

Stereoscopic projection: Applications in education

Paul Bourke

Western Australia Supercomputer Project (WASP)
University of Western Australia

Outline

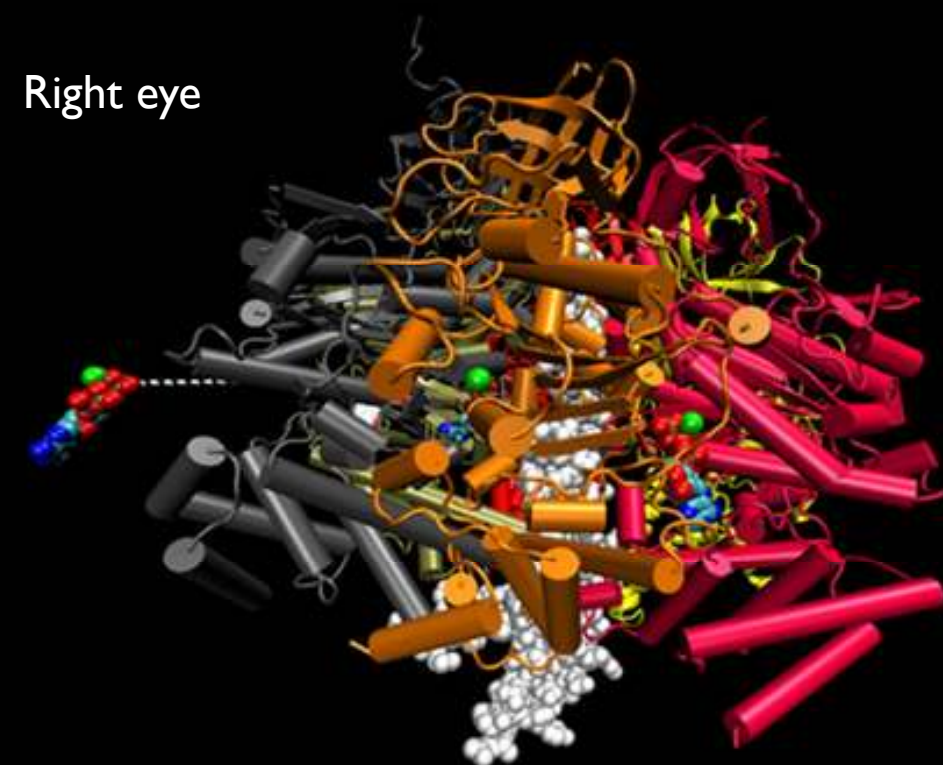
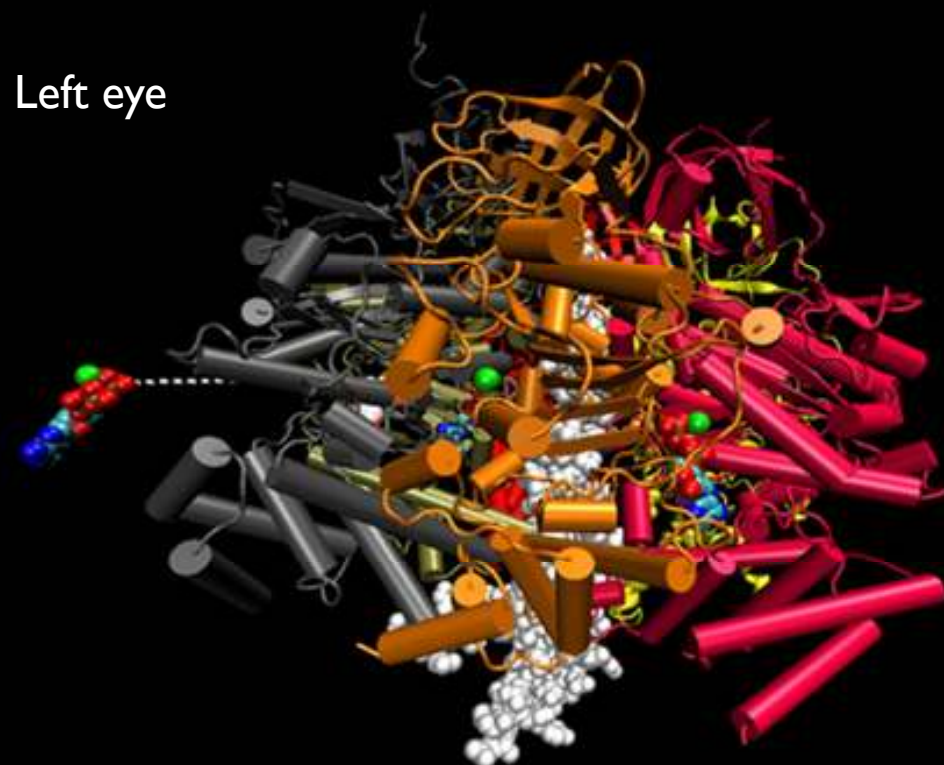
- Introduction.
- Short demonstration of stereoscopic projection.
- Some (brief) theory of how it all works.
- Movie example: *After Stars*.
- Photographic gallery of various installations.
- Further examples from a range of application areas.

