CSE 190: Virtual Reality Technologies

LECTURE #6: 3D STEREO

Announcements

Homework project 1 due tomorrow at 2pm

- To be demonstrated in VR lab B210
- One member of each team:
  Upload code to TritonEd by Friday 2pm

Stereo Imaging: Concept

General concept: each eye sees a slightly different image

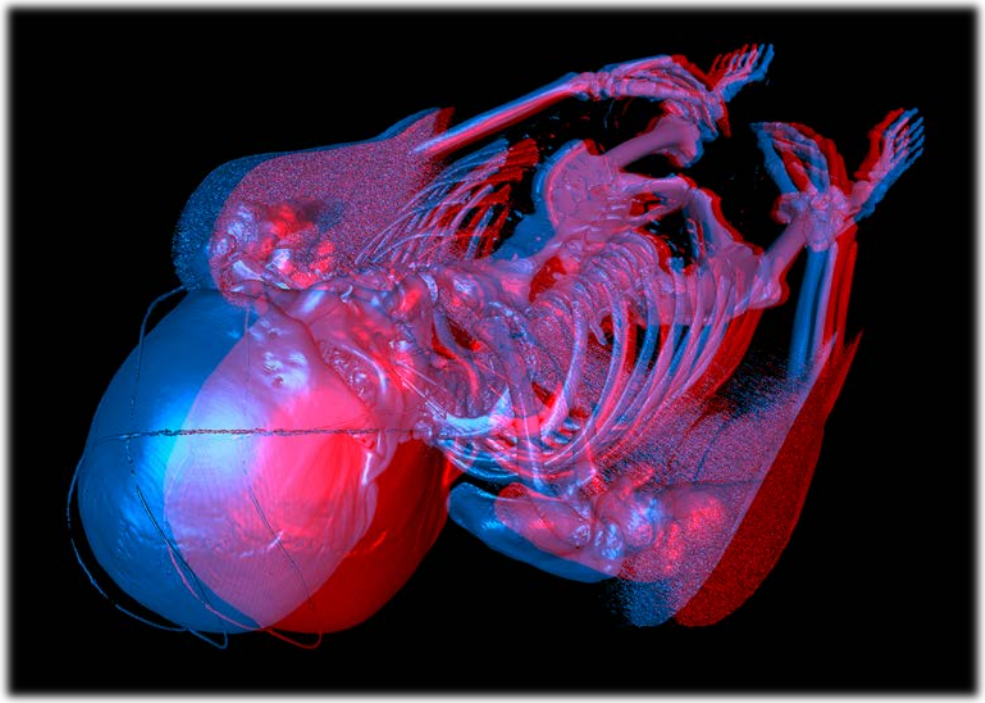
Example: Viewmaster:
left eye is shown one image on the disc, right eye sees a different image

Stereo Imaging: Anaglyphic

Requires red/blue, red/green glasses

Color is diminished (but not entirely lost)

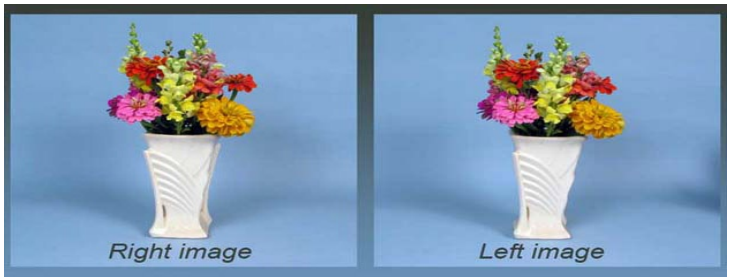
Example below: left eye: red, right eye: blue



Stereo Imaging: Side-by-Side

Stereo can be seen by fusing images: converge eyes in front or behind the actual image plane

