Vertical dome (iDome): Visualisation and Navigable movies.

Paul Bourke
WASP, UWA

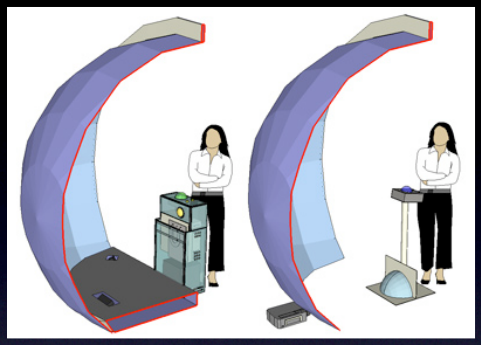
Outline

- iDome: An introduction
- Navigable movie player
  - Cylindrical movie example
  - Spherical movie example (molecular visualisation)
  - "warpplayer" and Quartz Composer patch
- Photographic capture
  - Fisheye video: Canon HV 20 and 180 degree fisheye lens
  - Still and time lapse: Nikon D300 and Sunex 185 degree fisheye lens
  - Spherical video: LadyBug 2 camera (135 x 360 degrees, 30fps)
- Future
  - Stereoscopic projection in the iDome (120Hz frame sequential)
  - Higher resolution using multiple projectors.

While examples will be demonstrated in the iDome, most of the discussion and examples shown are equally applicable in a planetarium orientated dome.

iDome

- Developed in conjunction with iCinema, UNSW. [Dome = iCinema, projection = myself]
- Initial commercial application is a mine truck driver simulator. (VirTools)
- Use at UWA is for primarily science visualisation and exhibition outcomes in art - history - cultural heritage ....
- Installations at
  - UNSW
  - UWA
  - SciTech
  - Various mining companies around Australia
  - Science Centre Wollongong (In progress)
  ... more to come soon

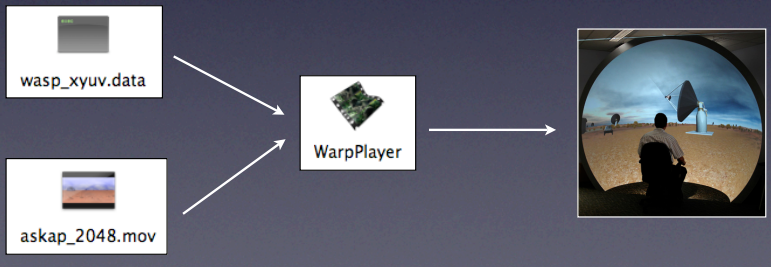


iCinema, UNSW

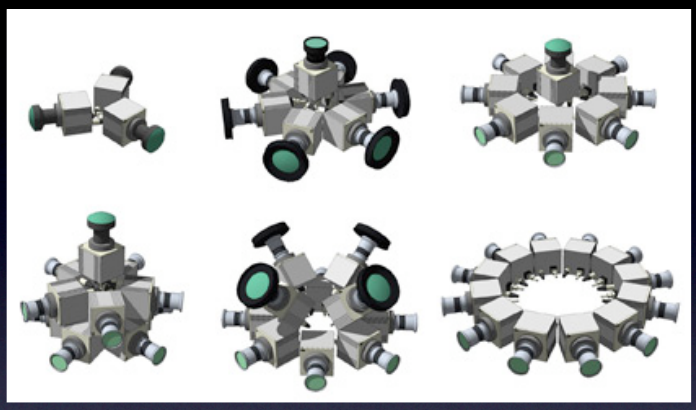
WASP, UWA

Navigable movie player

- Ability to navigate within movie frames, eg: spin a fisheye frame about it's center.
- Geared mainly towards movies consisting of cylindrical or spherical projections.
- Totally abstracts the input movie projection type and the output projection type from the application. Contained entirely within the warping file.
- Commonly encountered examples:
  - pan/zoom within a large frame movie, eg: 4Kx4K
  - perspective view within a cylindrical panorama (pan horizontally or vertically)
  - fisheye view within a spherical panorama
  - warped fisheye projections in a planetarium or iDome

