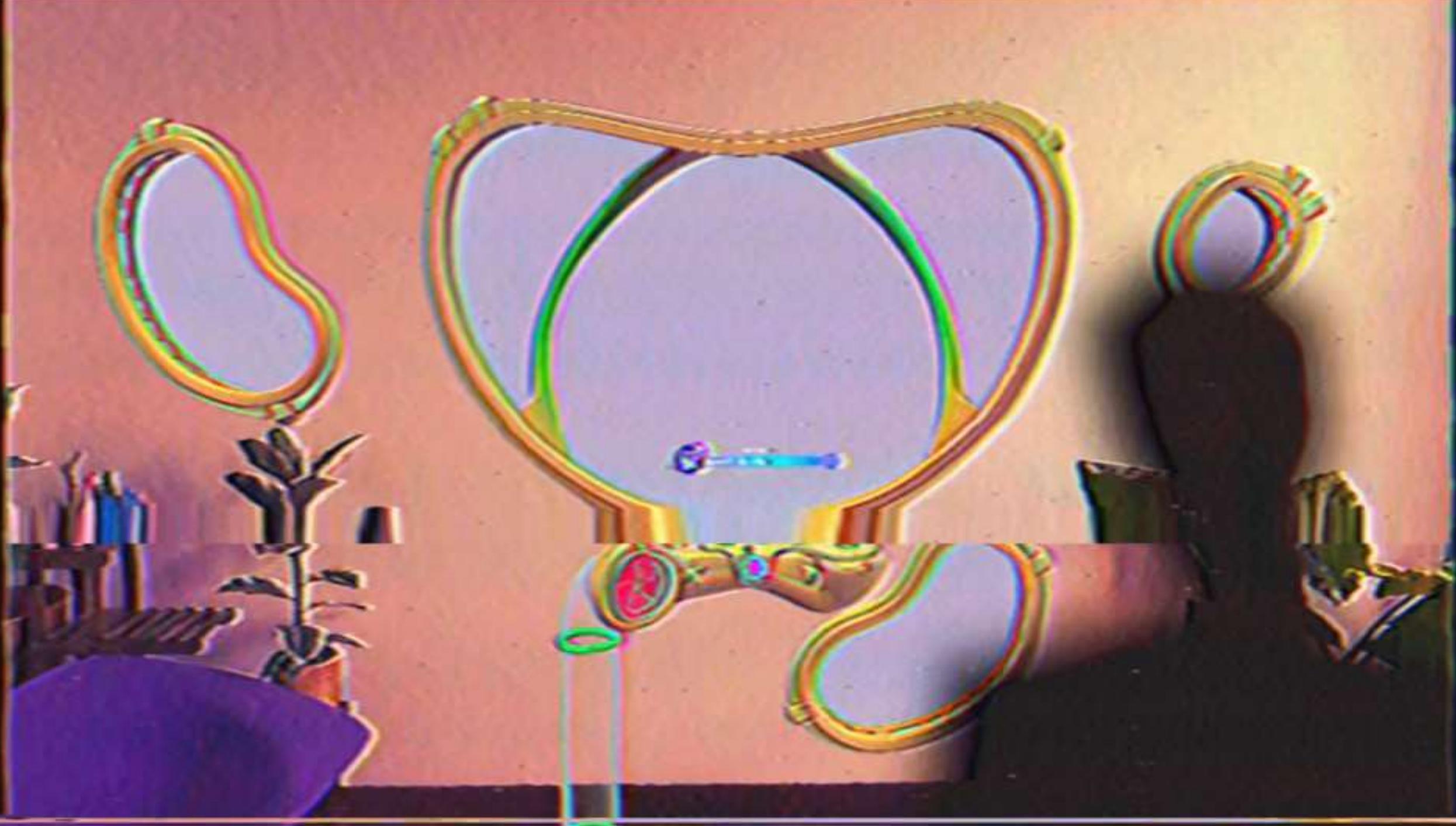
**Back T**  
Point at the



# 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.



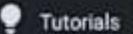
Erste Schritte in VR



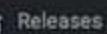
Deinen Avatar erstellen



Mit Freunden in der VR verabreden



Tutorials



Releases



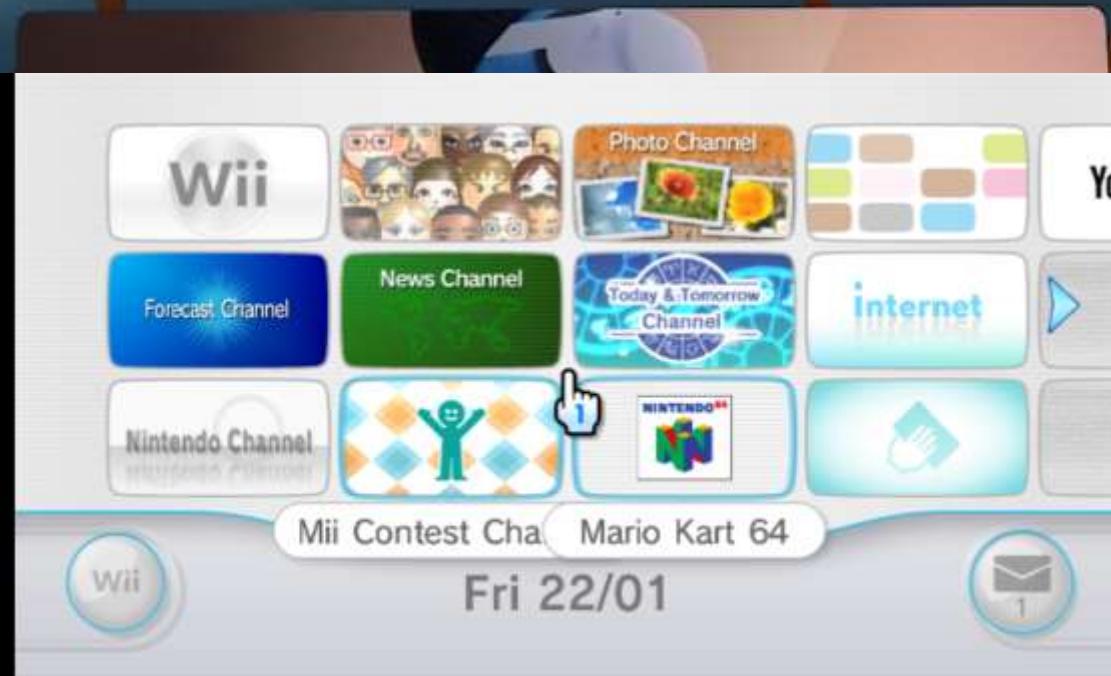
FAQs



Meta Quest-Anleitung

17:38





X -

