Web VR

COMP 531
Chongzhang "Christopher" Li
cl46@rice.edu

Outline

1. VR Basics
2. WebVR Overview
3. WebVR code demo

VR Basics

What is VR?

Hacking user's perception system to fully **immerse** the user into a virtual experience.

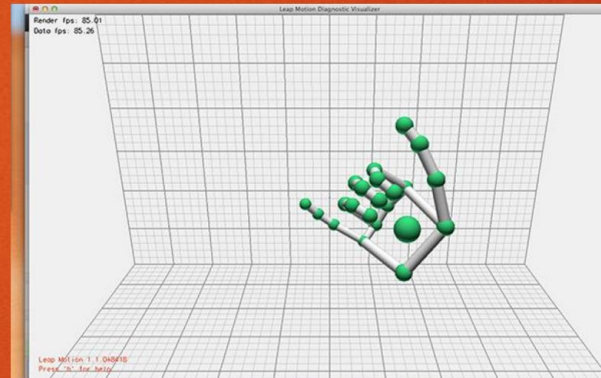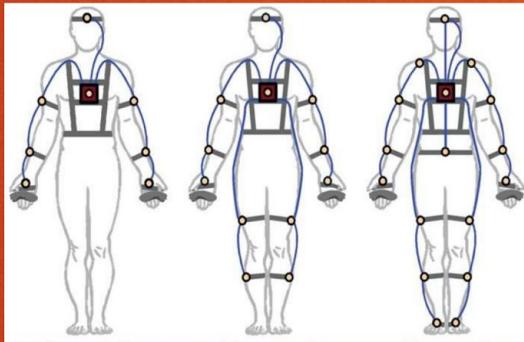# Visual Immersion

Per-Eye Rendering

Device-Specific Distortion

Input Immersion

WebVR Overview

What is WebVR?

WebVR is a JavaScript API for creating immersive 3D, Virtual Reality experiences in your browser.

Why WebVR?

Pros:
- Hardware Agnostic: Same code easily accessible across VR devices
- Easy for Users: Does not require downloading and installing specialized software per experience
- Open, Accessible, and Linked

Cons:
- Lag: Performance may be worse than native application
- Development Stack: Forced to use Javascript and WebGL
- Under Development: Not yet supported by all browsers; API subject to change

Development for webvr

Get access to the display

```javascript
_getDisplays () {
    return navigator.getVRDisplays().then(displays => {
        // Filter down to devices that can present.
        displays = displays.filter(display => display.capabilities.canPresent);
        // Store the first display we find. A more production-ready version
should
        this._vr.display = displays[0];
        this._vr.display.depthNear = DemoVR.CAMERA_SETTINGS.near;
        this._vr.display.depthFar = DemoVR.CAMERA_SETTINGS.far;
    });
}
```

Render the scene for each eye

```
// Get all the latest data from the VR headset and dump it into
frameData.
    this._vr.display.getFrameData(this._vr.frameData);


// Left eye.
    this._renderEye(
      this._vr.frameData.leftViewMatrix,
      this._vr.frameData.leftProjectionMatrix,
      {
        x: 0,
        y: 0,
        w: EYE_WIDTH,
        h: EYE_HEIGHT
      });
```

```
// Right eye.
    this._renderEye(
      this._vr.frameData.rightViewMatrix,
      this._vr.frameData.rightProjectionMatrix, {
        x: EYE_WIDTH,
        y: 0,
        w: EYE_WIDTH,
        h: EYE_HEIGHT
      });
    // Use the VR display's in-built rAF
    this._vr.display.requestAnimationFrame(this._update);
    // Call submitFrame to ensure that the device renders the latest
image from the WebGL context.
    this._vr.display.submitFrame();
```

```
_renderEye (viewMatrix, projectionMatrix, viewport) {
    // Set the left or right eye half.
    this._renderer.setViewport(viewport.x, viewport.y, viewport.w,
viewport.h);



    // Update the scene and camera matrices.
    this._camera.projectionMatrix.fromArray(projectionMatrix);
    this._scene.matrix.fromArray(viewMatrix);



    // Tell the scene to update (otherwise it will ignore the change of
matrix).
    this._scene.updateMatrixWorld(true);
    this._renderer.render(this._scene, this._camera);
 }
```

Recap

1. What is VR?
2. Visual Immersion
3. WebVR pros and Cons
4. Development with WebVR

Reference

- https://people-mozilla.org/~vladimir/misc/webvr-fitc.pdf
- http://web.mit.edu/hawksley/Public/IntroToWebVR/Intro-WebVR-slides.pdf
- https://developers.google.com/web/fundamentals/vr/getting-started-with-webvr/