



BROWN

YURT ULTIMATE REALITY THEATER



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Internet2 Meetings in Chicago

May 17, 2016





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model
d to wireframe sphere s

Challenges

- Physical
 - HVAC
 - ADA
 - Workspaces

Challenges

- Funding
 - Staffing
 - Students
 - Hardware
 - Software
 - Justification

Challenges

- Uses
 - Community Outreach
 - Public Relations
 - Teaching & Learning
 - Research
 - Funded Research

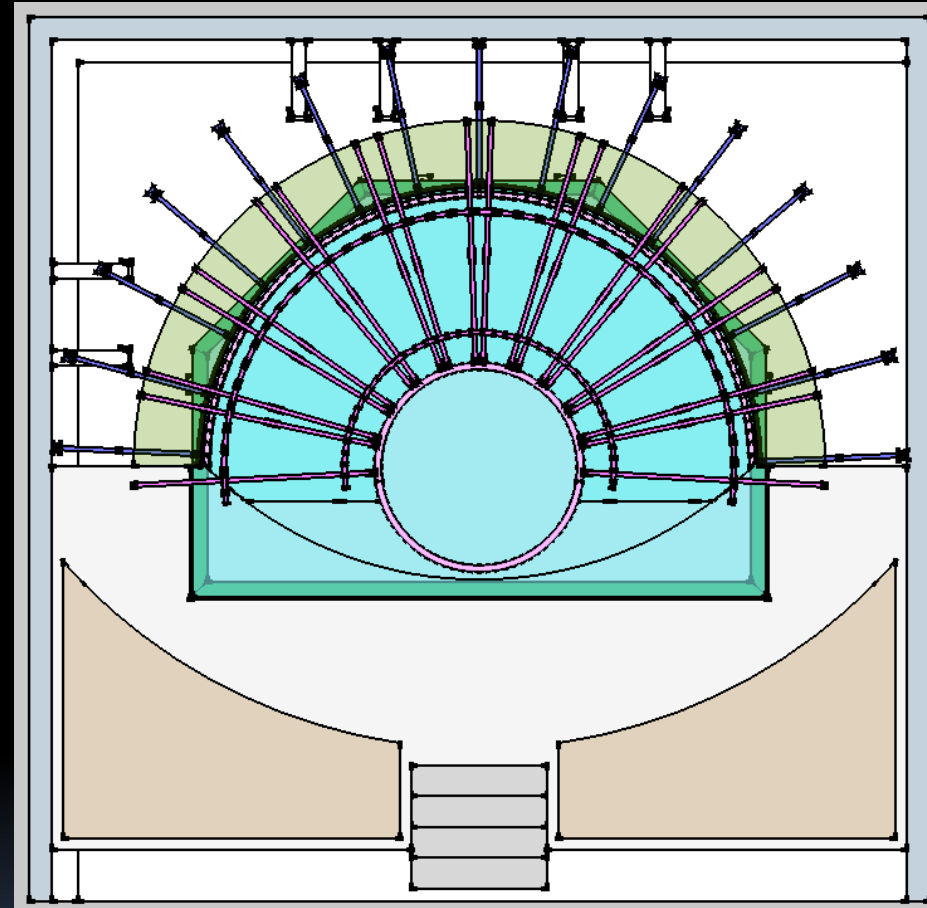
History

- 2009 NSF 0923393 (MRI/David Laidlaw)
- Proposed design inspired by CaliT2 StarCAVE but 8-sided vs. 5-sided



Basics

- Curved Wall
 - 3 Cylinder Sections
 - Eliminates most visible seams
 - Reduces construction complexity
- Bottom-projected floor
 - 10cm clear acrylic, 12'x18'
 - 2mm diffusion screen on top
- Top-projected ceiling
 - Hanging by threads
- Curved rear doors
 - Held off frame by plastic ribs



