



Designing for AR: A Postmortem on the Development of 'Woorld'

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Introduction and Overview

Who am I?



Who am I?



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What is this talk about?

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- Not about detailed technical implementations

What is this talk about?

- Not about detailed technical implementations
- Is about the things that we tried and what worked for us in making Woorld

What is Augmented Reality?

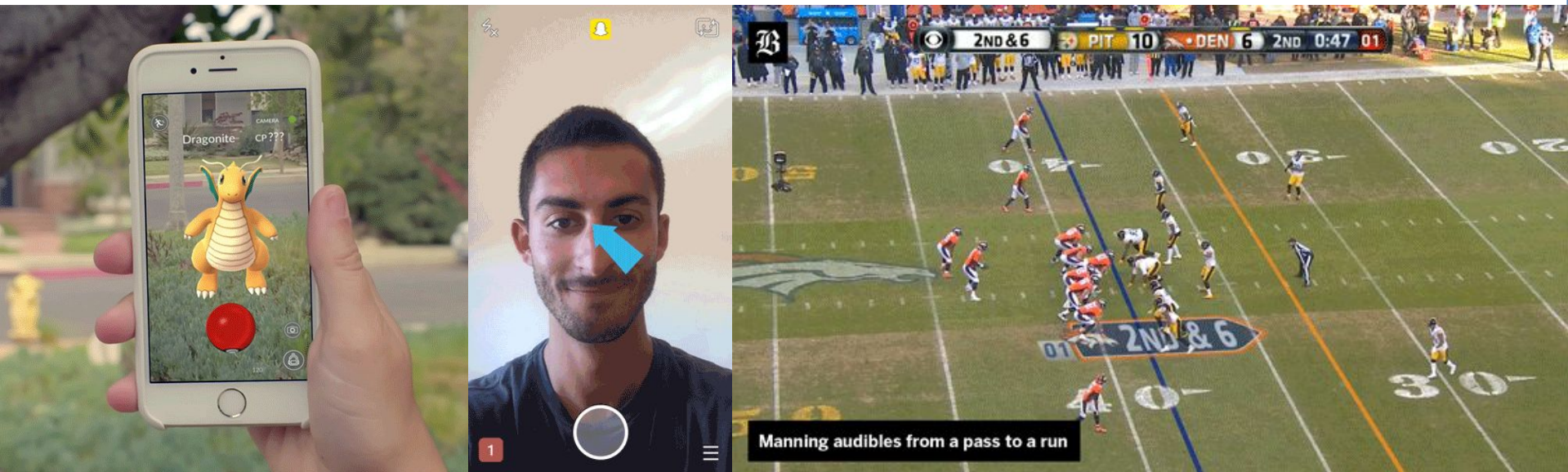
Augmented Reality Examples



Augmented Reality Examples



Augmented Reality Examples



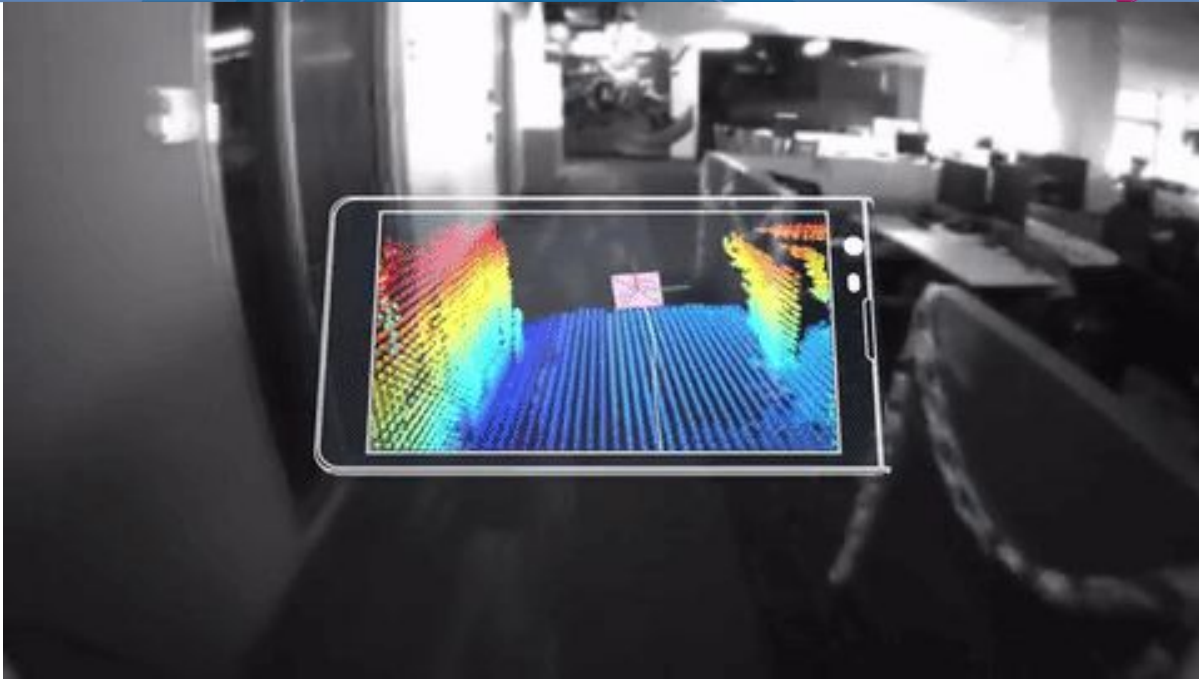
Augmented Reality Examples

What is 'Woorld'?



Woorld

What is Tango?



