

Raycaster for the Oculus Rift

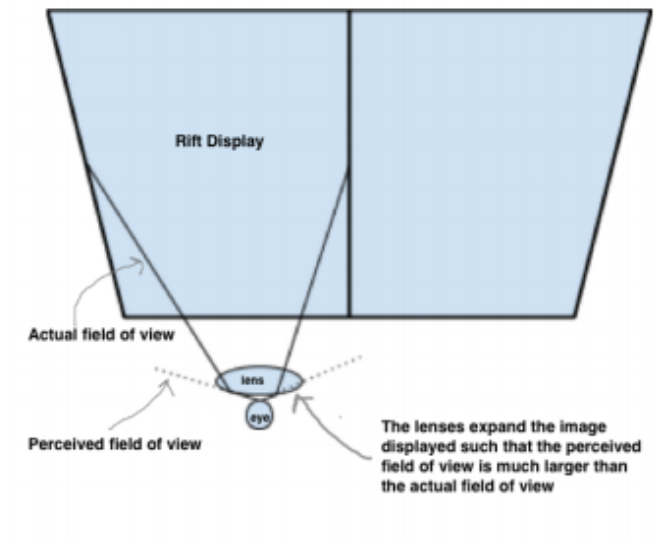


Brian Fischer

Project Goals

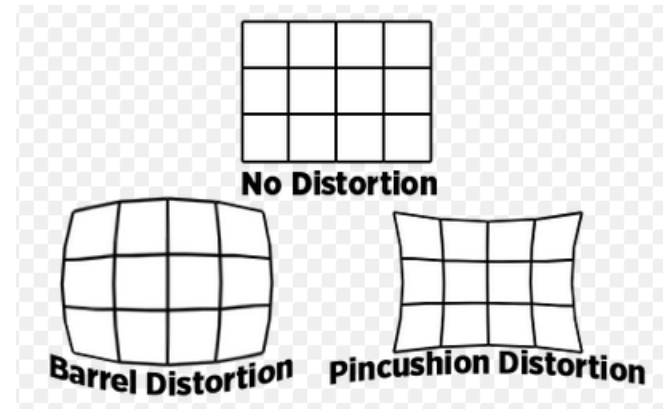
- Create a Raycaster for the Oculus Rift
- Analyze performance of Oculus Rift Rendering Techniques

Oculus Rift Display

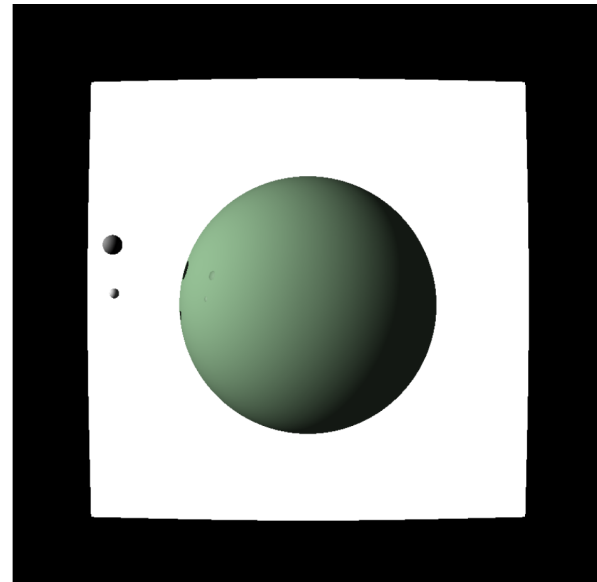
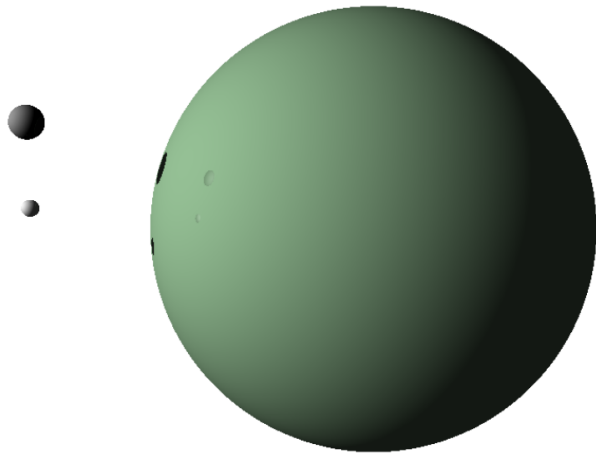


Barrel Distortion

```
uniform float BarrelPower;  
vec2 Distort(vec2 p)  
{  
    float theta = atan(p.y, p.x);  
    float radius = length(p);  
    radius = pow(radius, BarrelPower);  
    p.x = radius * cos(theta);  
    p.y = radius * sin(theta);  
    return (p.x,p.y);  
}
```