Eyes converge behind image plane



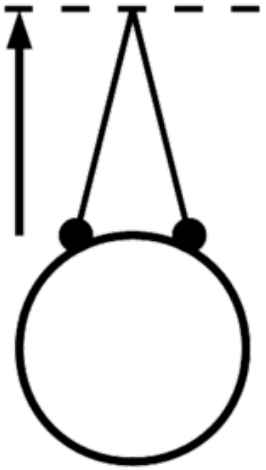
Eyes converge in front of image plane

Single Image Stereograms

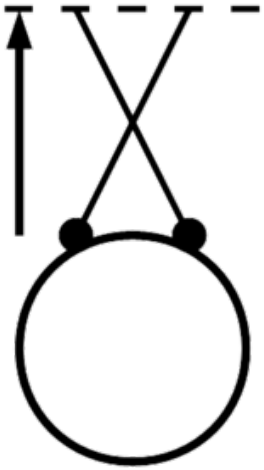
SIS: Single Image Stereogram

SIRDS: Single Image Random Dot Stereogram

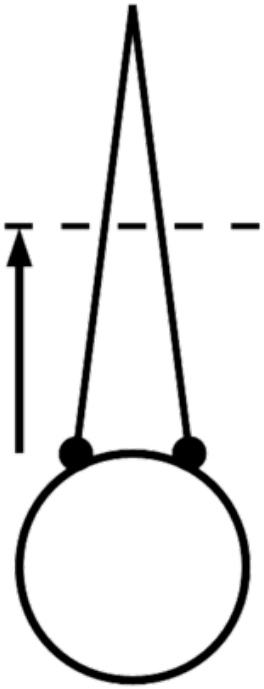
No glasses required



Aligned vergence and accommodation (normal viewing)