Tango

Tango Devices



Tango Devices

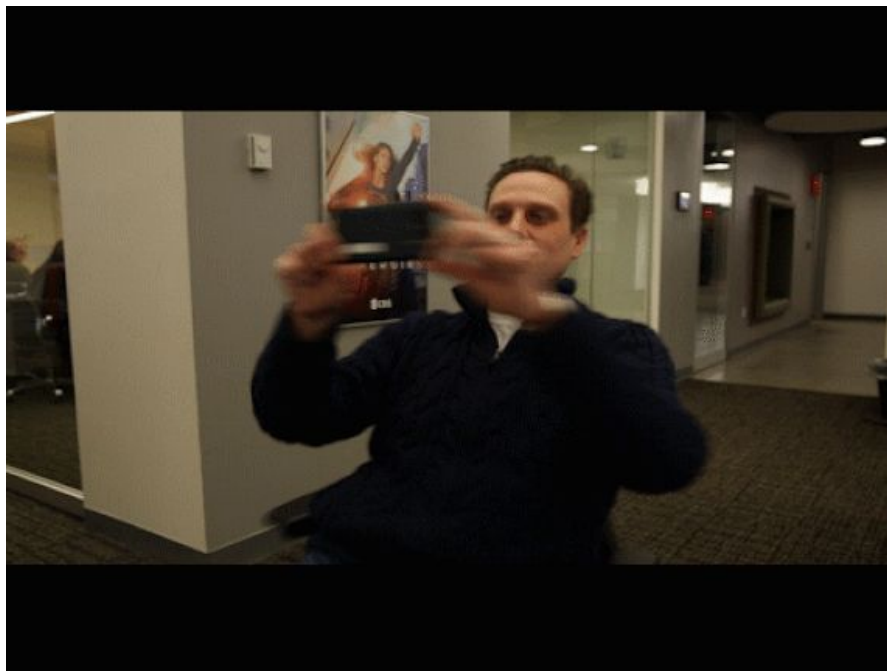


Tango Devices



Tango Devices

Problems with AR and Tango

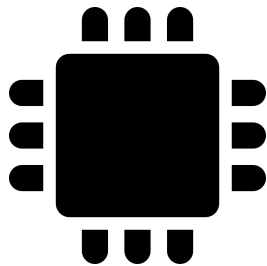


No Camera Control

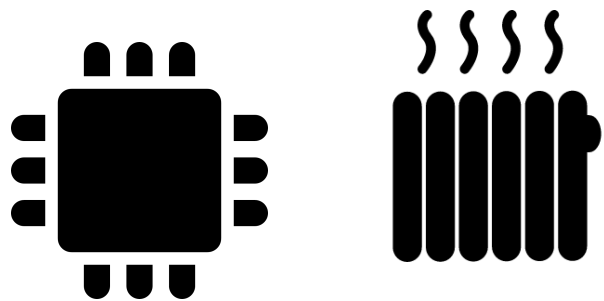


The Messy Real World

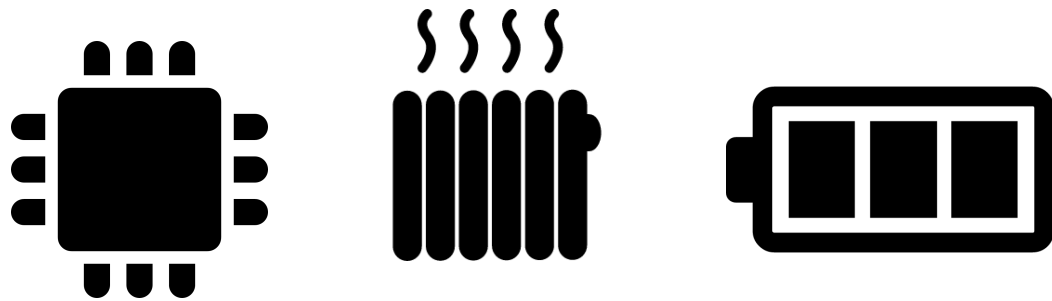
Mobile Device Limitations



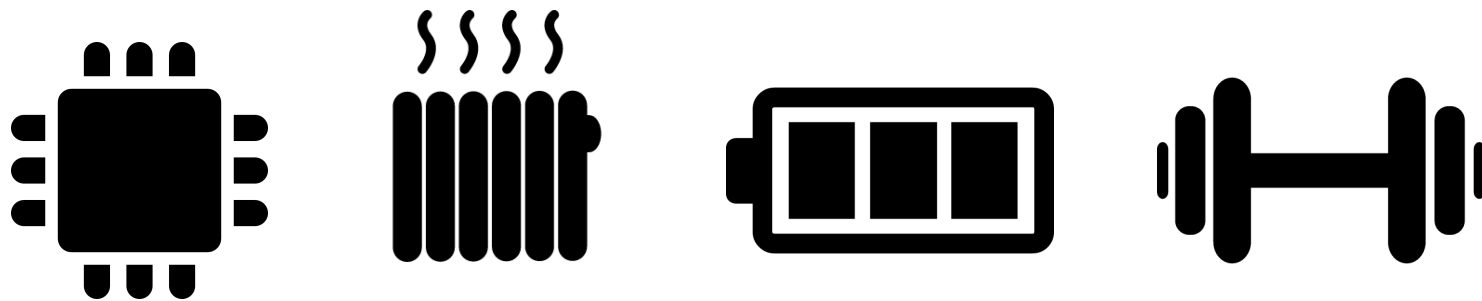
Mobile Device Limitations



Mobile Device Limitations

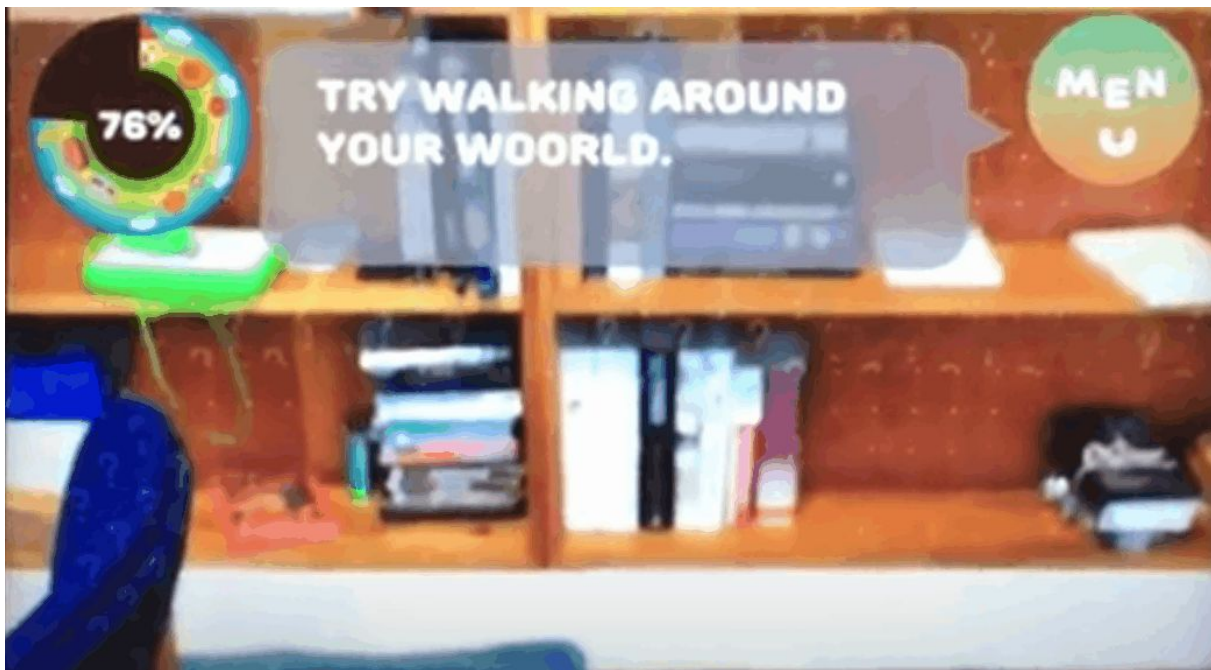


Mobile Device Limitations



Mobile Device Limitations