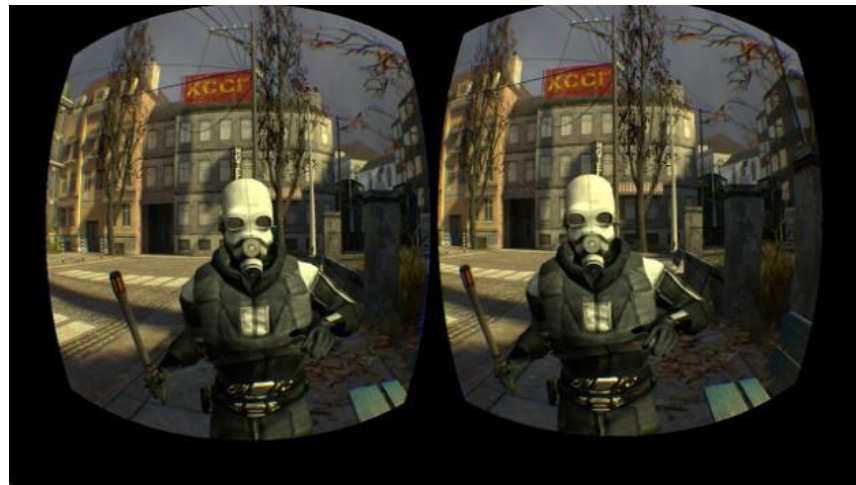


Barrel Distortion(Cont.)



How to fix this?

- Expand the field of view!
- A larger image is rendered than can be put on the display
- Will fill most of the screen after barrel distortion is applied



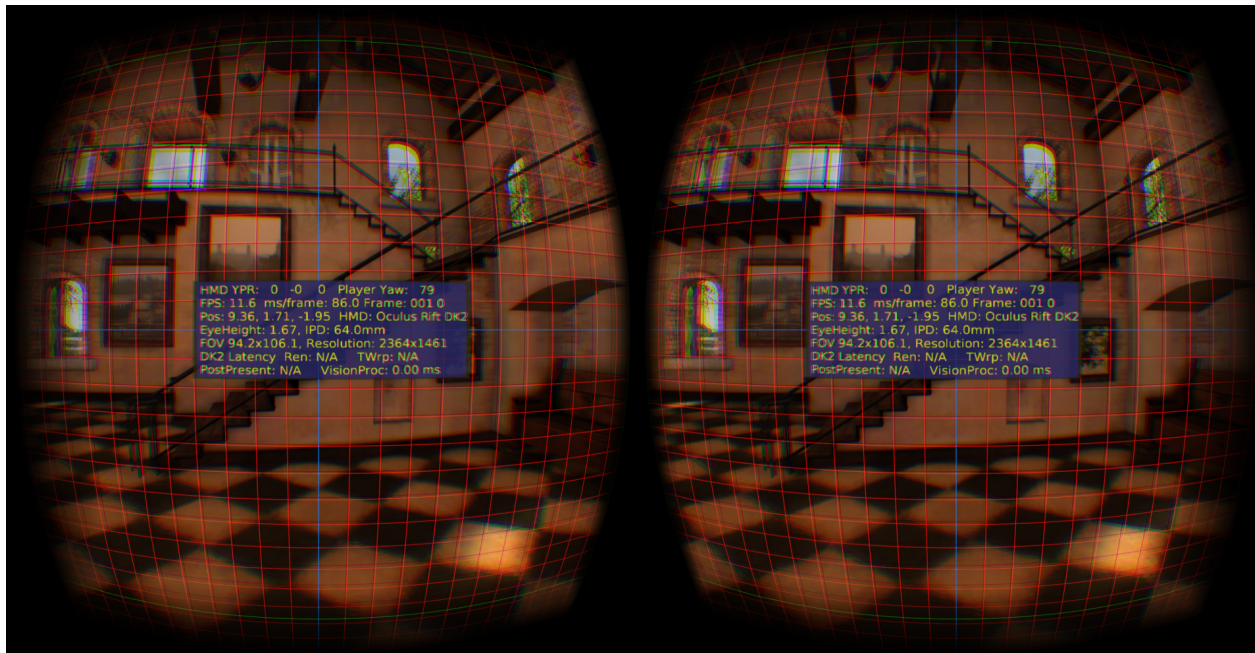
Adaptive Sampling

- Only cast a Ray for every pixel in center of the image
- One sample per 2x2 and 4x4 for pixels farther away from the center

Performance(# of Rays Cast)

- Standard Rendering(1920x1080)
 - 2364x1461 in Oculus World Demo
 - ~3.5 Million Rays
- Raycaster for OR
 - ~1920x1080 Rays Cast(When using the full screen)
 - ~2 Million Rays
 - ~1400x800 without extending FOV
 - ~1.1 Million Rays
- Adaptive Raycasting
 - ~1.2 Million Rays

Chromatic Aberration



Demos

- [Full Screen Checkerboard](#)
- [Rotating Spheres](#)
- Adaptive Sampling
 - [Checkerboard](#)
 - [Checkerboard Diagonal](#)
 - [Spheres](#)