Technical and Design tips for VR/AR Unity Projects

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VR Best Practices

Best Practices

- Frame Rate is King
- FRAME RATE IS KING!!
- VR moves a lot of pixels, up to 4x as many as mono rendering
- Dropped frames are not worth better graphics!
- Maximize performance to save power on mobile, maximize effects on PC
- Simple or Toon graphics that perform well trump photorealism
- Use tessellation to add detail as the player draws near an object

Be gentle to your players!

- Offer Quality Levels and Automatic Scaling
- Use LODs, culling, and batching
- **FRAME RATE IS KING!!!!**

VR Design

Input

- Mouse + keyboard
  - Limits movement
  - Player can’t see keyboard – difficult to use
- Gamepads
  - Allows people to sit further from hard objects
  - Limited inputs & axes
  - Careful with jumps!
- Touchpad
  - Swipe, tap gestures
- Motion-sensing “wand” controllers
  - Razer Hydra, WiiMote, PS Move
- Body-motion cameras
  - Kinect, SoftKinetic
- VR Tracked Controllers
  - SteamVR Controllers, Oculus Touch

Basic Design

Will you use an input device? Do you need one?

- use the gaze cursor for menu selection
- use your neck to point, tap the touchpad/HMD to select
- Bluetooth gamepads supporting mobile devices can also be used

Design

- shorter experiences, 5 to 20 minutes at a time
- designing from scratch recommended over porting existing games
- easier to hit performance targets and to implement game elements only possible in VR
- GEARVR: no cables -> 360 Degrees!

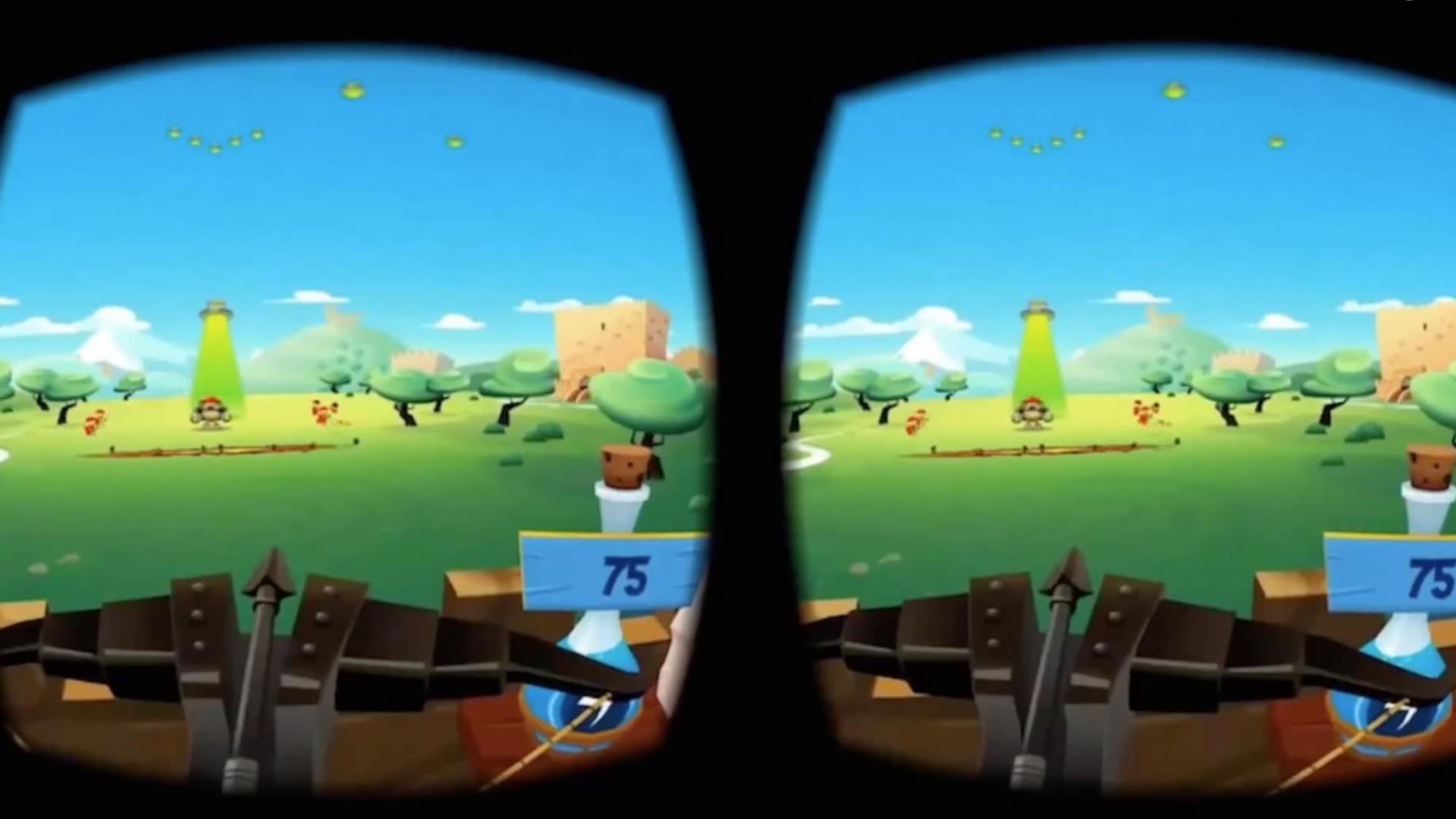

TEMPLE RUN

Design

- UI Design – 2 to 3 meters away (1 unit = 1 meter)
- UI should fit in the players' viewpoint
- Even in menus, when the game is paused, or during cutscenes, user should be able to look around.
- Be consistent across eyes! Differences can be subtle, but like everything else in VR, errors cause physical discomfort.

