



Virtual Reality to the People

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This year's biggest breakthrough

- Glasses-free active stereo!



A conservation of CAVEs?

- Many places are ramping down usage
 - While other places are ramping up
 - Perhaps:
 - Research: ↓
 - Applications: ↑
 - Requires: personnel who know vis & VR
(if you want the systems to be useful beyond demos)
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Increasing availability of VR tech

- Hardware:
 - 3DTVs around every corner
 - Tracking more and more available
 - Software:
 - VR libraries available (require expertise)
 - Building into familiar software
 - Complete turn-key solutions:
 - Or at least a community to hold your hand
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3D TVs

- DLPs
 - Good, but fat
 - Availability is decreasing
- LCDs
 - Too much ghosting
- Plasmas
 - Some good, some not
- Xpol technology
 - Passive stereo (polarized)
 - Prosumer – JVC
 - Consumer – LG & Vizio



Stereo glasses

- DLPs
 - Used standard 3-pin minidin (i.e. could reuse existing models)
- LCDs & Plasmas
 - Going toward proprietary glasses
 - Lower-quality
 - XpanD
- Xpol technology
 - “standard” polarized glasses
 - Half resolution stereo



Stereo screens big & small

- 103" Panasonic Plasma

- 17" stereo laptop



Tracking on the cheap

- NaturalPoint
 - Sixense/Razer
 - Wiimote
 - ARTk
 - Kinect
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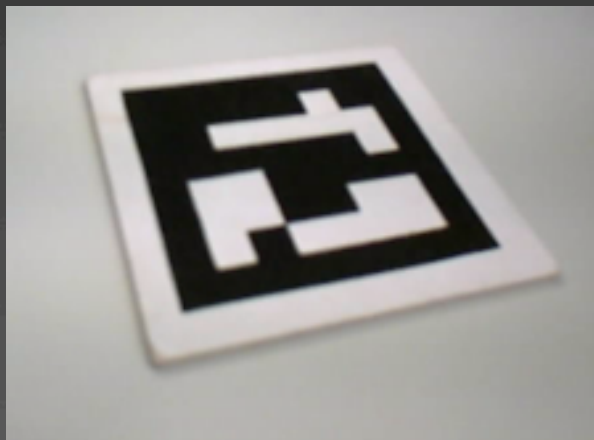
Tracking: NaturalPoint

- OptiTrack:
 - Multi camera system
 - Smart cameras
 - Windows only
 - VRPN feed
 - Calibration is not for the novice
 - ~\$6000 for a good system
- TrackIR:
 - Simple single sensor sensor
 - Windows only
 - Not full 6-dof tracking
 - ~\$170
- Track Duo & Trio:
 - Cameras in a bar (2 or 3)
 - Just released
 - No calibration required
 - \$1500/\$2500



Tracking: DIY cameras

- ARTk (Augmented Reality Toolkit)
 - Reappropriating for VR tracking
 - Fiducial markers
 - Requires VR expertise



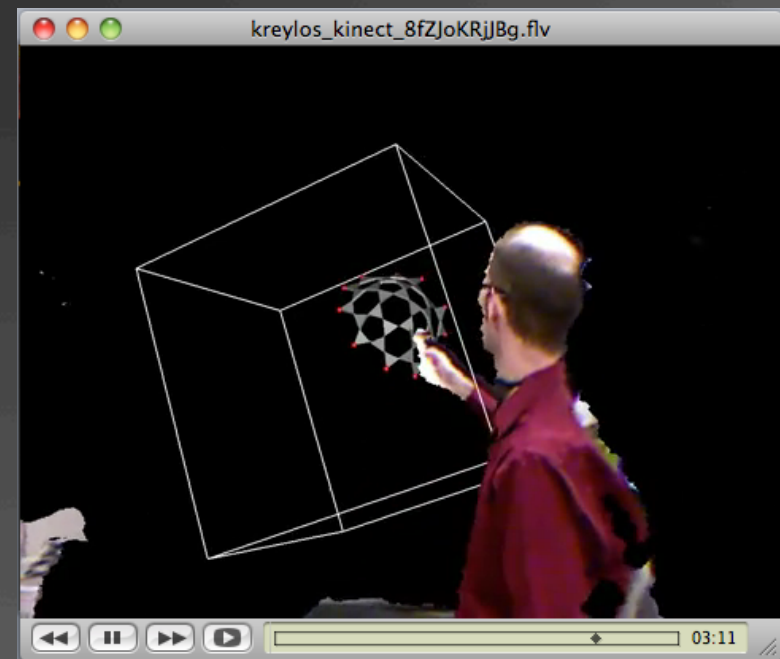
Tracking: Gaming systems

- Wiimote
 - Accelerometers for relative movements
 - Absolute tracking requires some DIY effort
- Sixense/Razer
 - Magnetic tracking
 - Dual hand – difficult to rig for head
 - Limited tracking range
 - Closed interface
- Kinect
 - ...



