Stereoscopic projection: Applications in education

Paul Bourke
Western Australia Supercomputer Project (WASP)
University or Western Australia

Outline

- Introduction.
- Short demonstration of stereoscopic projection.
- Some (brief) theory of how it all works.
- Movie example: After Stars.
- Photographic gallery of various installations.
- Further examples from a range of application areas.

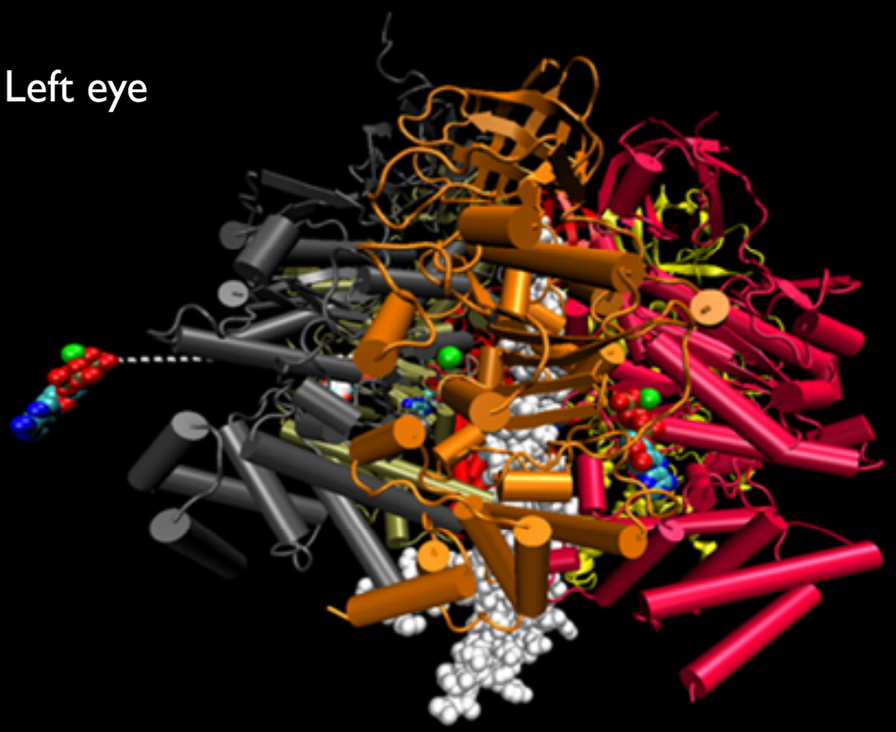
Introduction

- In the real world our eyes get two slightly offset views and these are used by our visual system to give a sense of depth.
- This is absent when viewing a computer monitor, painting, photo because each eye is only getting a single perspective view.
- There are various technologies that can present two views of an artificial world to our visual system such that we enjoy the expected depth perception.
- This technology can be used to present educational material and the novelty of the experience can be used to engage students.
- I use this technology to assist researchers visualise their datasets, the extra visual dimension can help to understand complicated geometric relationships.

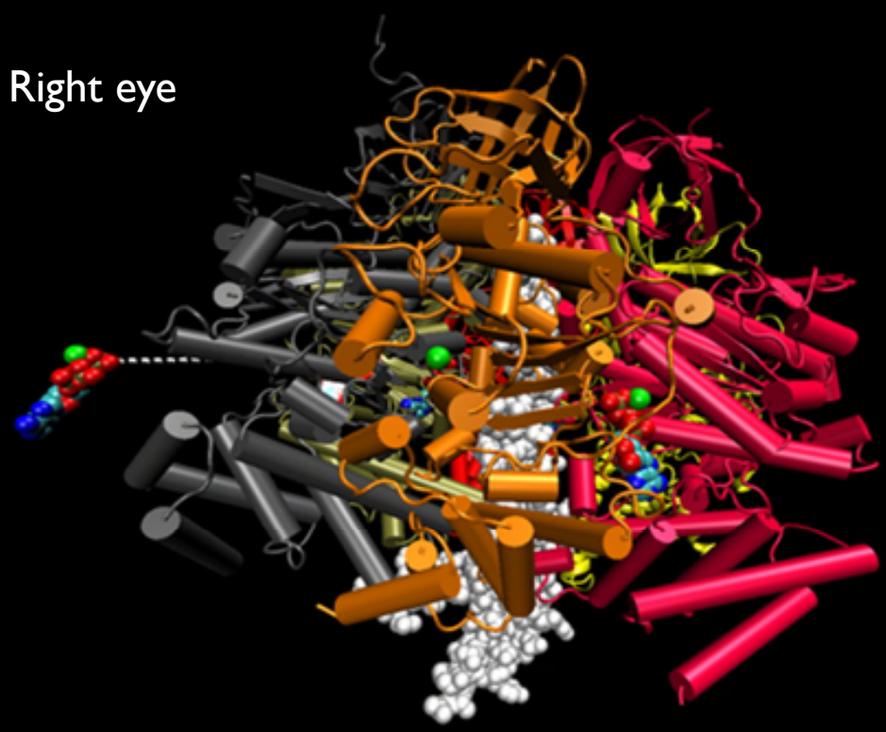
Demonstration

- Flight through galaxy survey data.
- Equivalent data from cosmological simulation.
- Molecular motors.
- Distribution of properties in coal burning furnaces.
- Isosurface example: Egyptian mummy.
- Geometric visualisation example: Lorenz attractor.