Meta Quest-Anleitung

17:38



# Skeuomorphism



Screens

Reality



Virtual Reality

Reality

Screens



Virtual Reality

Reality

Screens



Virtual Reality



Screens

Reality



Virtual Reality

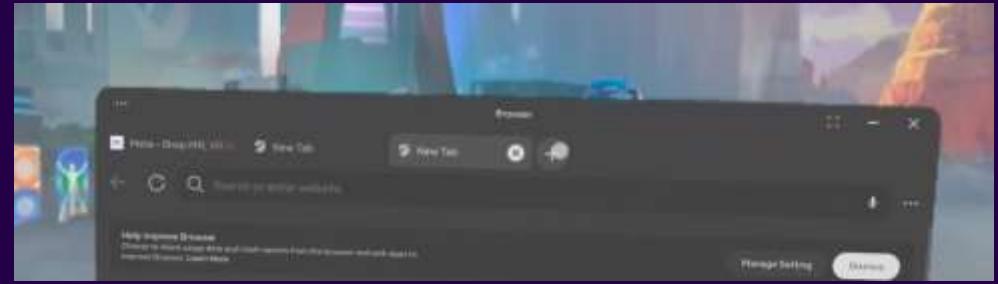


Screens

Reality



Virtual Reality

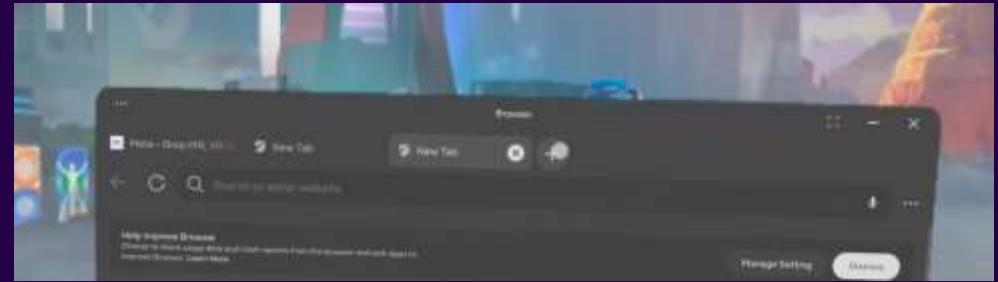


Screens

Reality



Virtual Reality



AI glasses for  
a fresh  
perspective