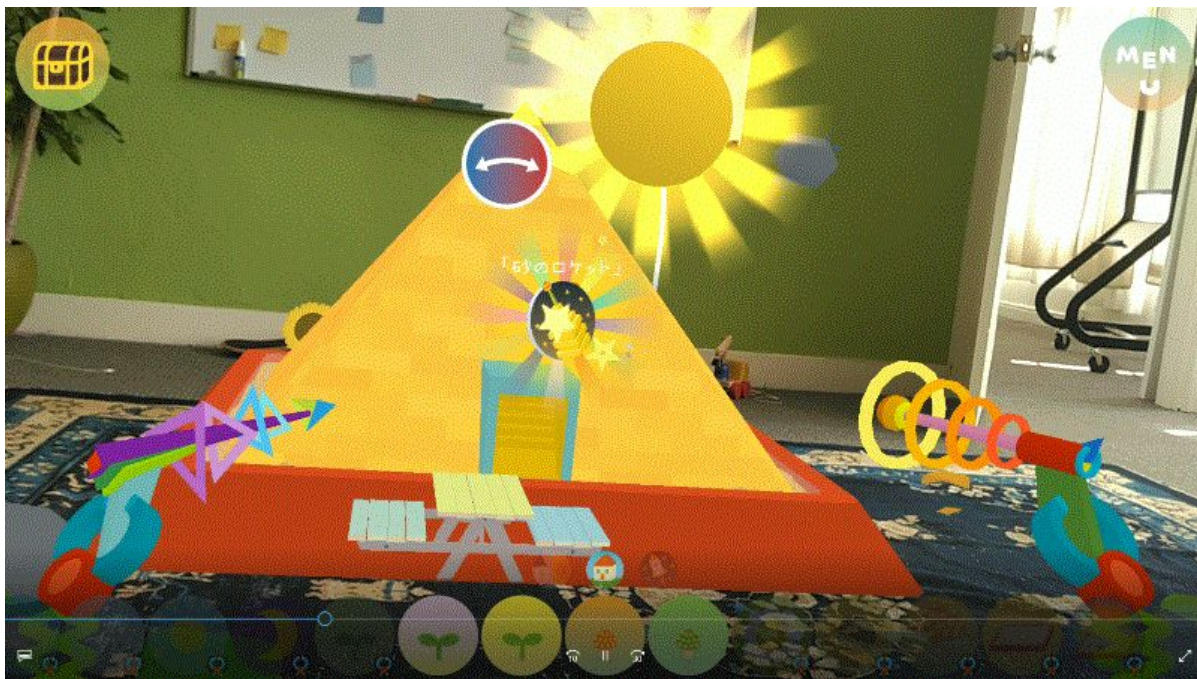
Player Attention



Direct: On Screen UI



Direct: Attach to Camera



Direct: Camera Tracking



Indirect: Teleport into View



Indirect: Character Movement



Indirect: VFX Trails



Indirect: Combination



Visual Metaphors

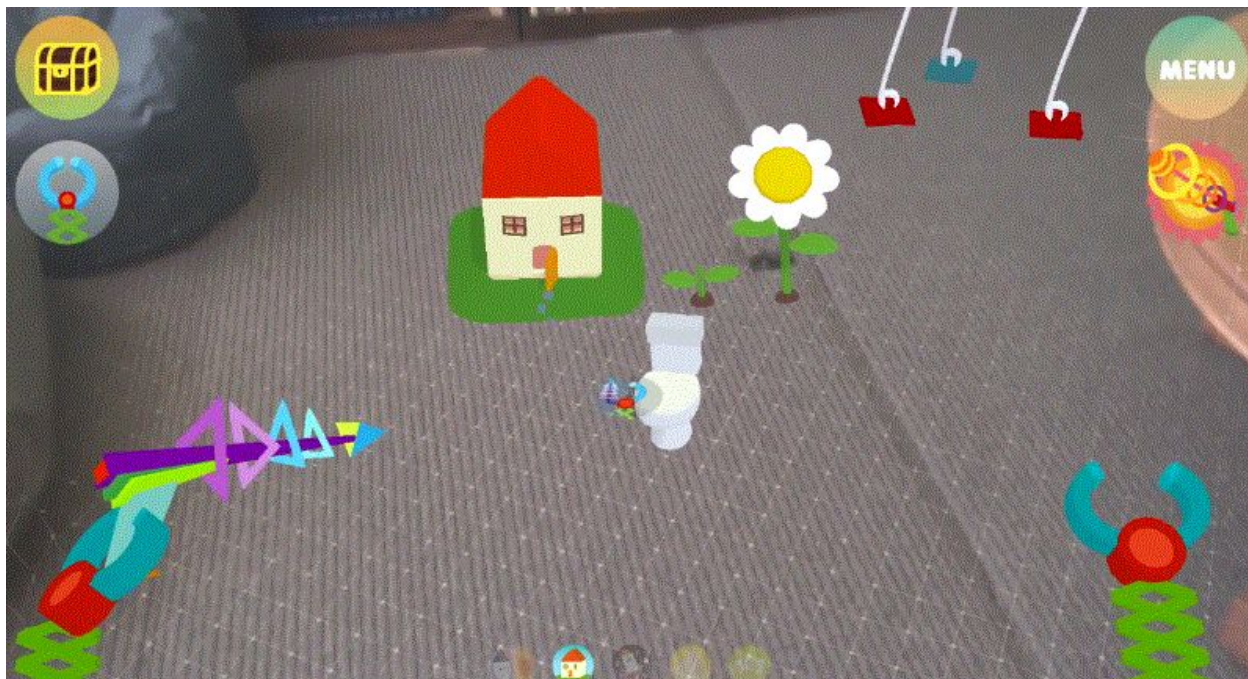
Interaction Design



Direct: Tapping



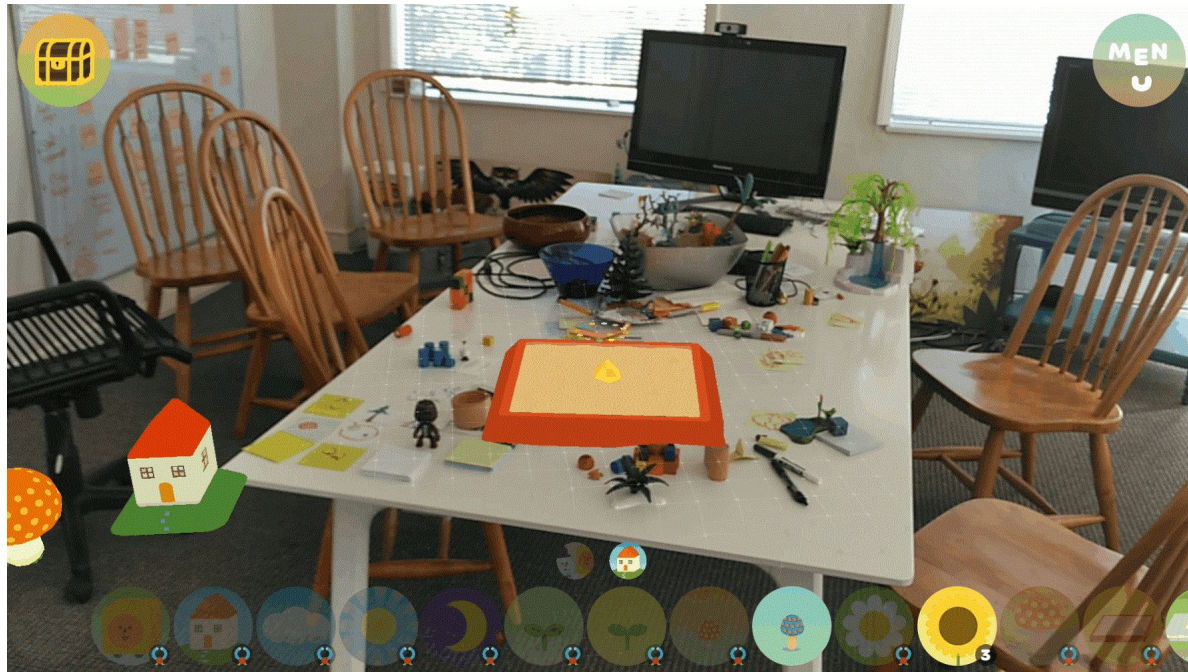
Direct: Touch and Drag



Indirect: Magic Hands



Indirect: Grow and Shrink Rays



Indirect: Context Menu

Environment Interaction