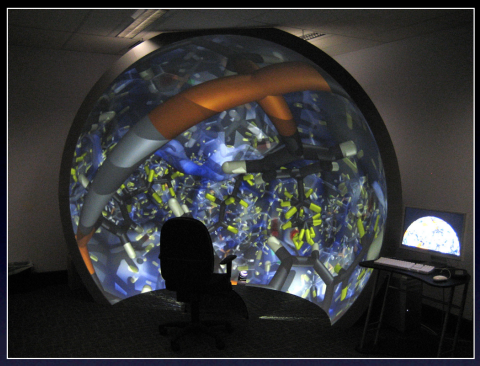


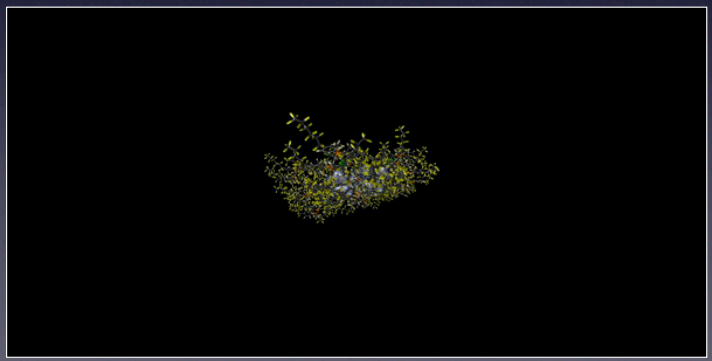
Example 1 (iCinema)



Sydney Streets (Volker Kuchelmeister)

Example 2: Molecular visualisation



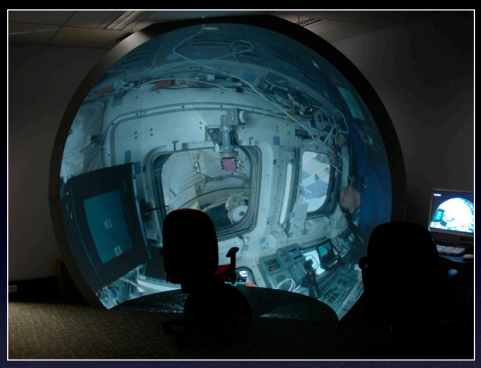


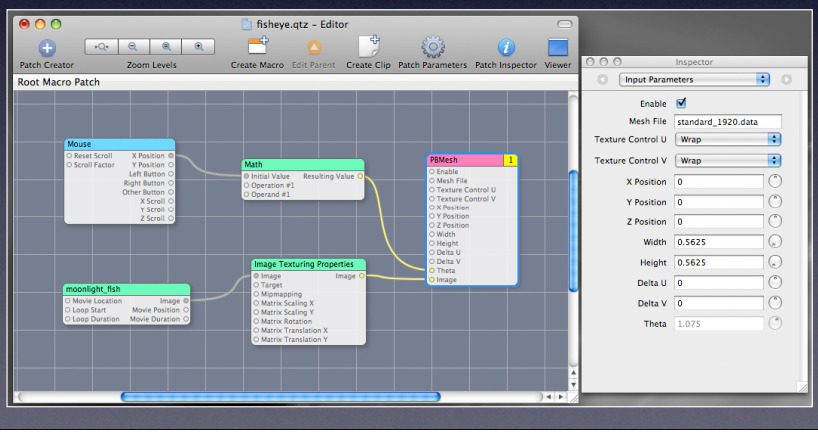
Chemistry, UWA

360 x 180 degrees (Full spherical projection)

Quartz Composer patch

- Implements warping and navigation modes within Quartz Composer.
- Ideal for scripting exhibitions with interactive elements, dynamic content, randomised components, transitions, etc.
- Example: Spacestation photos





Stitching standard camera shots

- 120 x 6MPixel images, stitched to form a 21500 x 10750 pixel spherical panorama.

