



JOE LUDWIG
VALVE

VIRTUAL REALITY AND STEAM

VR and Steam

- What are our goals?
- What exist and what does that mean for you?





Programmer Joe



Login



Join



Programmer Joe



Login



Join



2:16 PM



STORE

LIBRARY

COMMUNITY

WEB

FRIENDS

STORE

LIBRARY

COMMUNITY

GAMES

Installed (9)



WEB

FRIENDS



HALF-LIFE 2

- NEW GAME
- LOAD GAME
- ACTIVATE VIRTUAL REALITY
- ACHIEVEMENTS
- OPTIONS
- QUIT



H A L F - L I F E 2

- NEW GAME
- LOAD GAME
- ACTIVATE VIRTUAL REALITY
- ACHIEVEMENTS
- OPTIONS
- QUIT



HEALTH 100

SUIT 60





Half-Life 2

3:59:30 PM

117 FRIENDS

ACHIEVEMENTS



MOST RECENT

Singularity Collapse

Destroy the Citadel's reactor core.



SO CLOSE...

What cat?

Break the mini-teleporter in Kleiner...



MORE UNACHIEVED

Atomizer

Disintegrate 15 soldiers by throwin...



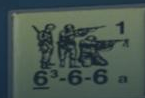
Counter-Sniper

Kill all of the snipers in City 17.

[VIEW ALL](#)



oLynx (Roy Elt... & (Ido Magel)



A Wild Ginger

LINKS & MORE



FRIENDS WHO PLAY



SCREENSHOTS



WEB



FRIENDS

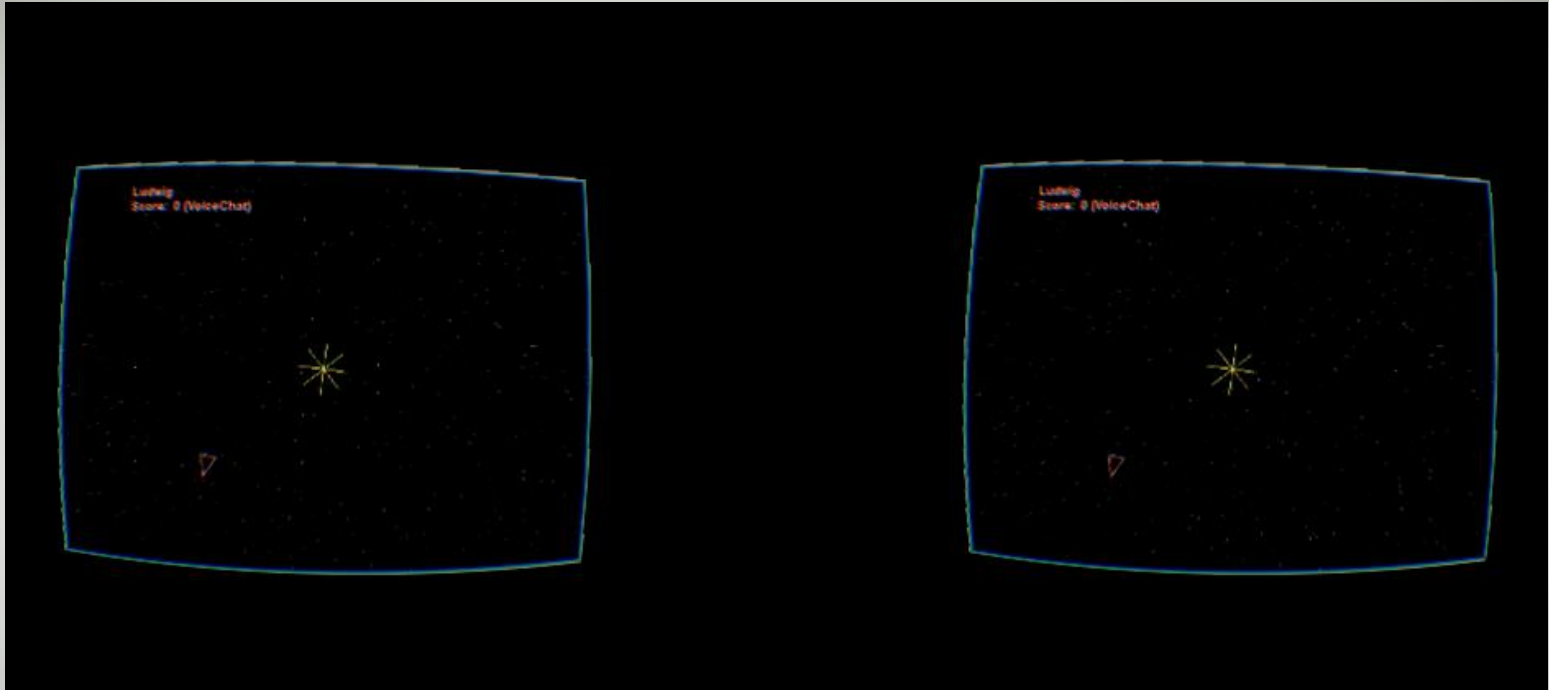
NICE MOCKUPS.
WHAT ACTUALLY WORKS?



