

CSE 190: Virtual Reality Technologies

LECTURE #7: STEREO

VR Content Presentations 4/25

Xinghang Li: Experience the Blue Angels in 360-degree video

- <https://www.youtube.com/watch?v=H6SsB3JYqQg>

Jiasheng Zhu: 360 Google Spotlight: Help

- <https://www.youtube.com/watch?v=G-XZhKqQAHU&list=PLDn90-IQtk8ECc9ImldHoBlSkWDzQ6Awf&index=4>

Hoang Tran: Son Doong Cave

- <http://www.nationalgeographic.com/news-features/son-doong-cave/2/>
- <https://www.youtube.com/watch?v=F60G7T4DF2I>
- <https://www.youtube.com/watch?v=h4EmrBPzfpE>

Nikhilesh Sankaranarayanan: Dota2 VR

- Regular footage: <https://youtu.be/uOAvtyFkln0?t=1m55s>
- VR footage: <https://youtu.be/l6US1o2nJL8?t=36s>

VR Content Presentations 4/27

Carmen Tin: What Happens Inside Your Body

- https://www.youtube.com/watch?v=-FyN5_-njAU

Joshua Huang: Vraccoon

- https://play.google.com/store/apps/details?id=com.spxyz.vraccoon_card&hl=en
- https://www.youtube.com/watch?v=ZSWVVYfRb_o

Hanchao Liu: Inside the Tank

- https://www.youtube.com/watch?v=yV67vwiVaXc&list=PLU8wpH_LfhmsSVRA8bSknO4-2wXvYXS4C&index=15

Tianyang Li: Autism TMI Virtual Reality Experience

- <https://docs.google.com/presentation/d/1pS-K3uyVDBYR8rV-69uuHEkaZNImYAGazDtJq3lubE4/edit?usp=sharing>
- https://www.youtube.com/watch?v=DgDR_gYk_a8

David Ruble: Large Hadron Collider

- https://youtu.be/d_OeQxoKocU

Announcements

Homework project 2

- On-line now
- Discussion moved to Thursday after class **in VR lab**
- Due next Friday May 5 at 2pm
 - To be demonstrated in VR lab B210