Design

- Don’t rely entirely on the stereoscopic 3D effect to provide depth to your content
- Lighting, texture, parallax, and other visual features are equally (if not more) important to conveying depth and space to the user.
- These depth cues should be consistent with the direction and magnitude of the stereoscopic effect.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OMEGA AGENT
FIREPROOF GAMES
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Designing For Humans

Humans Get Sick

- If your eyes and ears don’t agree you can get nausea
  - Make sure you have a stable horizon
  - Always maintain head tracking
- If reality does match your eyes and ears you get queasy
  - Never drop a frame or freeze
- We can’t feel velocity, only acceleration
- Down is always Down
  - Gravity will always be pulling down
  - No other G-forces

Humans Get Scared

- VR has incredibly high emersion
- Very easy to trigger claustrophobia, agoraphobia, acrophobia, etc.
- We don’t like sharp things
- Don’t like being crushed or run into or over
- NO SPIDERS!
- If you do anything that could trigger a fear response, warn them

Humans Get Tired

Pretty good at standing

Arms tire easily if flailing about

- Or holding something up

Eyes tire too

- In order to focus, we need convergence
- Forcing converge between near and far can tire the eyes
- Keep focus at ~ 2 to 5 meters

VR best for short experiences, 5 to 30 minutes

Humans Like Reality

… But not that much

- Hyper realistic graphics have to avoid uncanny valley
- We don’t care!
- Want things to *feel* correct and/or consistent
- Don’t like the unexpected

Humans Can Empathize

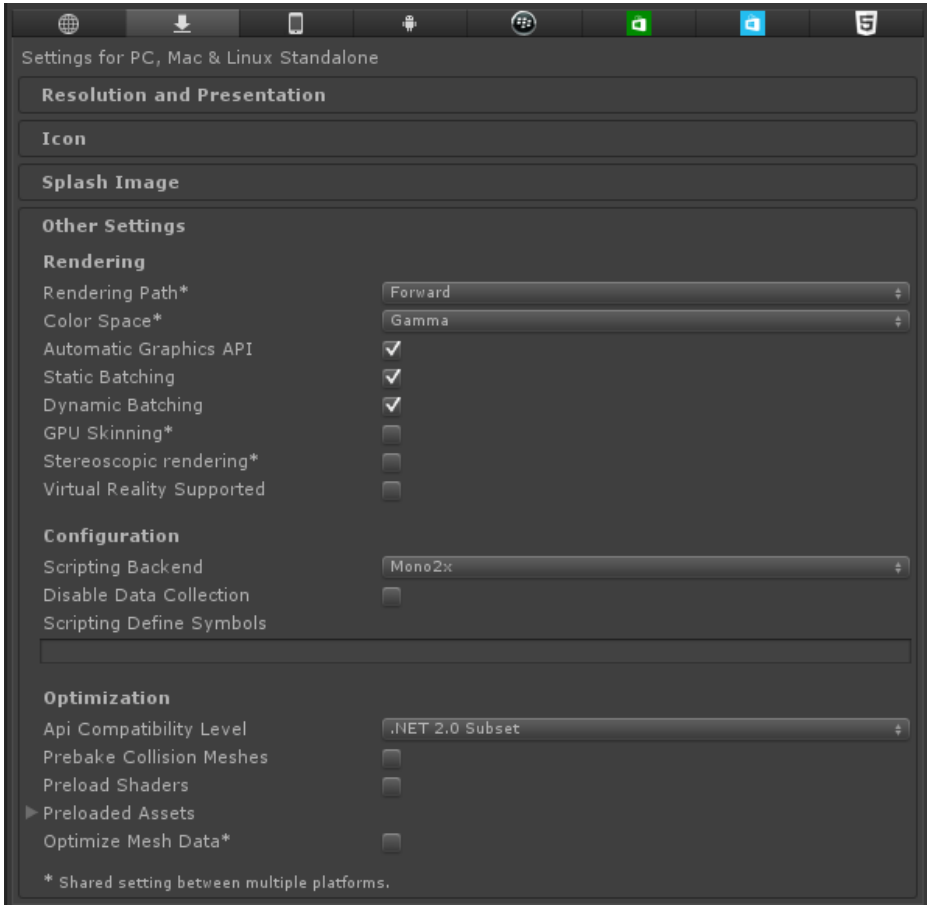
- VR has higher empathy
- Small things seem toy like

  Makes the player feel powerful
- Large things make the player feel intimidated

  Even the UI!

VR Integration

VR Integration



VR Integration

More than just ease of development….

….Performance Gains!

- Shared Shadows
- Shared Camera/Occlusion Culling
- Other upcoming optimizations

Thank you very much!

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Obrigado!

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