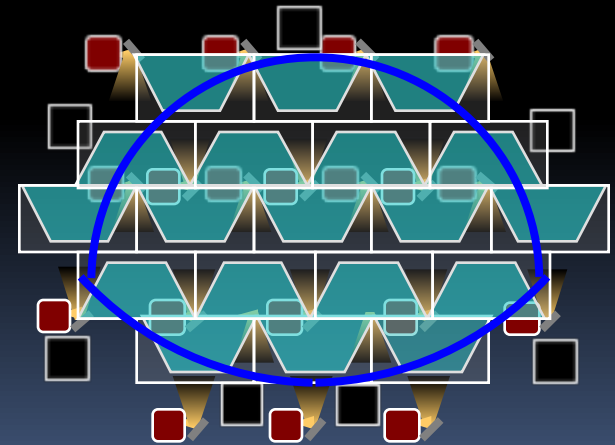
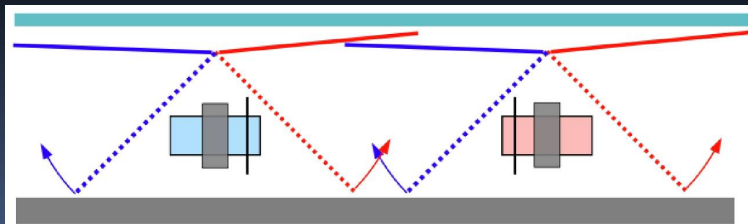
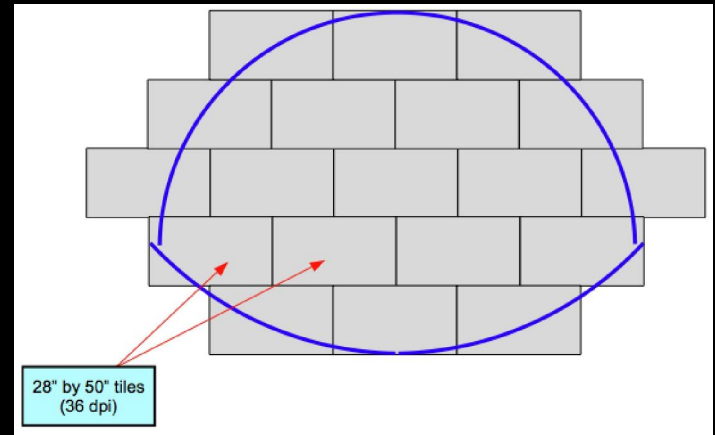
Details

- 20, 69, 145, 200, 2500, 100 million
- 20 dual-socket 128GB Supermicro Linux nodes
 - 4 x Quadro K5000 (with Gsync)
 - Twinview, 2xDVI outputs, convert to HDMI
 - Active stereo, software swapping
 - FDR14, GPFS
 - Part of OSCAR, the campus supercomputer cluster
- 69 1080p Delta projectors
 - Single DMD
 - Custom projector firmware, 2 x HDMI input