Steam Big Picture in VR Mode



Steam Overlay and Half-Life 2 in VR



Steamworks Example (aka Spacewar) in VR

VR and Steam

- What are our goals?
- What exist and what does that mean for you?

VR Mode in Steam

New ISteamUtils member:

```
bool IsSteamRunningInVR();
```

Your Game

Steam

Steamworks VR API

Oculus VR SDK

Other Hardware SDK

VR in Steamworks

Future Proofing

- New Hardware
- Updated Software

One Device, Multiple Apps

FUTURE PROOFING

Future Hardware

Future Software

Future Hardware



Future Software

- Improved calibration
- Improved filtering for the tracker
- New platforms

ONE DEVICE, MULTIPLE APPS

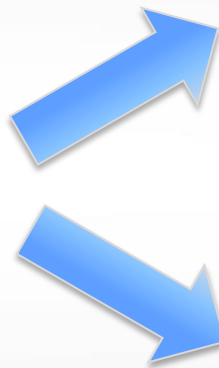
Traditional Shared Hardware



Shared VR Hardware



Steamworks



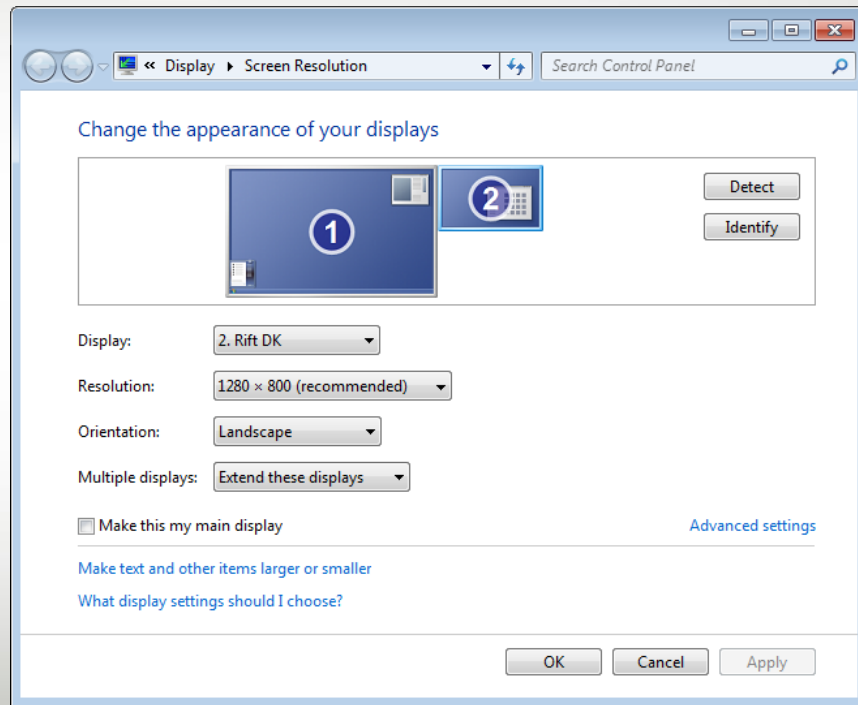
VR in Steamworks

- **Display geometry**
- Distortion compensation
- Head tracking

Display Geometry

```
bool GetWindowBounds(  
    int32_t *pnX,  
    int32_t *pnY,  
    uint32_t *pnWidth,  
    uint32_t *pnHeight );
```