Capture, share and stay in the moment, completely  
hands-free.

[Shop all styles](#)

[Learn more](#)



## GAME CATEGORIES

SPORTS

CASUAL

STRATEGY



There is No Such Thing  
as “Click”

# Mental Models

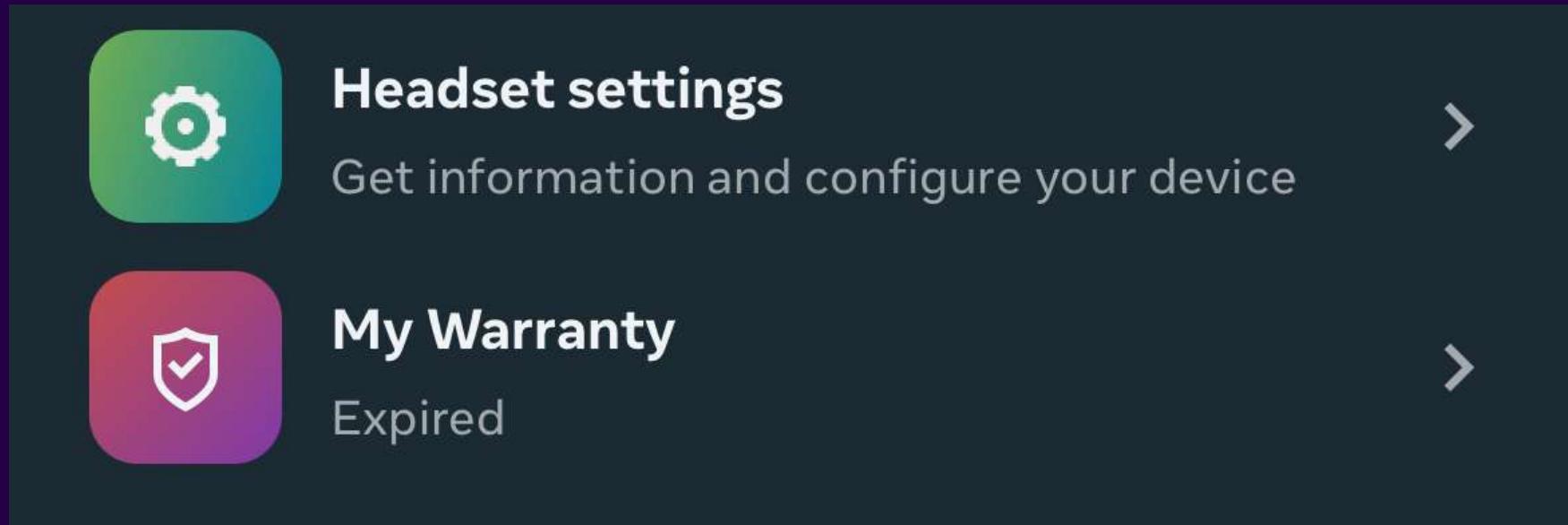
- That rectangle is a computer screen
- The dot is a computer mouse
- Your controller is a hand
- Controller is like a tool
- The tool is a laser pointer
- The laser pointer is a mouse