Left eye

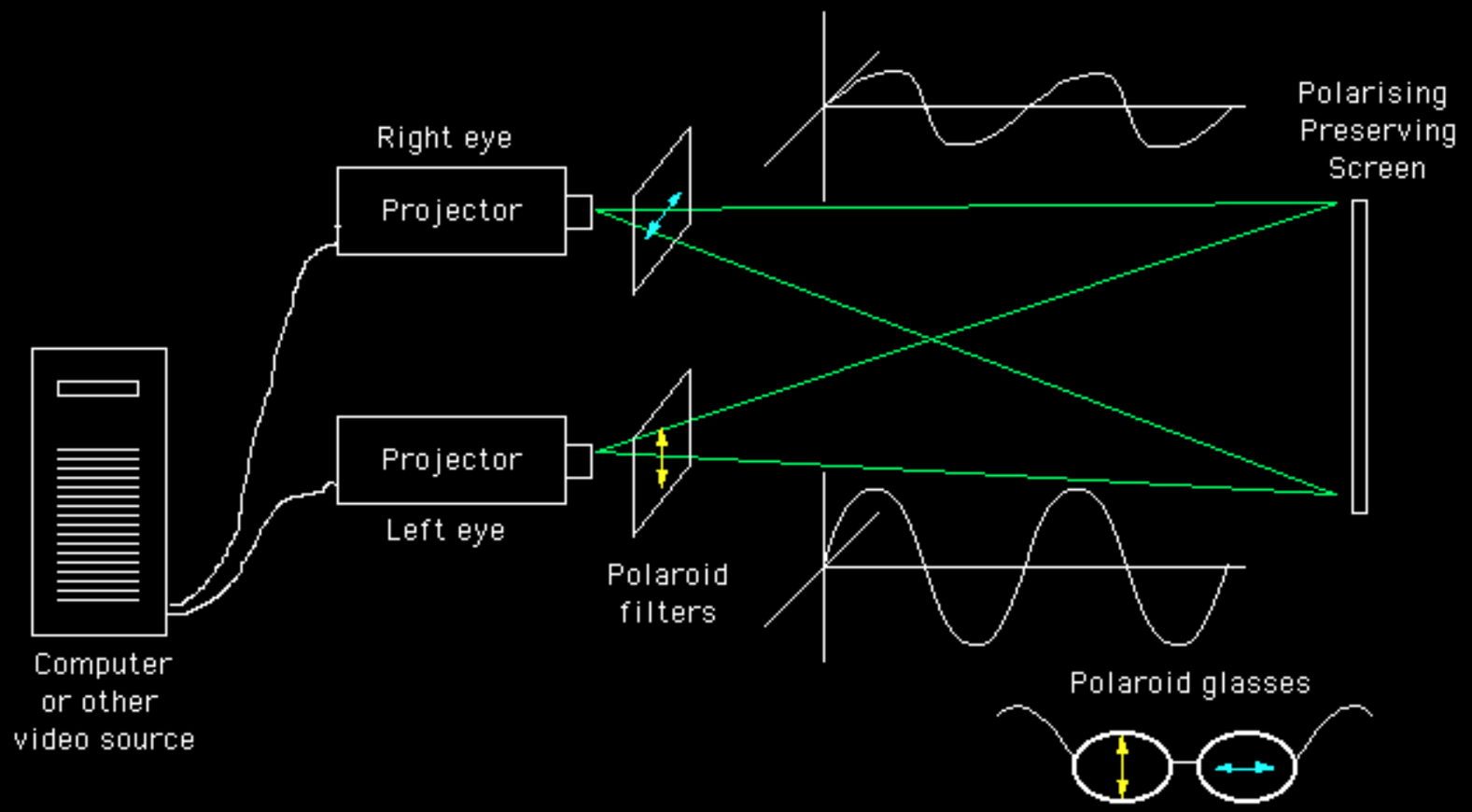


Right eye



How does it all work?

- Two data projectors, one projects the image for the left eye, the other projects the image for the right eye.
- Matching polaroid filters in front of the projectors and in the glasses means each eye only sees the image it is supposed to.
- All stereoscopic systems have the same aim: to independently present an image to each eye.



Other technologies

- Linear polaroid based systems are the most affordable, have a low cost of ownership, and constructed from commodity components.
- Circular polaroid option allows head tilt.