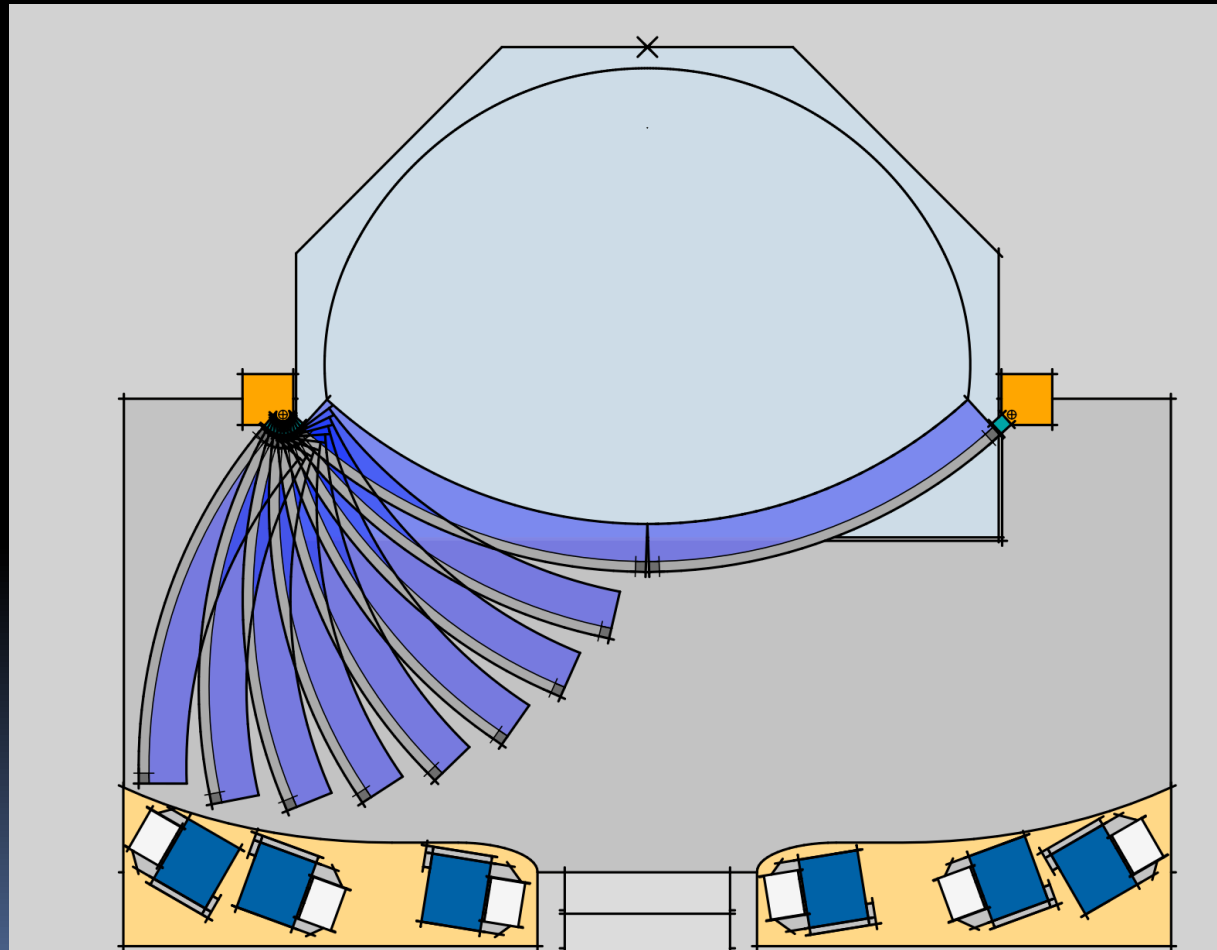


Floor Projection

- 19 tiles in running bond placement
- Projector positioning allows access between rows
- Larger mirror assemblies fold up for projector/mirror access



Door Projection



Scalable software

- Warping and blending of individual screens
- Screens calibrated using a camera
- Color calibration, maybe
- Limits us to open source
- Edges a problem, no bezels