Geraldton Cathedral

Fisheye video capture

- Canon HV20 (1080 progressive)
- Doesn't give full frame fisheye, but can tilt the fisheye in postproduction sufficiently for the iDome.
- Final (truncated) fisheye is around 1500 pixels square.

Still and time lapse fisheye

- Nikon D-300 and Sunex 185 degree fisheye lens.
- Capable of 2800 pixel square 180 degree fisheye stills.
- Capture sequences at 6fps.
- Continuous time lapse at lower frame rates.

Nikon D-300 and fisheye lens

Perth city centre

Stitching fisheye images

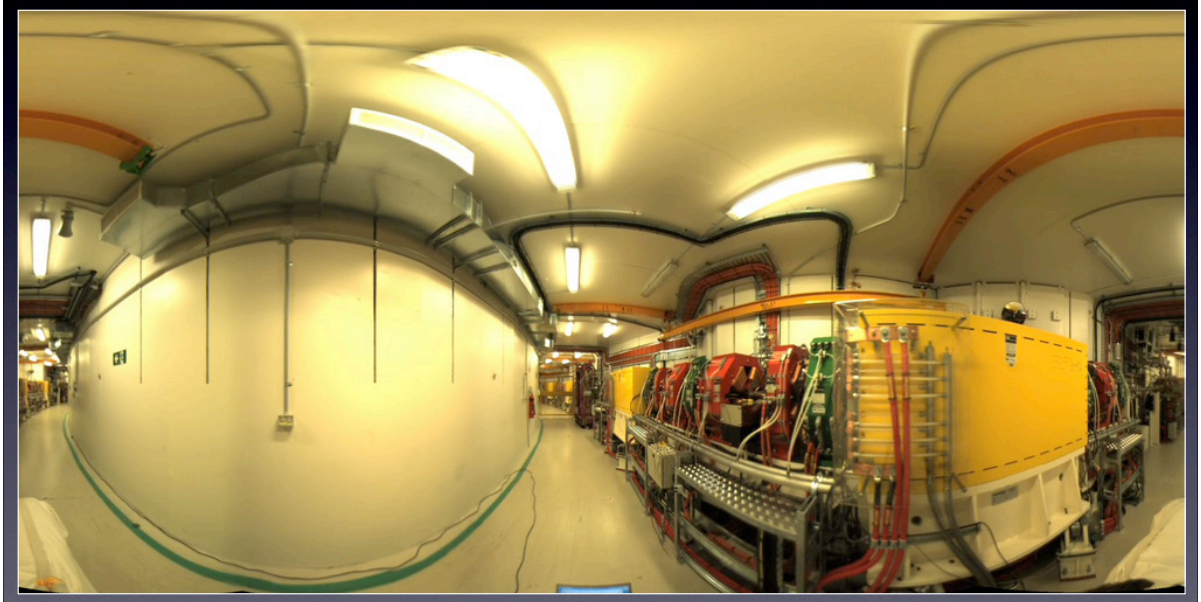
- 3 shots with the Sunex lens for a 6K x 3K spherical panoramic image.



East Perth

Spherical video capture

- LadyBug camera (360 x 150 degree @ 30fps)



Synchrotron, Melbourne (Chris Henschke)

Example 3: (iCinema)

Nagur, India (Volker Kuchelmeister)

Stereoscopic projection

- Currently based upon the Mirage HD3 - frame doubling stereoscopic projector.
- Active stereo with shutter glasses.
- Alternative is Infitec and a dual projector arrangement (or single projector Infitec stereo). Colour fidelity and cost of ownership a problem with Infitec.
  (Polaroid systems not appropriate due to dome surface requirements).
- Developing techniques to create omnidirectional fisheye stereo, both CG and real imagery. Correct stereo pairs independent of view direction.

Questions?

Mawsons hut, Antarctica (Peter Morse)