Stereo Imaging Techniques

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

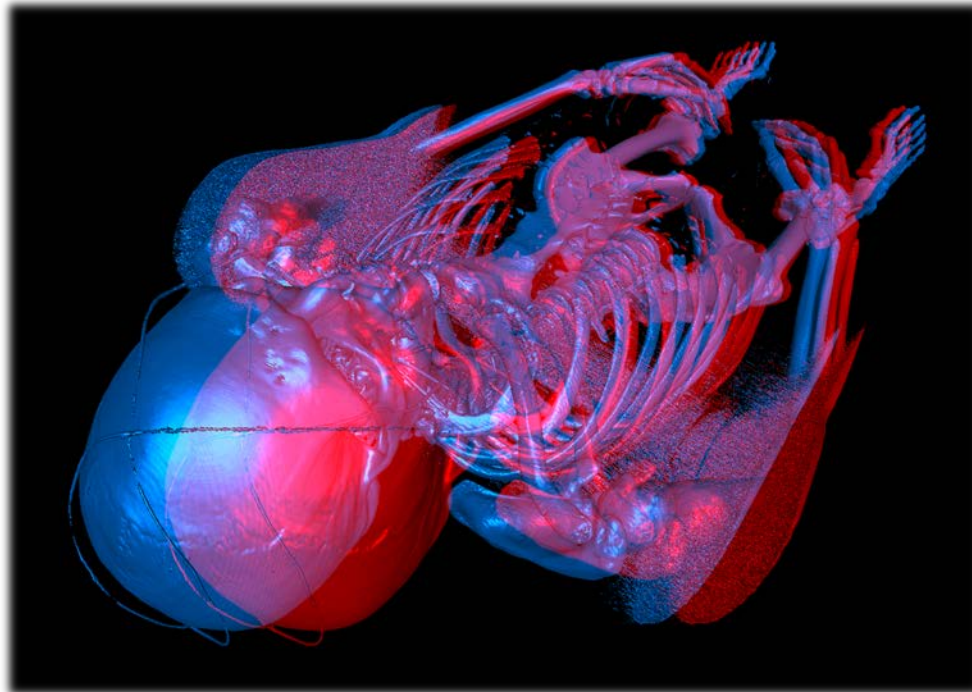


Stereo Imaging: Anaglyphic

Requires red/blue, red/green glasses

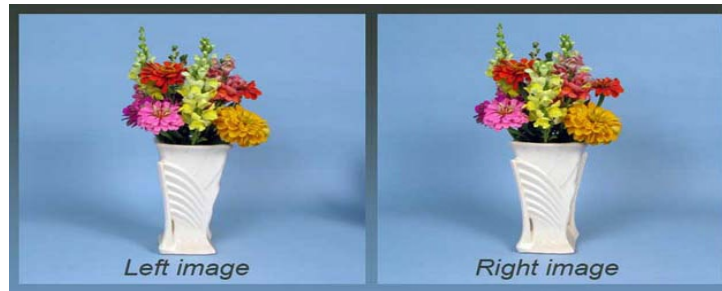
Color is diminished (but not entirely lost)

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

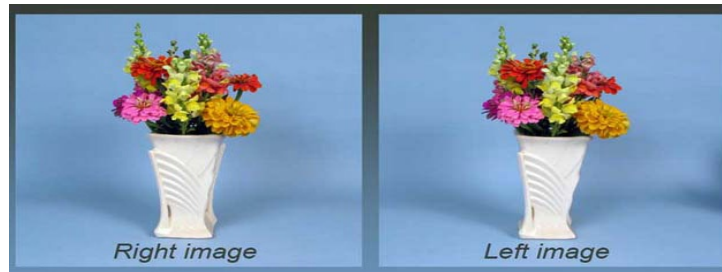


Stereo Imaging: Side-by-Side

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



Eyes converge
behind image
plane



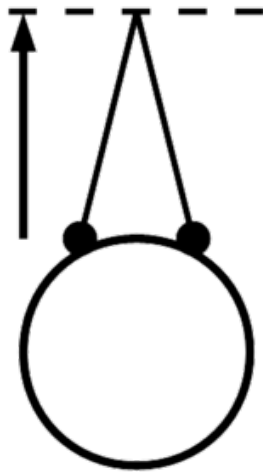
Eyes converge in
front of image
plane

Single Image Stereograms

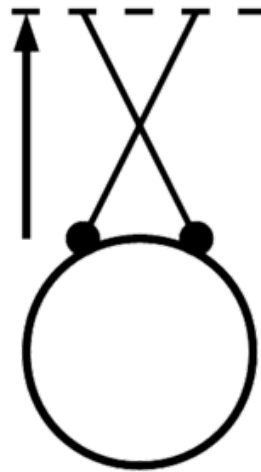
SIS: Single Image Stereogram

SIRDS: Single Image Random Dot Stereogram

No glasses required

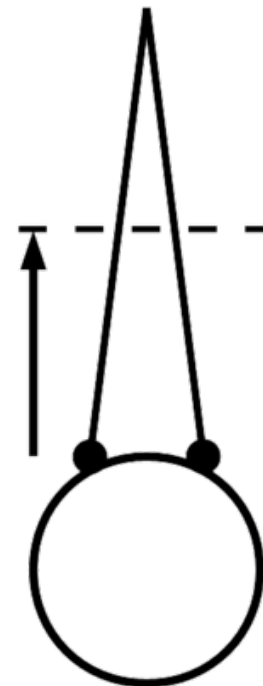


Aligned vergence and
accommodation
(normal viewing)