Camera Relative Placement



Object Relative Placement

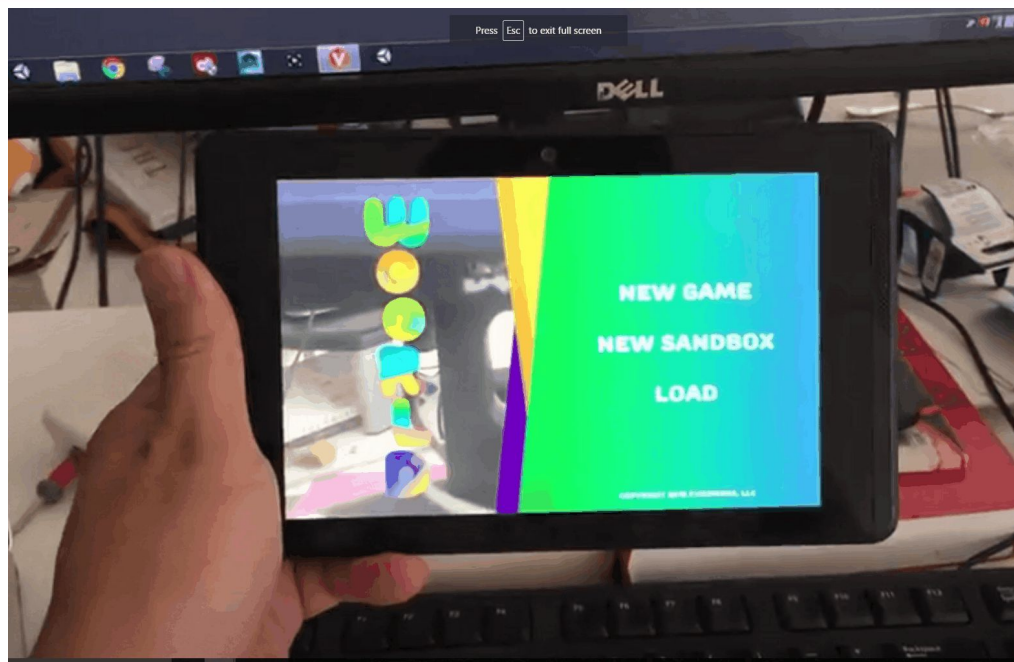


Placement Smoothing



Embodiment

Accommodating the player

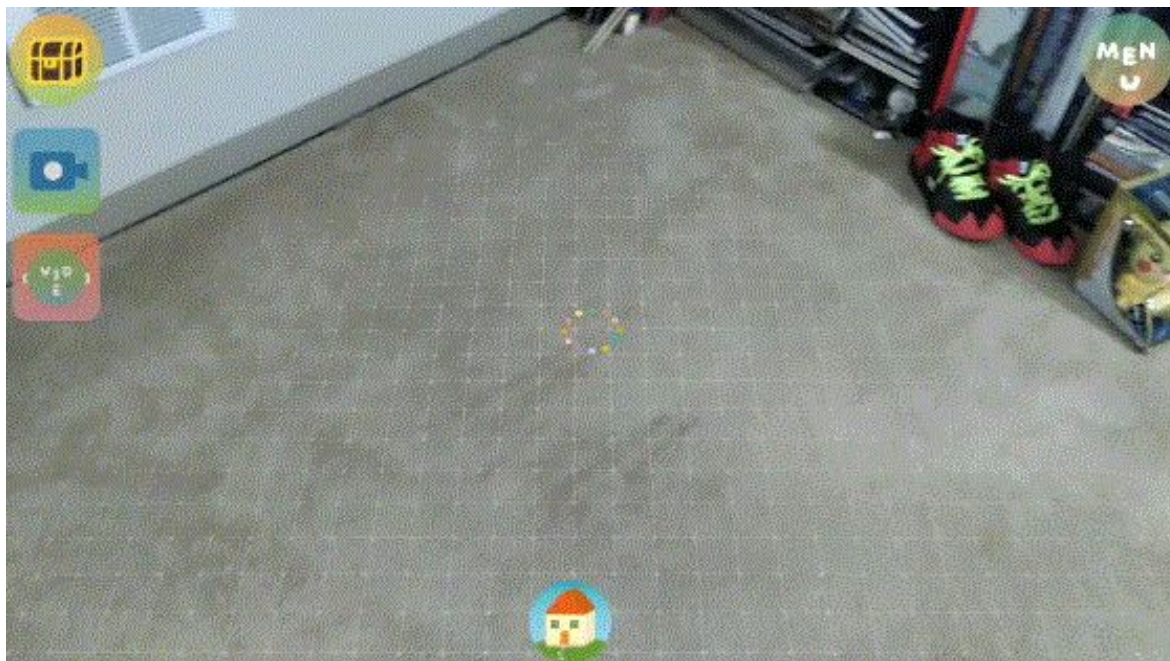


Orientation Independence

Staggered Tutorial



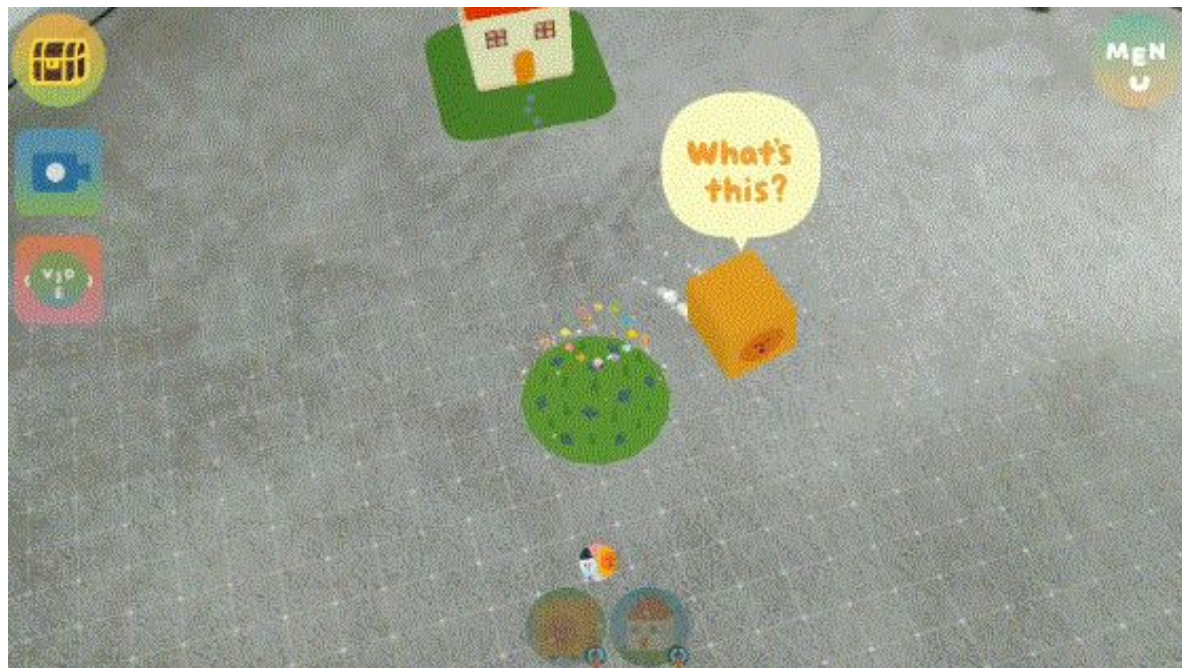
Tutorial: Room Scanning



Tutorial: Object Placement



Tutorial: Physical Movement



Tutorial: Tapping



Tutorial: Dragging



Tutorial: Context Menu

Flexible Gameplay

Flexible Gameplay

- No lose condition

Flexible Gameplay