- Active stereo (LCD shutter glasses) were popular but require a large CRT projector and relatively expensive/delicate glasses. Still the best way to get stereoscopic support on a single monitor.

- Infitec: has the advantage of not requiring a special projection surface. Currently rather delicate and requires frequent calibration.

- Autostereoscopic: doesn't require glasses but currently very low resolution.

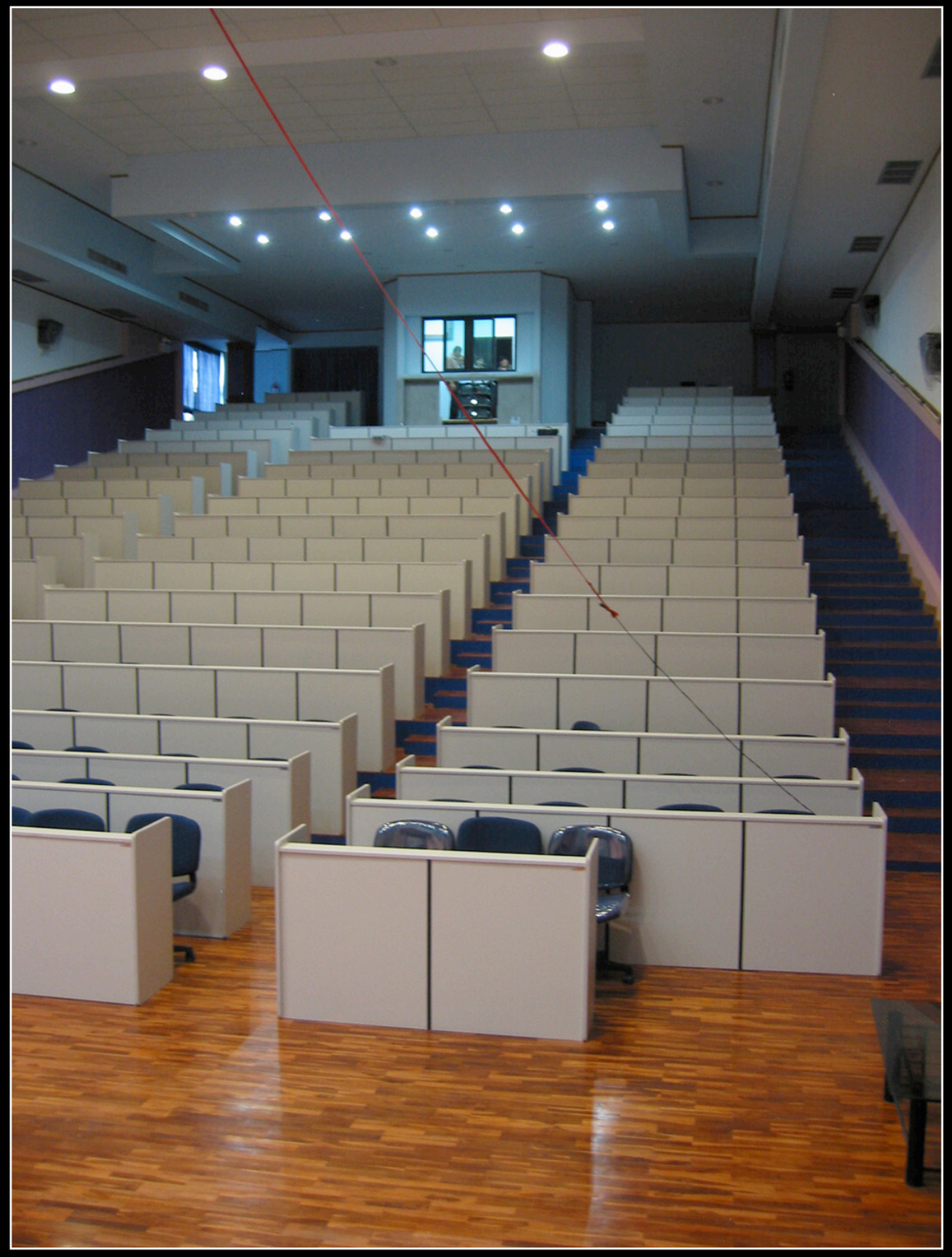
Movie example

Alien scientists debate the fate of a dying star.

Created by Centre for Astrophysics and Supercomputing
Swinburne University

Photographic gallery of various installations

Mahidol Wittayanusorn School, Thailand



Sydney Observatory

Parkes Telescope Visitors Centre

Further examples

- 3D geological reconstruction
- Nature photography - small scale.
- Virtual heritage.
- Photographic - Antarctica ~ 1905.
- Virtual Room (Melbourne Museum)

Questions?

- Other opportunities/activities
  - Stereoscopic photography.
  - Stereoscopic filming.
  - 3D modelling, rendering, animation.
  - Art exhibitions.