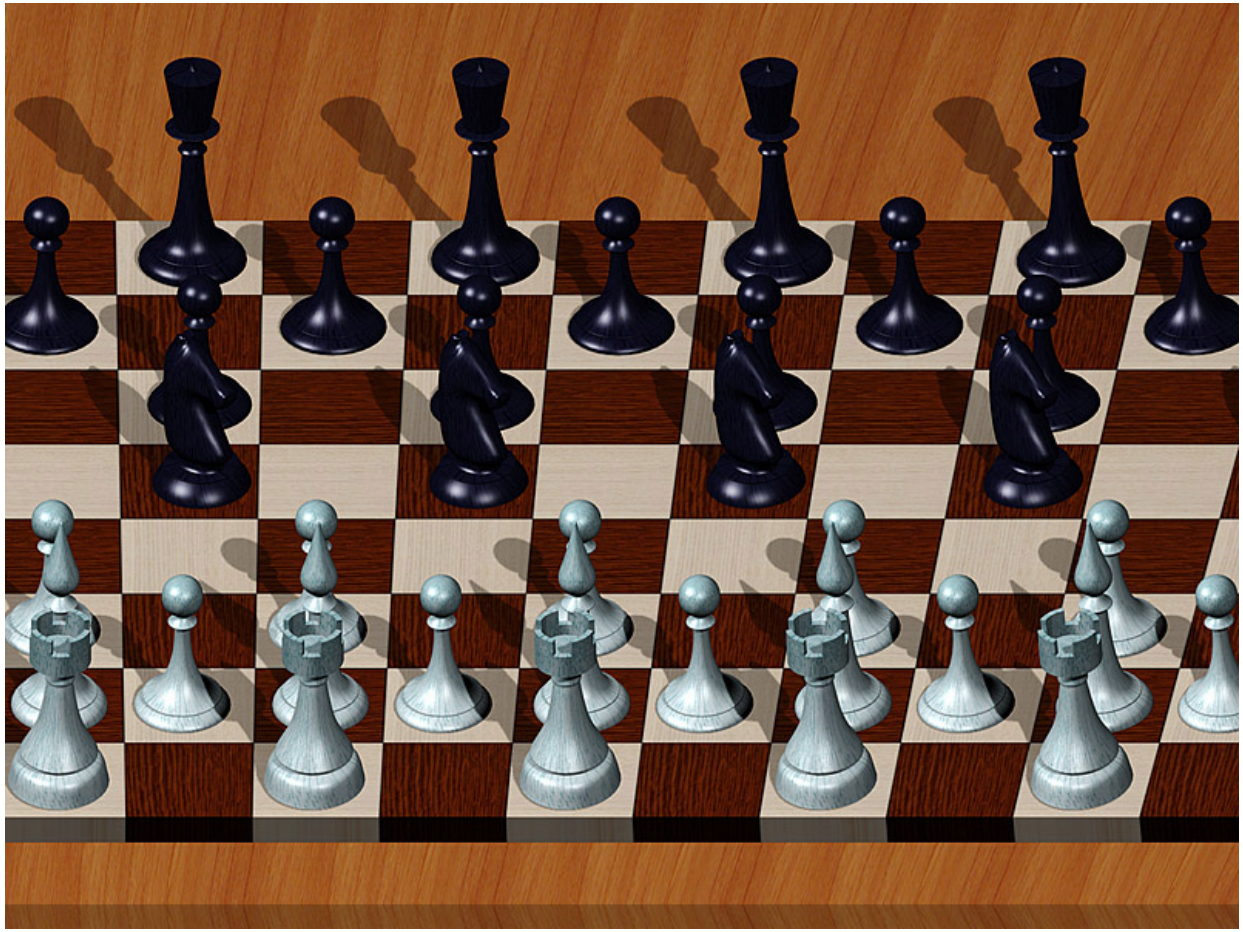


Cross-eyed vergence.
Arrow: accommodation

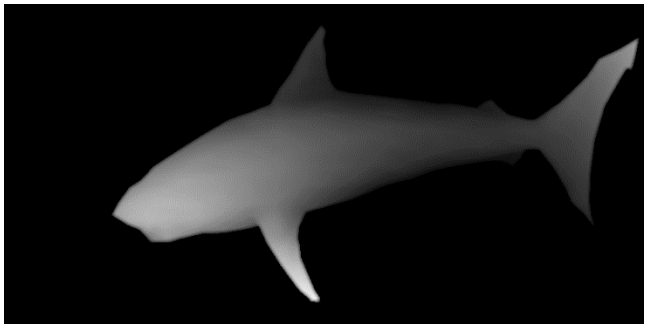


Wall-eyed convergence

SIS Example



SIRDS Example

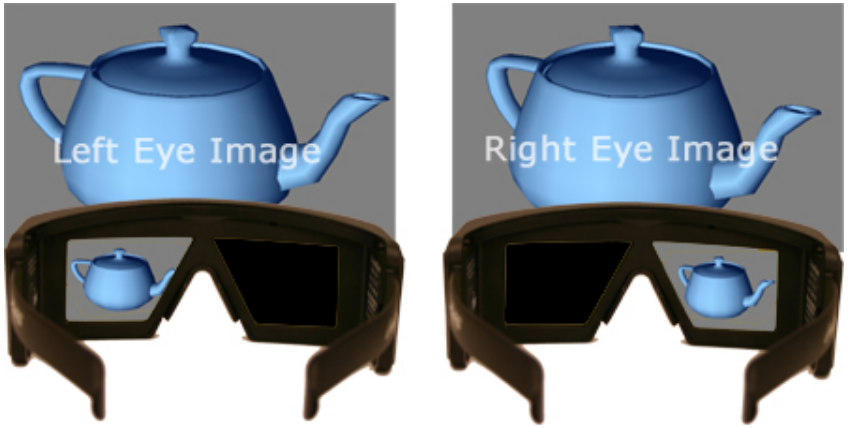


Stereo Imaging: Active Stereo

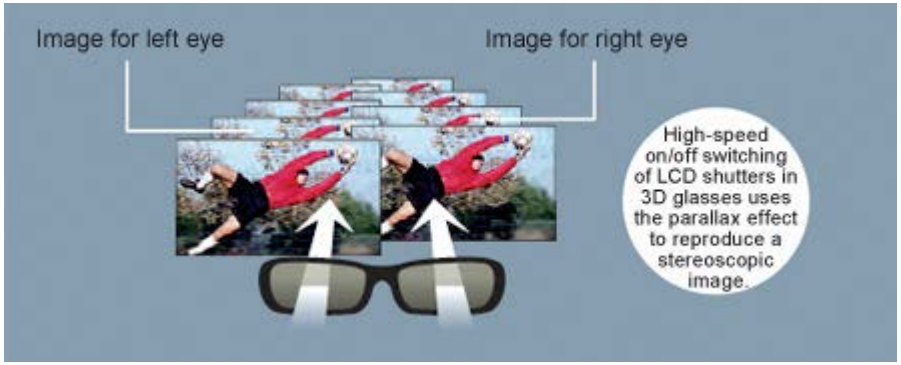
Display alternates between images for left and right eyes at 120+ Hz

Shutter glasses