First light



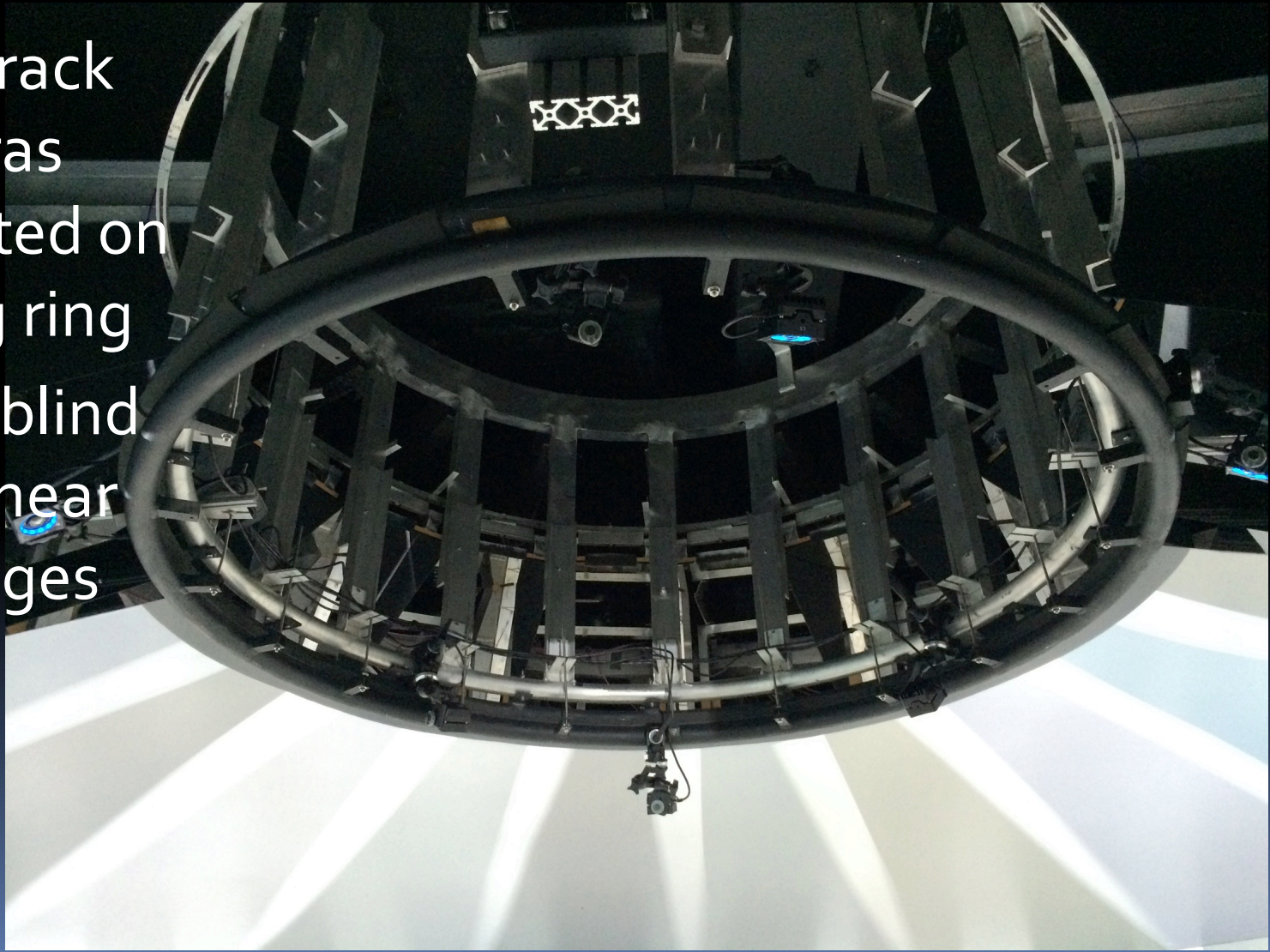
Peripherals

- Opti-track motion capture system for tracking glasses, wands, whatever.
- 3D printed glasses antennae, wands.
- VRPN servers for other wand buttons, pulse monitors, whatever.
- Volfoni active stereo glasses