# Chains of Models

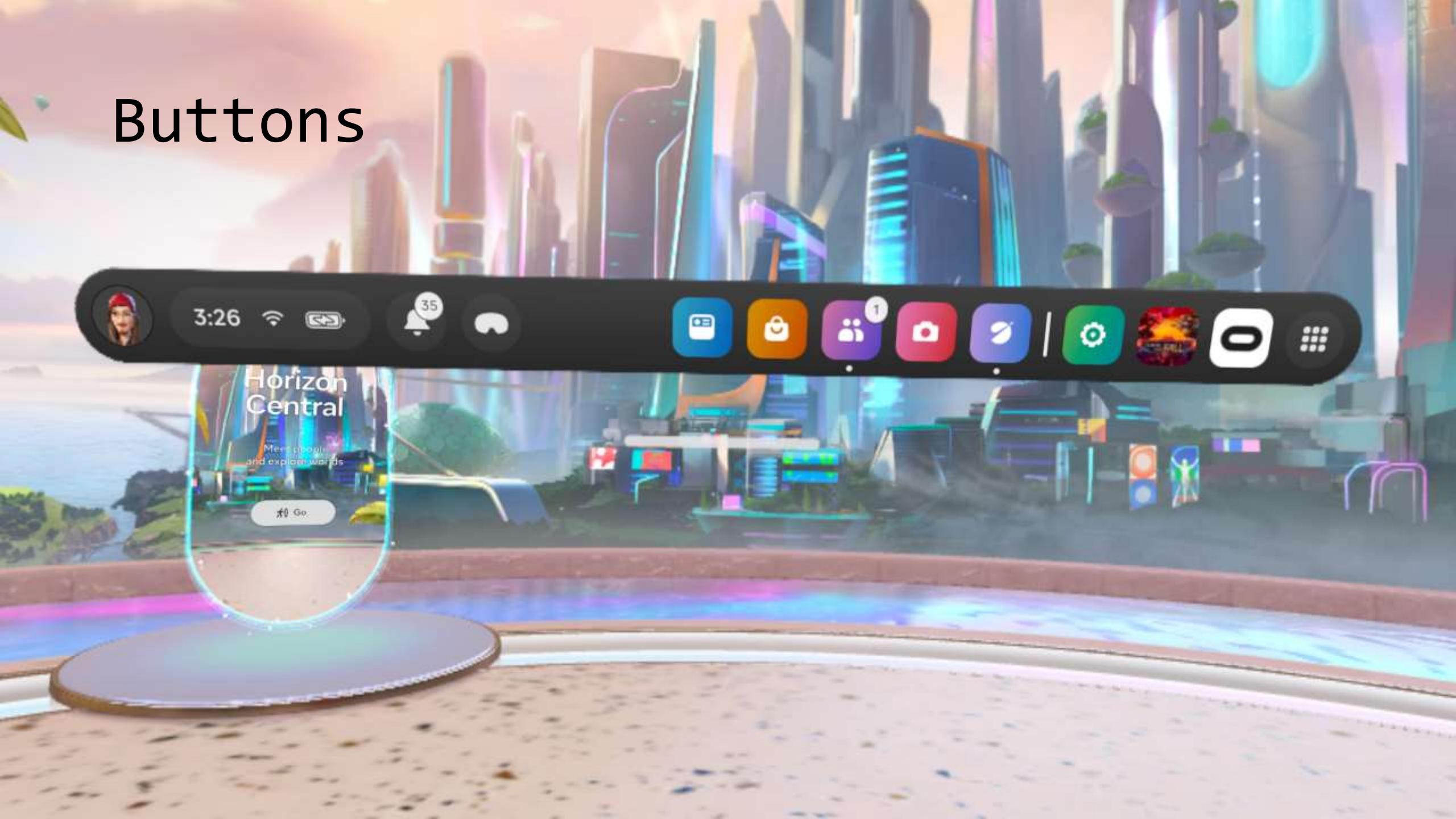
- One concept that you have to use to understand another model that you have to use to understand another model that you have to use to understand another model that you have to use to understand another model