Tracking: Kinect

- Multiple uses
 - Skeletal tracking
 - Enhanced video (image & depth)
- OpenNI
 - Natural Interaction API
 - Skeletal data
 - Not Kinect specific
- Enhanced Video
 - Tele-collaboration
 - 3D video integration (Kreylos YouTube)

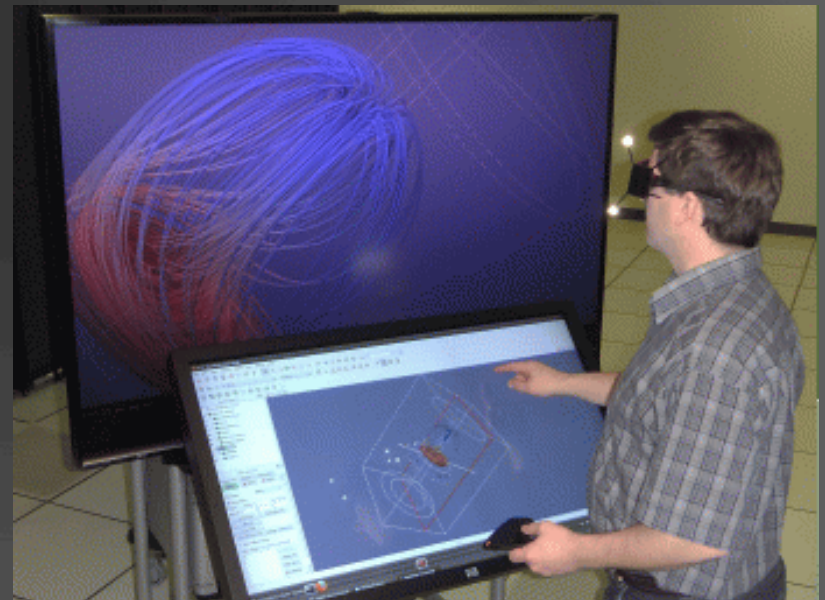


Software: Immersive ParaView

- Avoid the unfamiliar software hurdle
 - VR capabilities come for free
 - Already included in recent releases of ParaView
 - Still a work in progress
 - Requires special configuration of ParaView displays
 - Doesn't work well in CAVEs yet
 - Doesn't have special VR widgets
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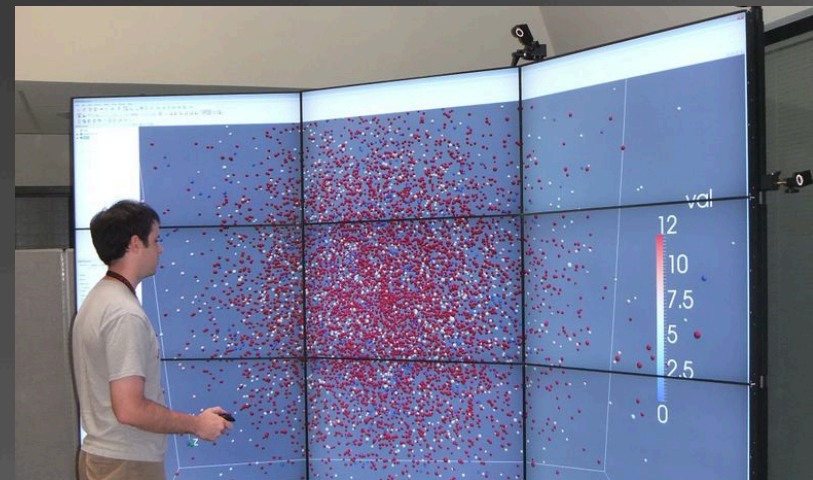
IQ-station: putting it all together

- A low-cost system based on COTS hardware and open-source software
- Catalysts:
 - Commodity 3D displays
 - Low cost quality tracking
- Always evolving
 - Huge plasma screens
 - Small & portable laptop systems
 - Combining with touch technologies
- Building a community
 - INL supplying collaborators
 - iq-station.com (brand new)



VR for the elite people

- IQ-wall
- DRI 6-sided CAVE
- CALIT2 NexCAVE
- Tele-collab room



IQ-wall

- Major components
 - Samsung ultra-thin bezel, stackable displays
 - 4x3 tiles (4080x3072)
 - Matrox Triple Head 2 Go (4)
 - QuadroPlex 2200-D2
- Driver issues
 - Matrox units don't recognize full res on Windows 7



DRI 6-sided CAVE

- Display
 - 12 projector, 6-sided system
 - 1920x1920 per screen
- Render cluster
 - GraphStream
 - 17 nodes
 - CPU: dual quad-core Xeon w5590
 - RAM: 24 GB
 - GPU: Quadro FX 5800
 - Network: Gig-E & InfiniBand 4x QDR
 - OS: Ubuntu w/ Puppet cluster management



- SMP Renderer
 - GraphStream
 - MB: Tyan server (S7015-CA w/ 8 PCI-e 16x slots)
 - CPU: dual quad-core Xeon w5590
 - RAM: 96 GB
 - GPU: 7 Quadro FX 5800
 - Network: Gig-E & InfiniBand 4x QDR
 - OS: Ubuntu

DRI 6-sided CAVE



CALIT2 NexCAVE

- Tiled stereo displays
- Not thin-bezel (though soon)
- Overlap in Z:
 - Hide some of the bezel
 - Allow curvature
 - Address Xpol falloff
 - Not as bad as you might think
- Segments can be easily transported



CALIT2 NexCAVE



INRIA – video hull tele-collab

- Convex hull shape reconstruction
- Multi-angle video capture
- Allows user to see self in VR
- Allows collab with self-avatars
- Works best w/ green-screen



Conclusion

- Consumer technology advances making VR more widely available
 - Not yet turn key, but making progress
 - Trickle down benefits from high-end development
 - Once it becomes pervasive, benefits will bubble up
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Call for papers

- International Symposium on Visual Computing (ISVC) 2011
 - Special Track: Immersive Visualization
 - Papers due: May 20
 - Conf: Sept 26-28 in Las Vegas
 - isvc.net
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