- synchronized to display refresh rate
- more expensive than passive glasses (~$30+)
- require batteries



3D shutter glasses

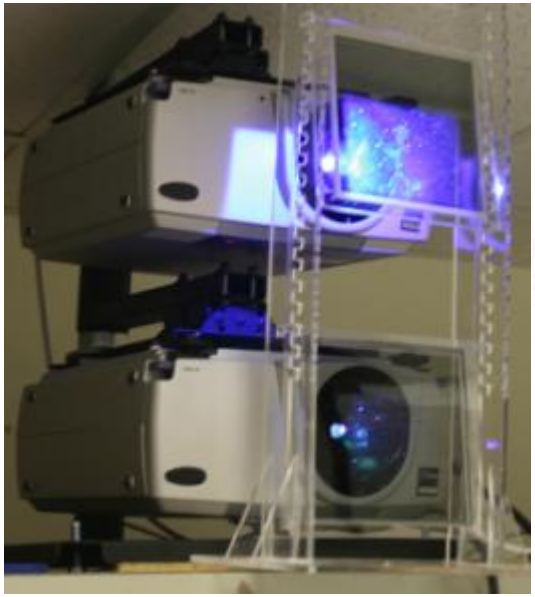


Stereo Imaging: Polarizing Filters

Linear polarization

Circular polarization: creates circularly polarized light by adding a quarter-wave plate after a linear polarizer

Polarizing glasses are inexpensive (~$2-10)



