VIVE™

htc

VR Eye Tracking & Foveated Rendering with VRS

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Agenda

- Eye Tracking & SRanipal SDK
- Nvidia Variable Rate Shading (VRS)
- Foveated Rendering

Requirements

- HMD
  - VIVE Pro Eye
- PC
  - Windows 10 (64-bit)
- Software
  - Unity 5.5.3 or Later
  - SteamVR (October 14 release or later)
- Graphics card
  - NVIDIA (Turing required for VRS & Foveated Rendering)

VIVE Pro Eye Tracking

SRanipal Demo

What is SRanipal

- Super reality animation pal

- A software framework able to read a user’s face, including
  - Eye movement
  - Facial expression

VIVE Pro Eye Tracking

Supported Hardware

- Eye tracking - VIVE Pro Eye
- Lip tracking - VIVE Lip accessory which attaches to VIVE Pro and VIVE Pro Eye

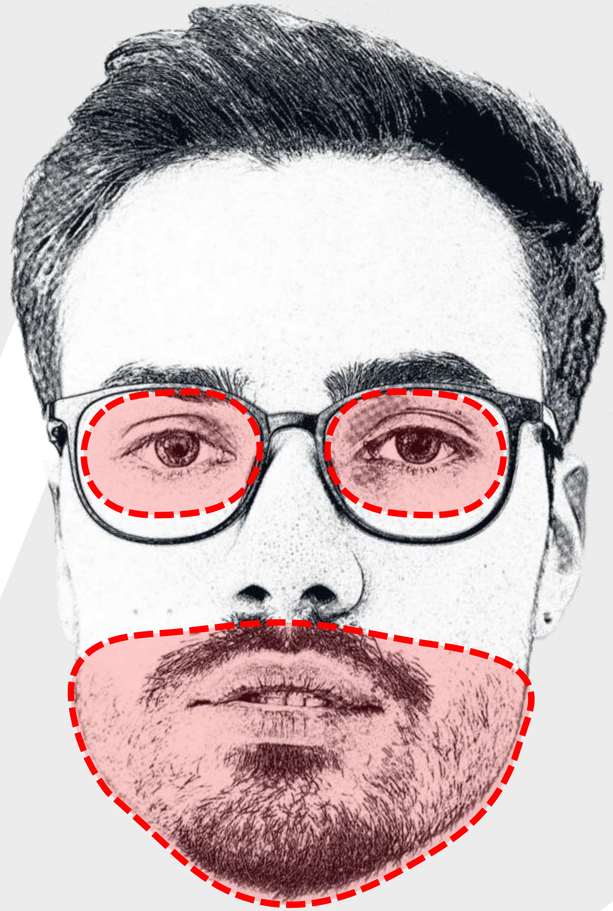
Vive Pro
Vive Pro Eye

Vive Lip accessory

VIVE Pro Eye Tracking

SRanipal Function

- Input:
  - Eye image
  - Lower facial image
- Facial coverage - Eyes, Jaw, Mouth, Cheeks
- Output:
  - Gaze vector, pupil size, eye openness
  - 26 blend-shape weights for lower facial portion



VIVE Pro Eye Tracking

Software Architecture

Lip data

Eye data

SR-Runtime and SRanipal client communicate via IPC

SR-Runtime

1. Eye expression
2. Lip expression
3. SW auto update

Support Eye-tracking Plugin

SRanipal Unity Plugin

unity Applications

SRanipal Unreal Plugin

UNREAL ENGINE Applications

Eye Tracking Uses

- Expressive Avatars
- UI Controls (Selection and Scrolling)
- Analytics
- Object Selection (Focus)
- Aim Assist & Hand Eye Coordination
- Gaze Aware NPCs
- Realistic Depth of Field
- Foveated Rendering with VRS

Nvidia Variable Rate Shading (VRS)

- Variable Rate Shading:
  - Allows fine control of shading rate for each 16x16 pixel region
  - Coarse Shading: 1×1, 1×2, 2×1, 2×2, 2×4, 4×2, 4×4
  - Supersampling: 2x, 4x, 8x

- Algorithms:
  - Content Adaptive Shading
  - Motion Adaptive Shading
  - Foveated Rendering

Nvidia Variable Rate Shading (VRS)

- VRS Benefits:
  - VRS reduces excessive pixel shading load
  - VRS allows customizing shading rates within the frame
  - VRS selectively improves visual quality with supersampling
  - VRS preserves edges and visibility of the objects
  - VRS works at screen space and is simple to integrate

* https://devblogs.nvidia.com/turing-variable-rate-shading-vrworks/

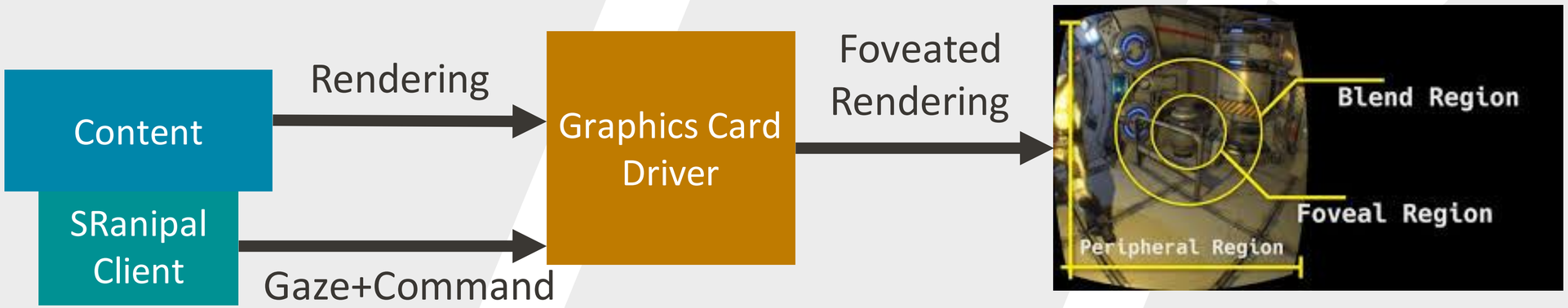
Foveated Rendering

- Render lower resolution in peripheral vision
- Fovea: middle of retina, FOV 5°, half of optic nerves
- Fixed Foveated vs. Dynamic Foveated

Eye Tracking

Foveated Rendering

- Graphics card driver handle foveated rendering



Avatars

- We provide 4 avatar samples in SDK

Eye Tracking Tips

- The pupil diameter data is provided for the left and the right eye individually (mm)
- Adding gaze aware to small objects, increase collider size to prevent flickering
- Use a mesh collider for complex shapes that may be near or block other colliders
- First person is better than 3rd person for eye tracking uses (objects larger)
- Place focus point in center of UI buttons, don't use strong outlines (distracting users/draw eyes away)
- UI elements with labels should be grouped and act together (i.e. if reading label)

VIVE Pro Eye Tracking

Download Now

SDK

https://developer.vive.com/resources/

Video

https://developer.vive.com/resources/

Contact

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