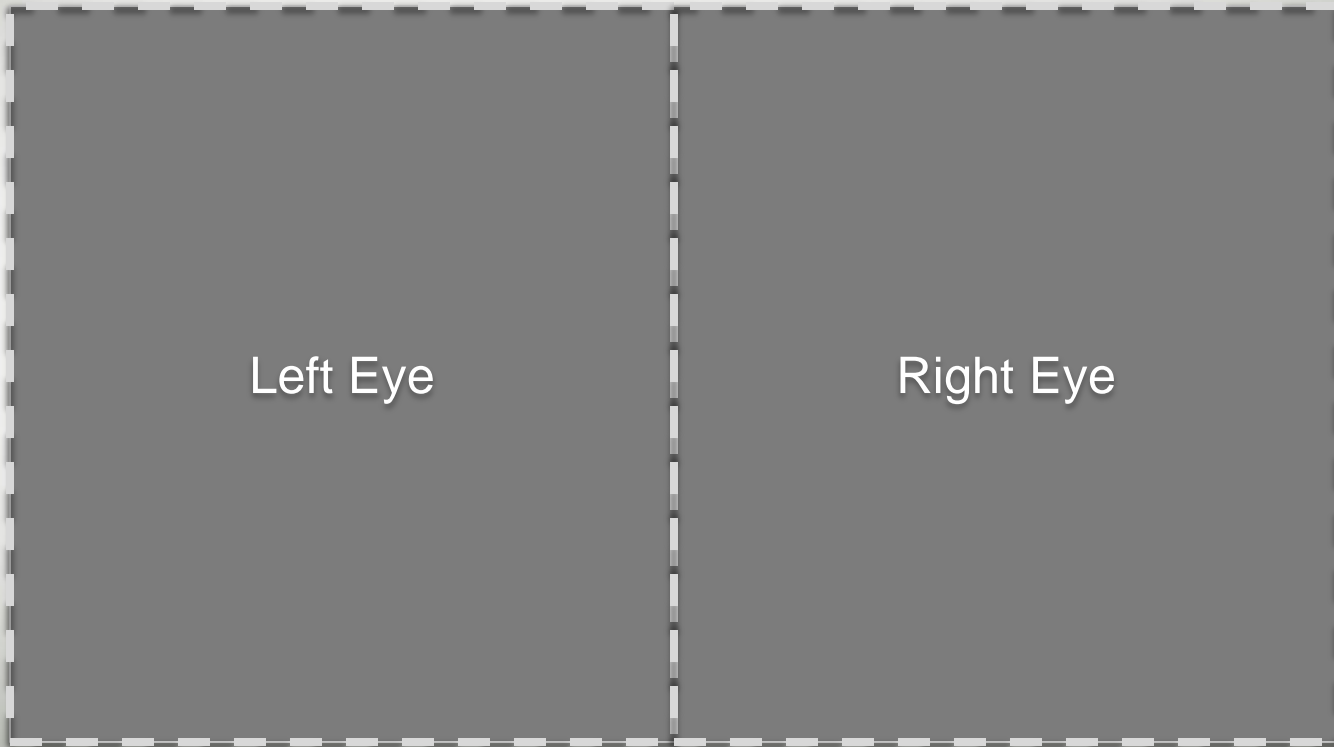
Display Geometry



Display Geometry

```
void GetEyeOutputViewport(  
    Hmd_Eye eEye,  
    GraphicsAPIConvention eAPIType,  
    uint32_t *pnX,  
    uint32_t *pnY,  
    uint32_t *pnWidth,  
    uint32_t *pnHeight );
```

Display Geometry



Display Geometry

```
HmdMatrix44_t GetProjectionMatrix(  
    Hmd_Eye eEye,  
    float fNearZ,  
    float fFarZ,  
    GraphicsAPIConvention eProjType );
```


Display Geometry



Display Geometry

```
HmdMatrix44_t GetEyeMatrix(  
    Hmd_Eye eEye );
```

Display Geometry



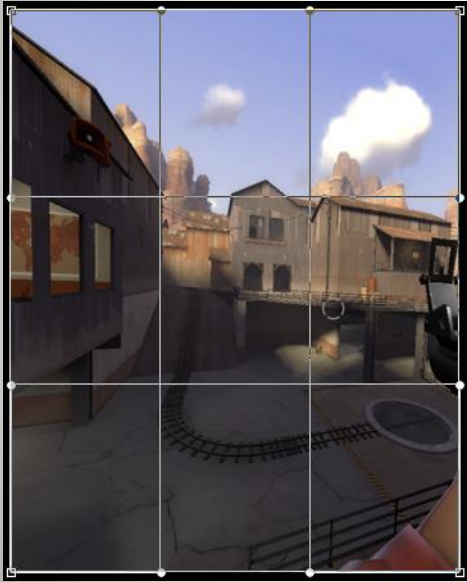
Display Geometry

```
void GetRecommendedRenderTargetSize(  
    uint32_t *pnWidth,  
    uint32_t *pnHeight );
```