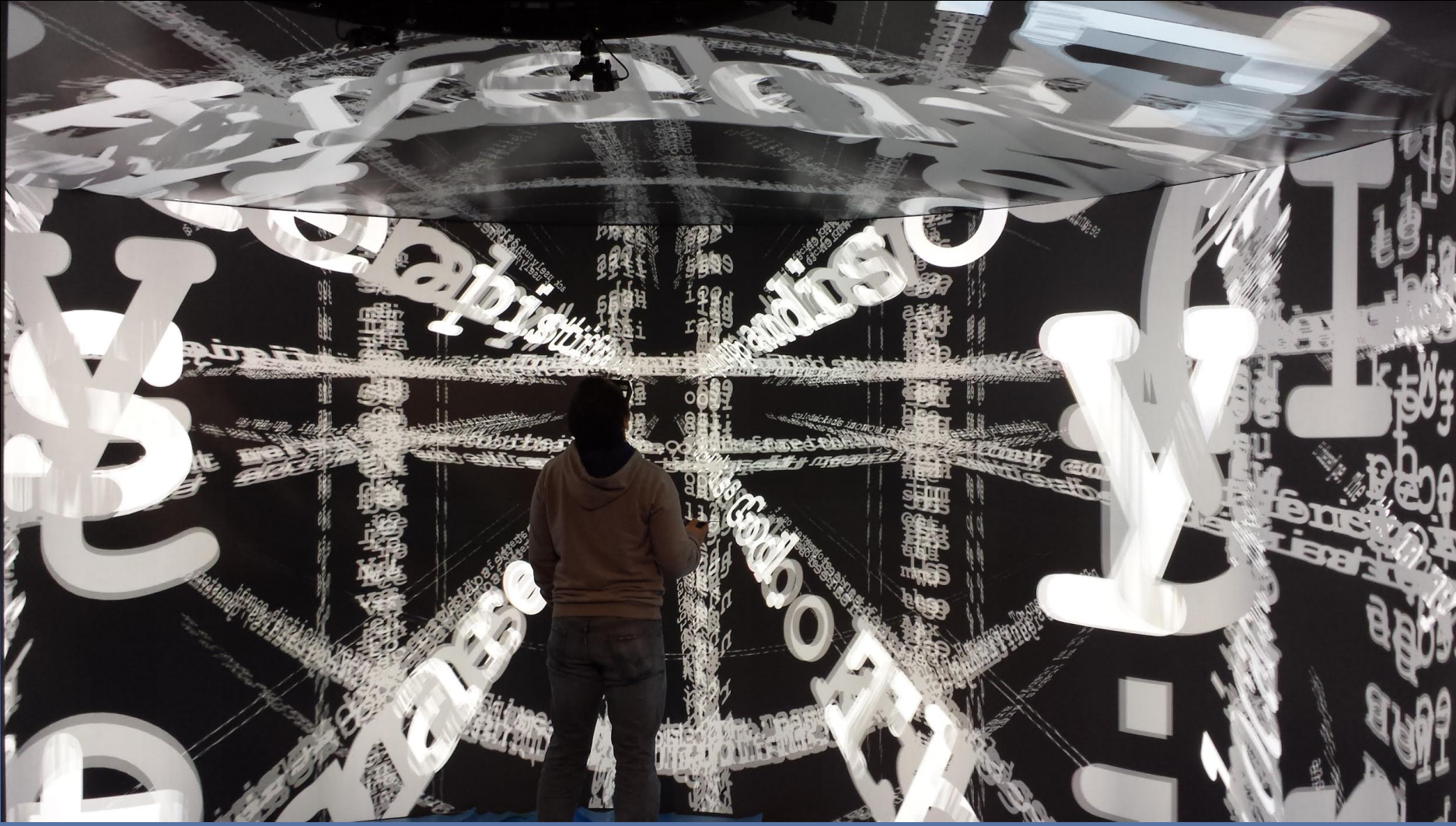


Motion capture

- Opti-track cameras mounted on ceiling ring
- A few blind spots near the edges

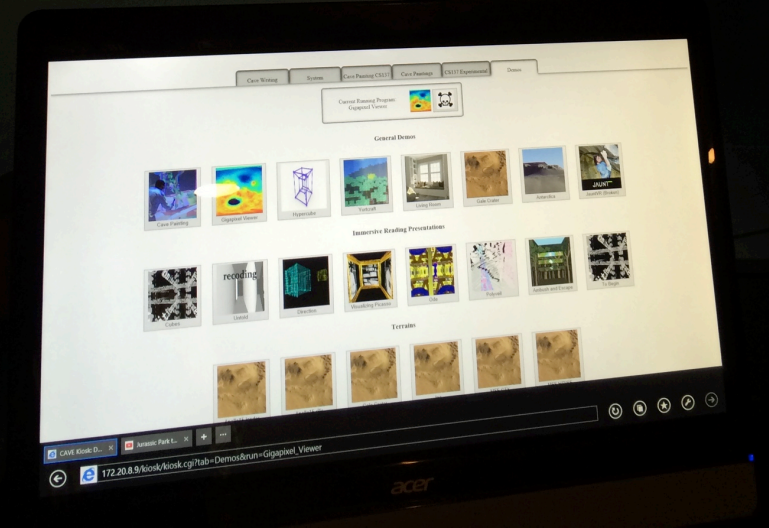


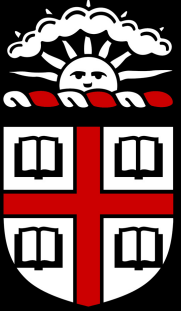
Writing3D – spatial poetry



Technical Challenges

- Dark images – blend regions visible
- Light images – color shifting over bulb life
- Custom projector firmware
- Sound
- Open source limitation
- Calibration at the edges





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