- No lose condition
- Auto-saving

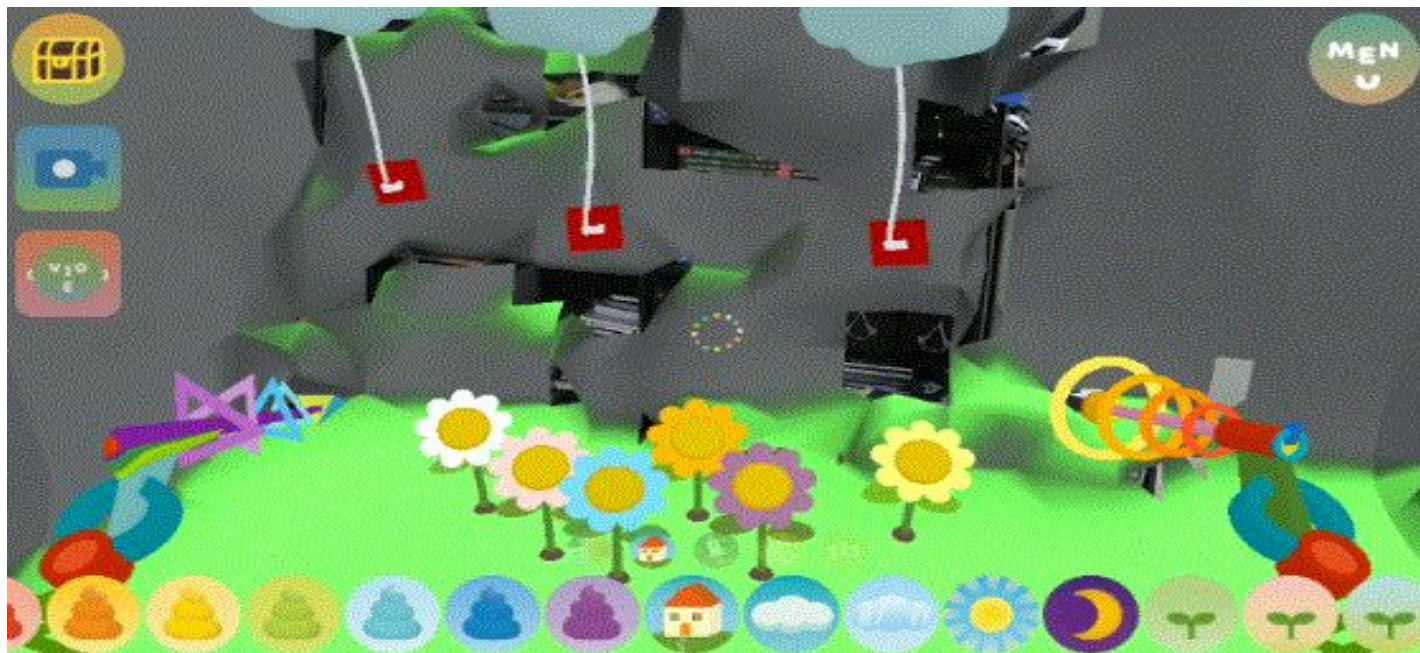
Flexible Gameplay

- No lose condition
- Auto-saving
- Easy object recovery

Flexible Gameplay

- No lose condition
- Auto-saving
- Easy object recovery
- Sandbox mode

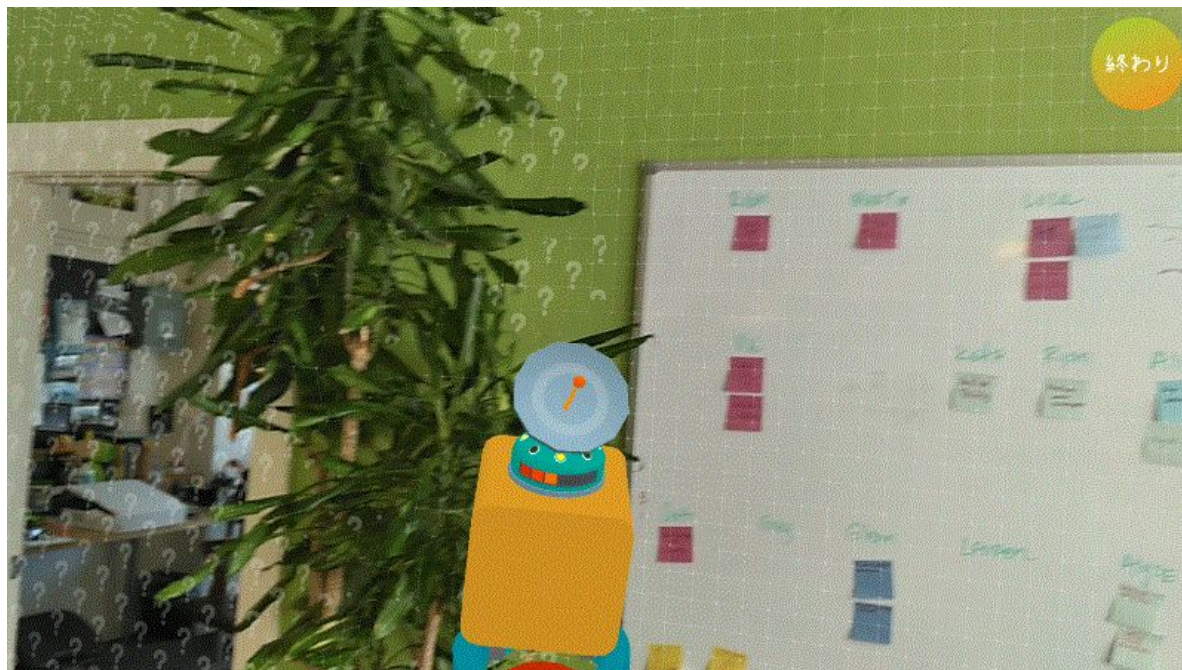
Virtual Space



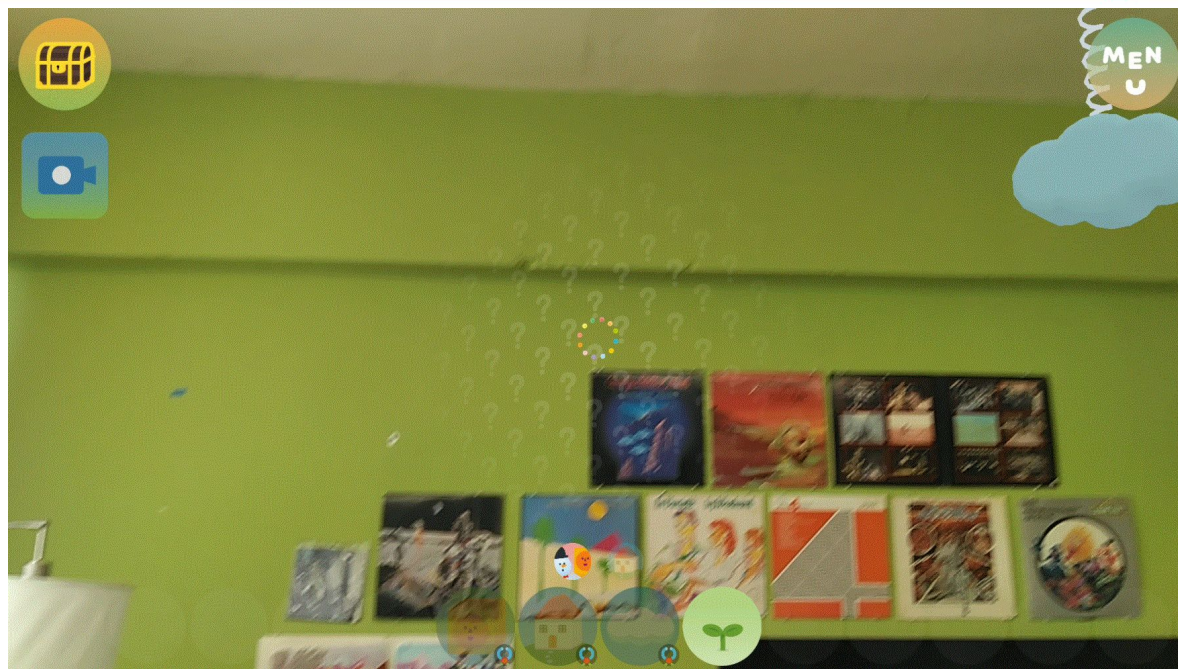
Early Environment Rendering



Final Environment Rendering



Fully Visualized Environment



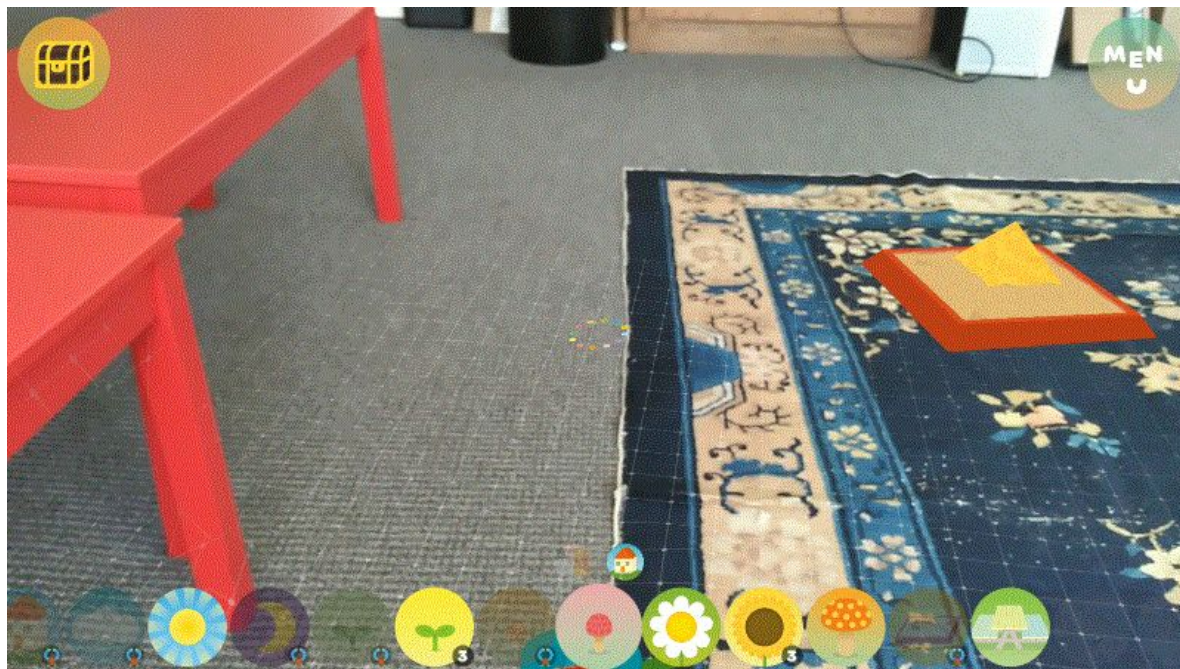
Gameplay Visualized Environment



Environment Subtraction