VR in Steamworks

- Display geometry
- **Distortion compensation**
- Head tracking

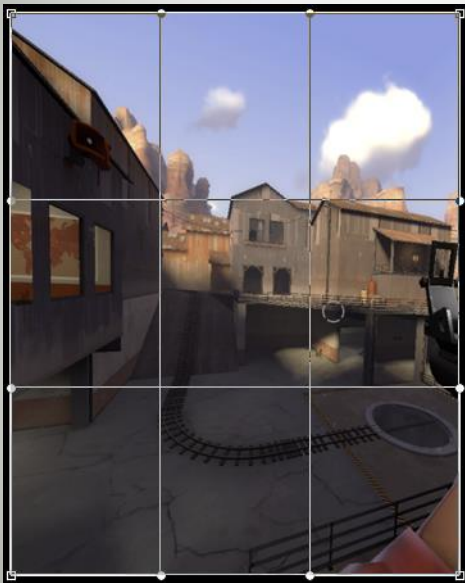
Distortion Compensation



f



Distortion Compensation

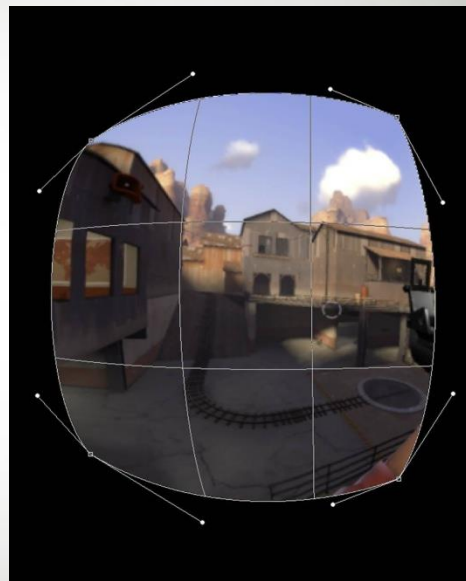


$$A + Br + Cr^2$$

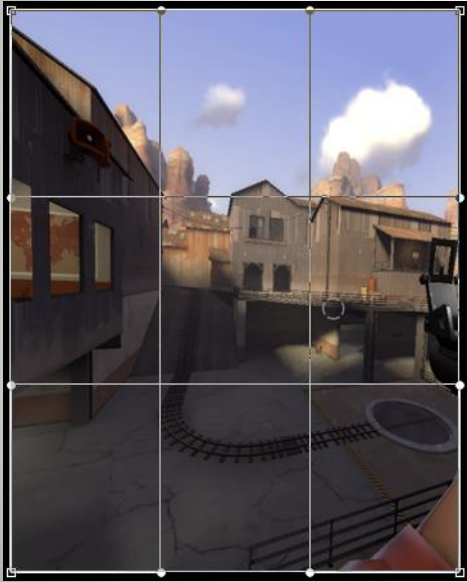
$$\frac{1}{A + Br + Cr^2}$$



$$(2t^3 - 3t^2 + 1)p_0 + (t^3 - 2t^2 + t)m_0 \\ + (-2t^3 + 3t^2)p_1 \\ + (t^3 - t^2)m_1$$



Distortion Compensation



Distortion

```
DistortionCoordinates_t ComputeDistortion(  
    Hmd_Eye eEye,  
    float fU,  
    float fV );
```

VR in Steamworks

- Display geometry
- Distortion compensation
- **Head tracking**

Head tracking

```
bool GetWorldFromHeadPose(  
    float fPredictedSecondsFromNow,  
    HmdMatrix34_t *pmPose,  
    HmdTrackingResult *peResult );
```

Head Tracking



Head Tracking






Head tracking

```
void ZeroTracker();
```

VR in Steamworks

- Display geometry
- Distortion compensation
- Head tracking

VR in the Steam Store

	Steam VR Support
	Controller Support
	Multi-player

WHEN?

WHEN?

Within a few weeks



JOE LUDWIG

JOE@VALVESOFTWARE.COM

<http://tinyurl.com/steamworksvr>

<http://tinyurl.com/tf2vrslides>

<http://tinyurl.com/steamvrhub>