# Let's Consider Quest OS Buttons



# Buttons





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

## Settings

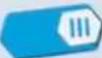
music

comfort cage

camera rotation

rotation speed

handedness



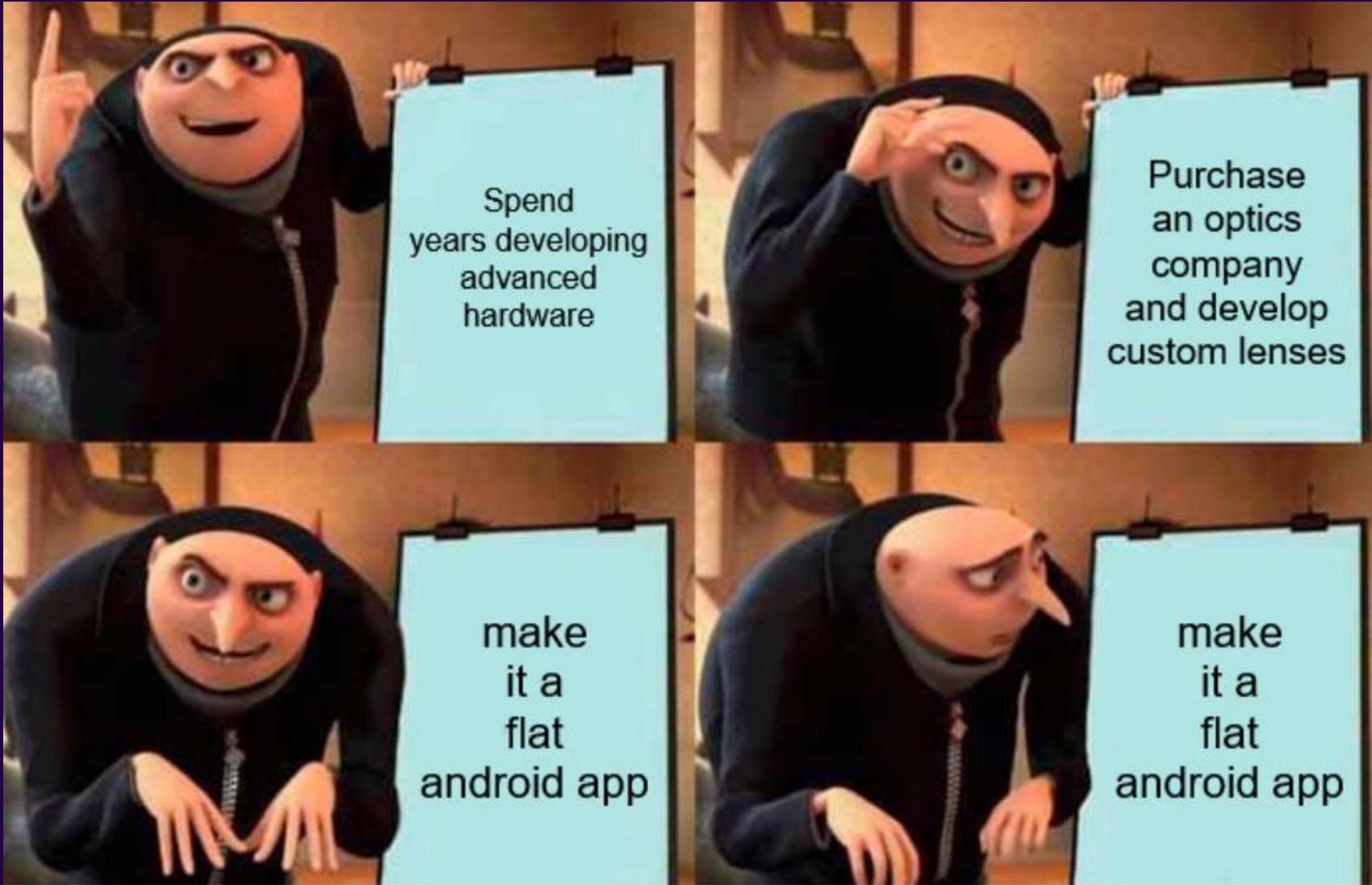
< snap >  
< 30° >  
< right >

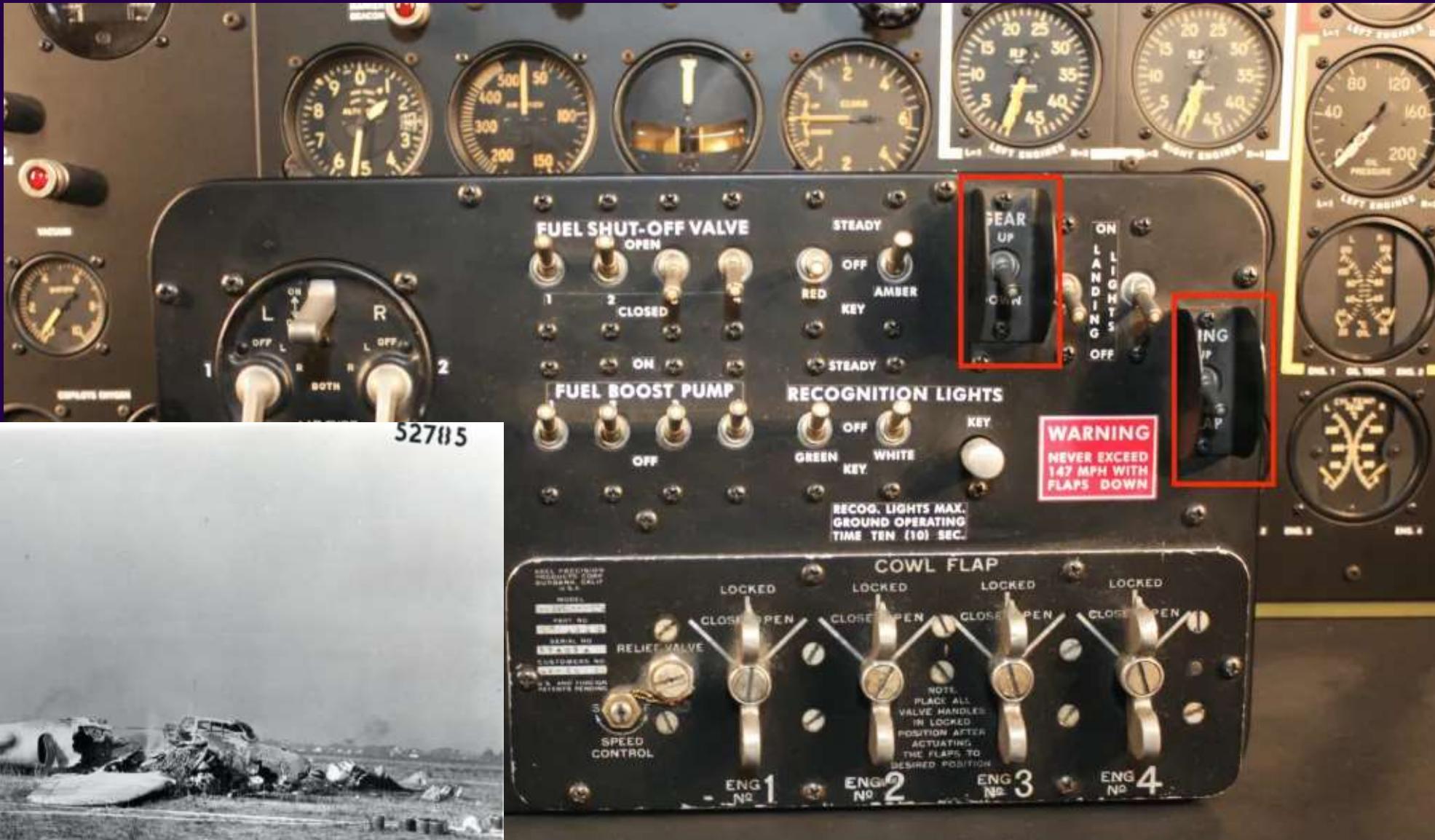
view save slots

credits



# Abandoning Immersiveness









“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?