Cavernous Space



Camera Feed Manipulation



Surface Feedback: Reticle



Surface Feedback: Taps

Virtual Objects



Visual Aesthetic



Physicality



Physicality



Object Permanence



Overcoming Technical Limitations



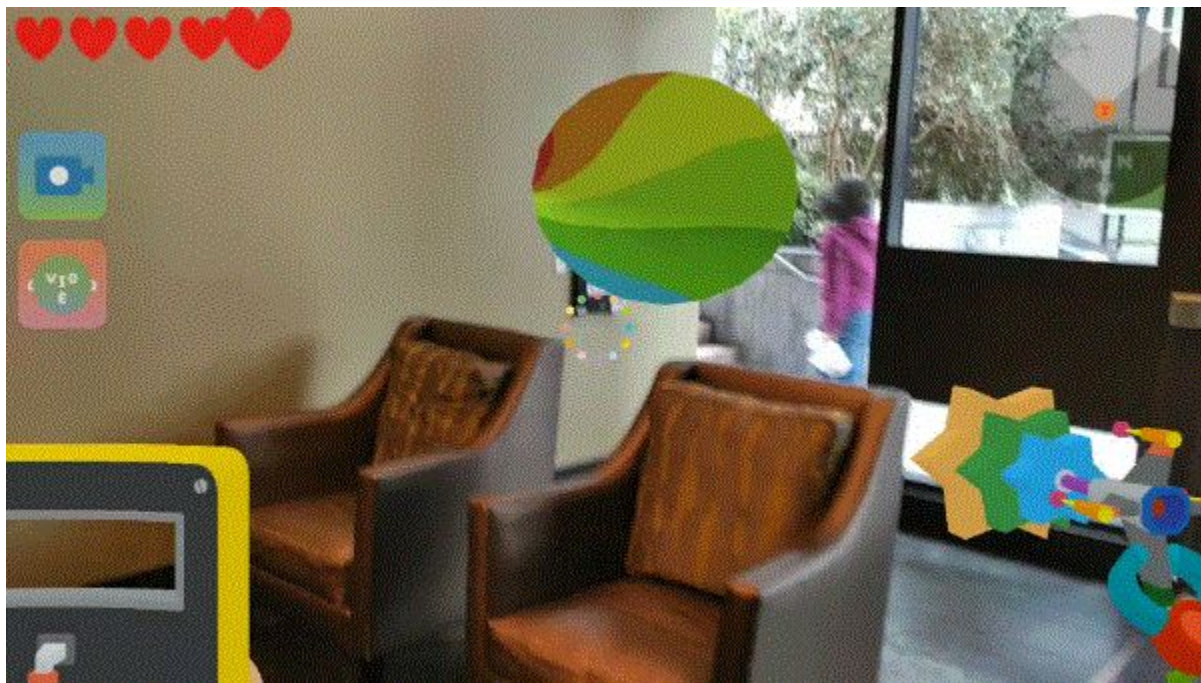


Save and Load

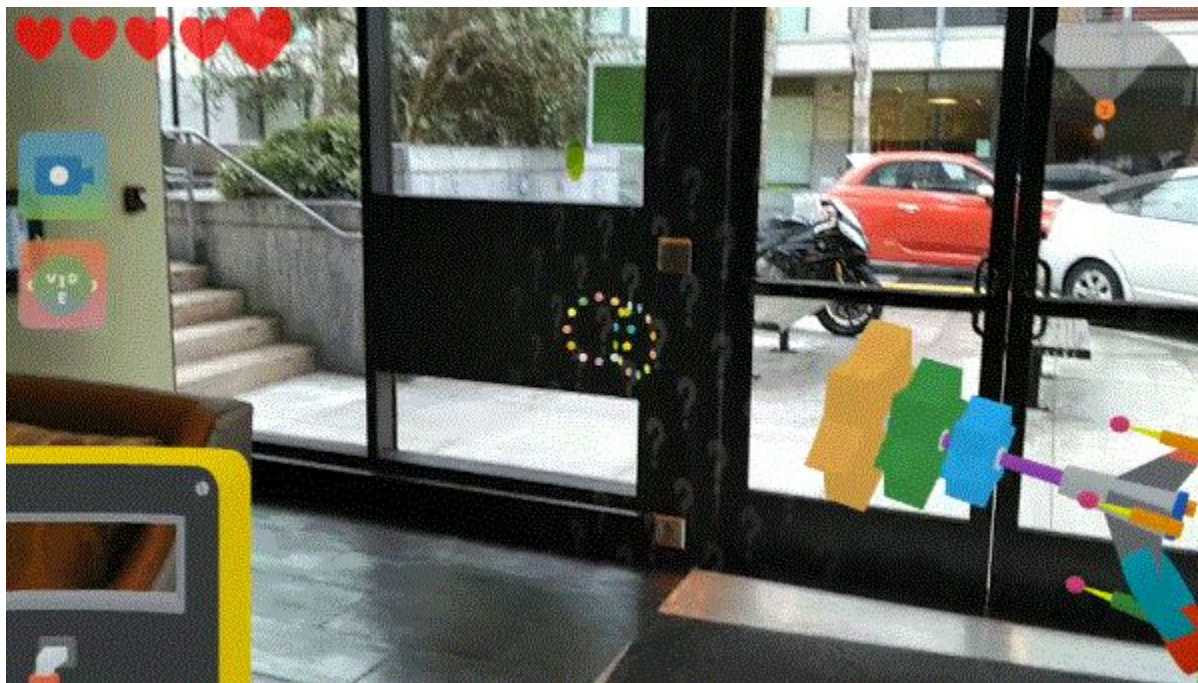
Additional Game Mode



First Person Shooter Mode



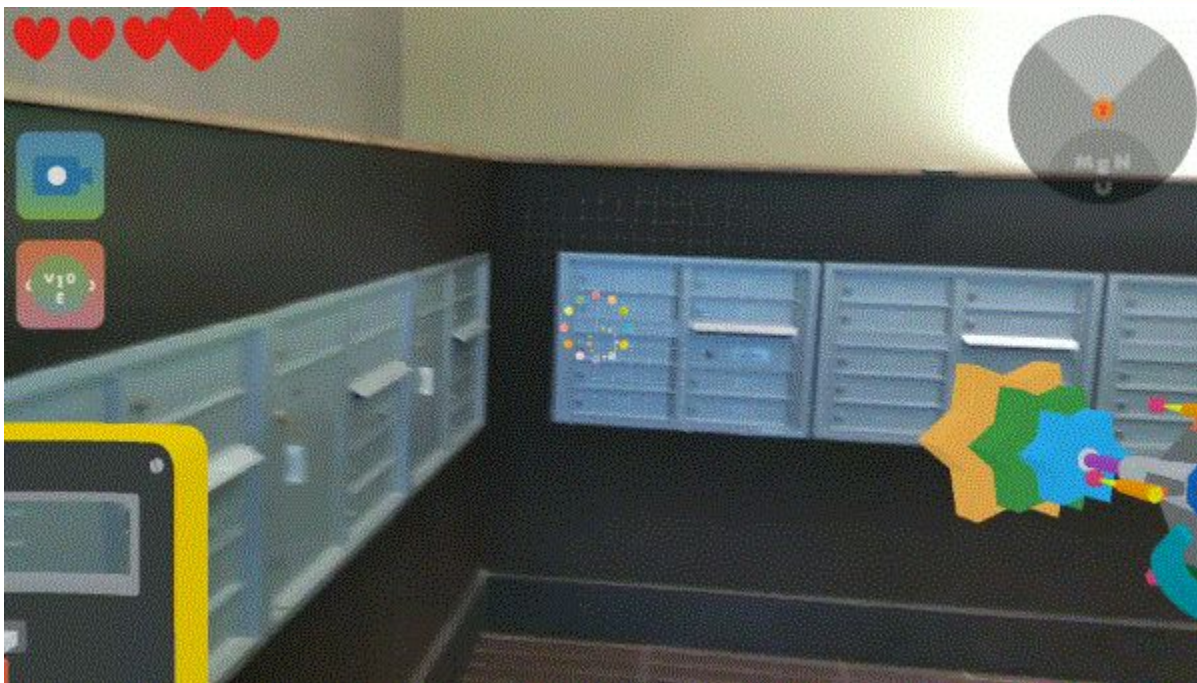
Enemy Spawning



Picnic Table Boss



Refrigerator Boss



Toilet Boss



Embodiment

Optimization and Tips

Mobile performance

Mobile performance

- Low-poly count

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- Share materials/textures

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- Batch render to reduce draw calls

Mobile performance

- Low-poly count
- Share materials/textures
- Batch render to reduce draw calls
- Resolution reduction and upscaling

Unity Optimizations

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- Async load audio assets

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- Crunch textures

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- Atlas sprites

Unity Optimizations

- Async load audio assets
- Crunch textures
- Atlas sprites
- Use physics layers



Development Environment



Localization

Final Takeaways

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- Be aware of the player's perspective

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- Be adaptive to the environment

Final Takeaways

- Be aware of the player's perspective
- Be adaptive to the environment
- Test test test!

Q&A