Stereo projectors

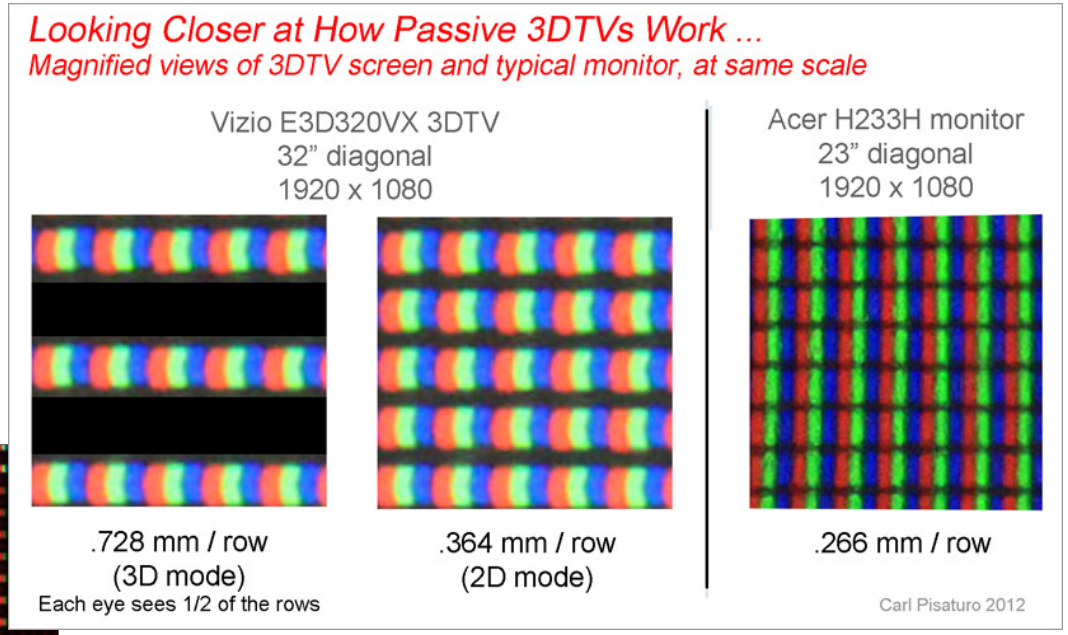
Polarizing glasses

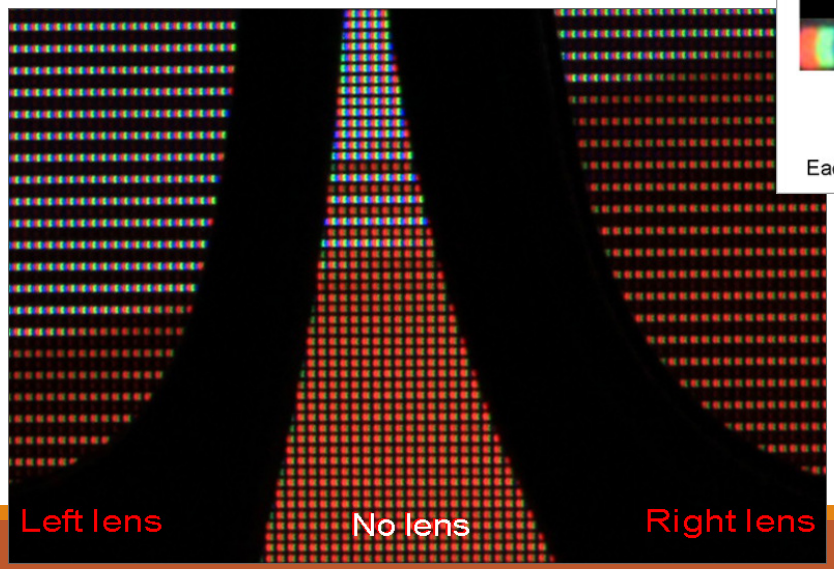
Passive Stereo Monitors

Filter on monitor polarizes alternating pixel rows clockwise/counter-clockwise

Best view point is on-axis

Off-axis viewers see ghosting





Stereo Imaging: Infitec

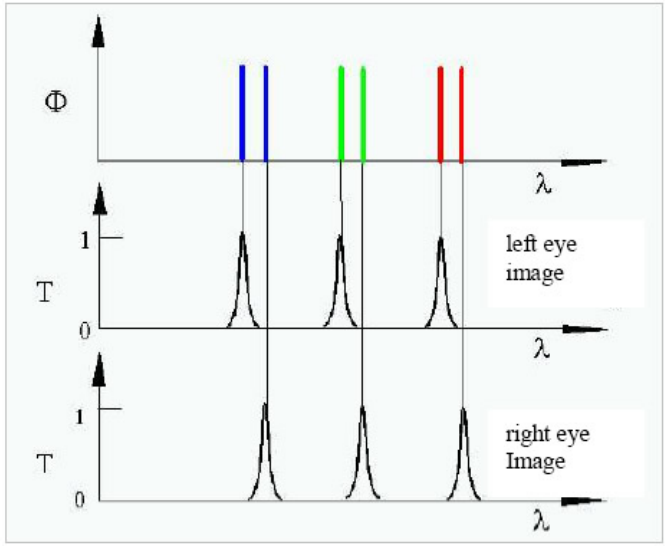
Clever technology, based on wavelength multiplexing