# Stick





JOB SIMULATOR  
the 2050 archives

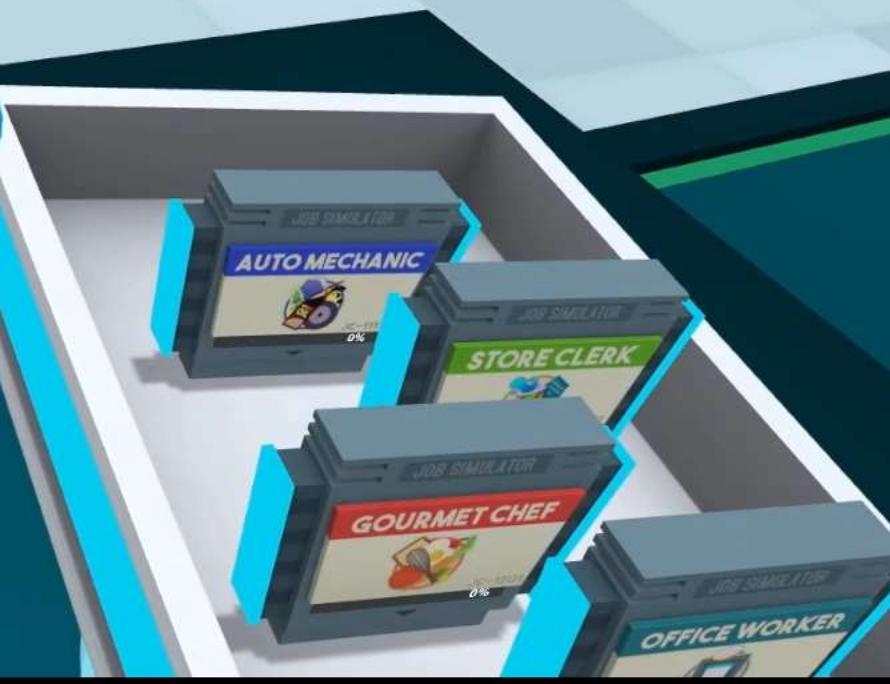
BOT

BOTCARD  
JOB  
EXPRESS  
BOT  
NETWORK



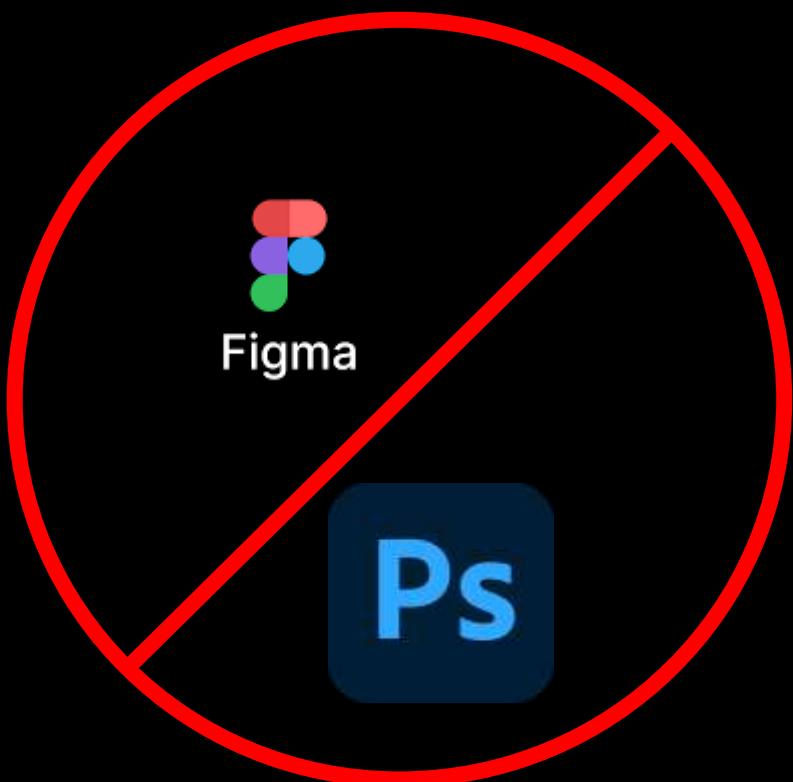
THE JOB SIMULATOR 3000

SEPT CARTRIDGE



# 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](http://hdyar.com/talks/vrdesign2025)