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.

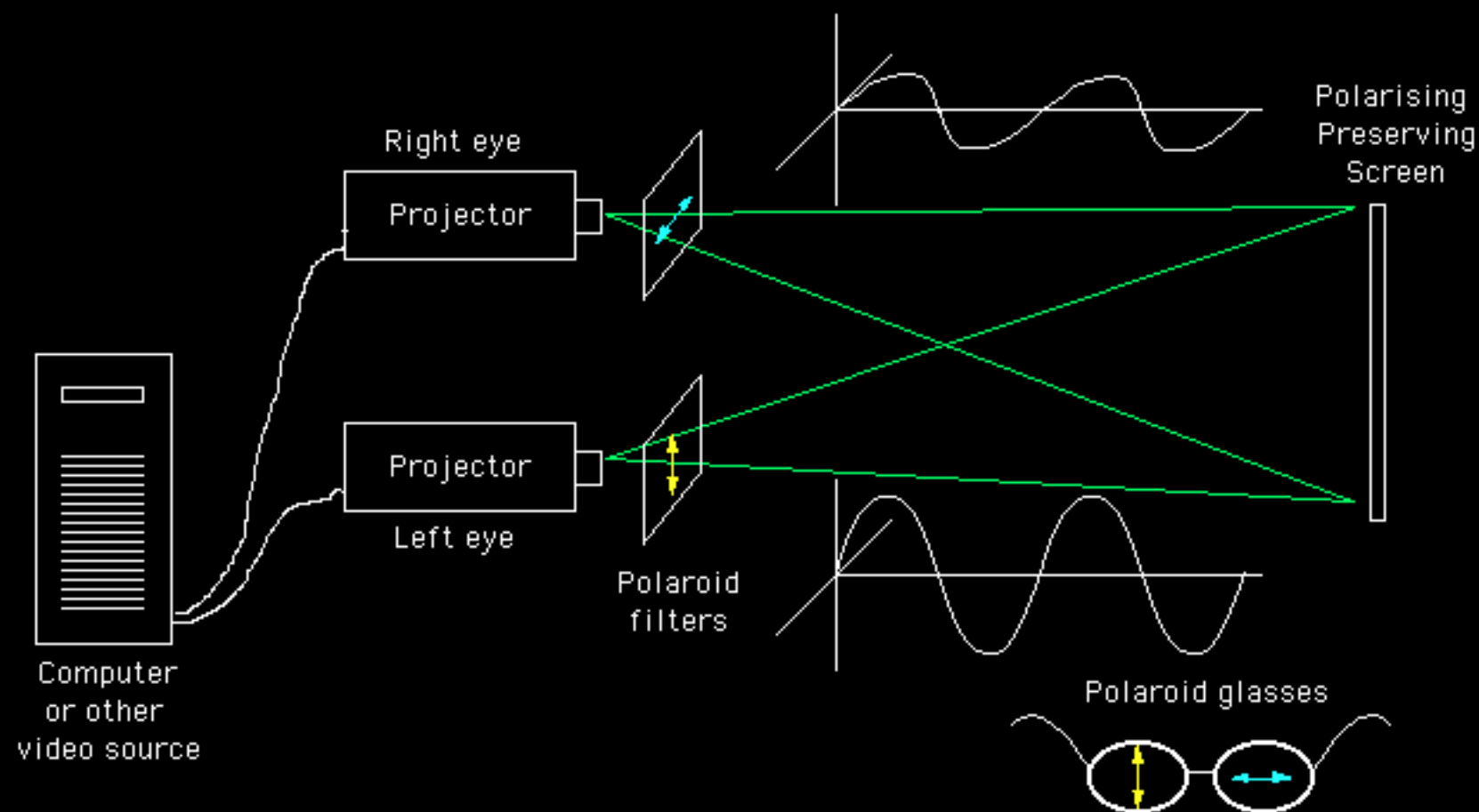
Demonstration

- 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.



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

Left eye



Right eye



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.