Two separate primary color triplets are filtered by glasses to generate two sets of primary colors

Infitec resulted from a research project at DaimlerChrysler

Projectors with Infitec filters

Infitec glasses



Primary color triplets

Autostereoscopic Displays

Light sent separately to each eye from a monitor

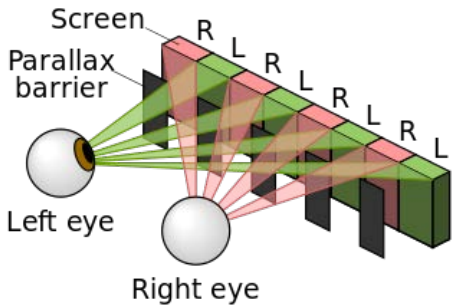
No headgear required

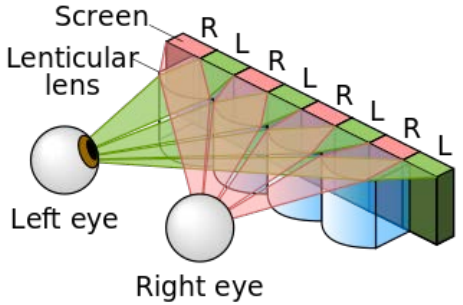
Tracked (dynamic) vs. non-tracked (static, sweet spot)

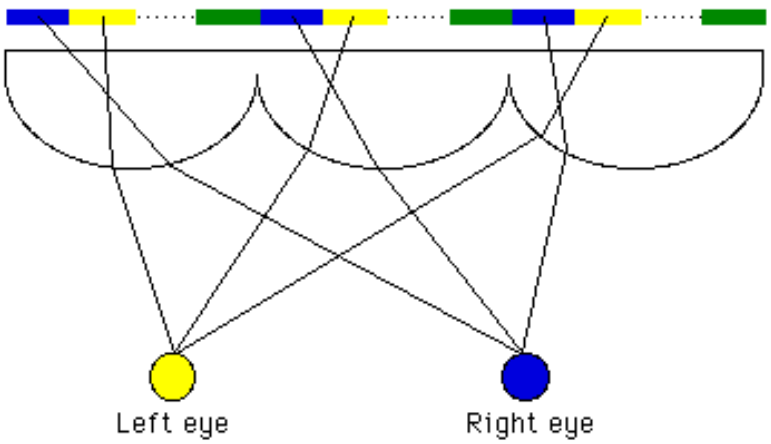
Approaches:

- lenticular screen
- barrier screen

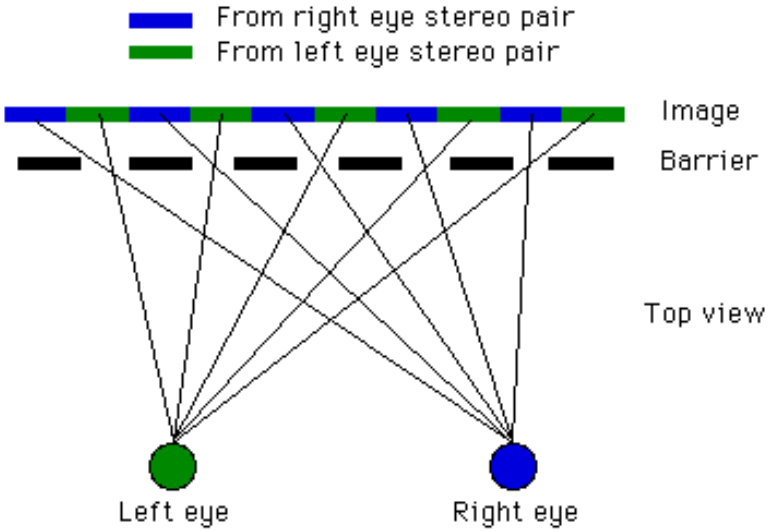
Autostereo







Lenticular screen



Barrier screen