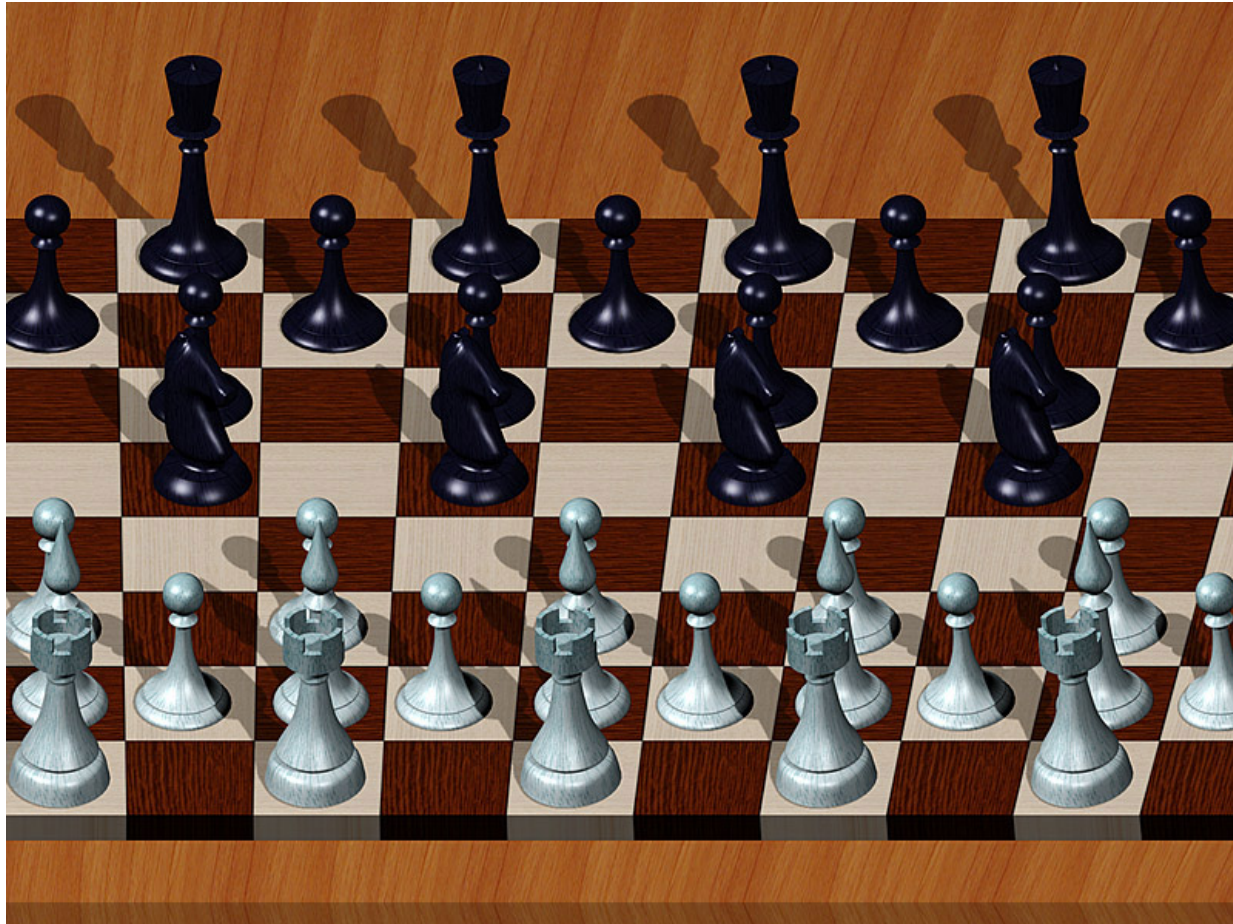
Cross-eyed
vergence.

Arrow: accommodation



Wall-eyed
convergence

SIS Example



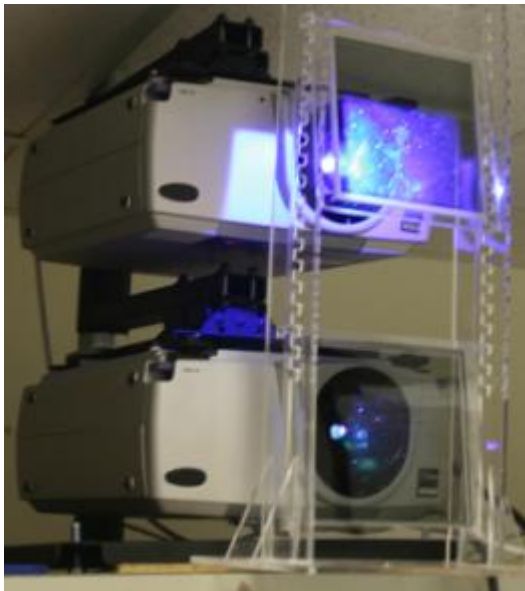


Stereo Imaging: Polarizing Filters

Linear polarization

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

Polarizing glasses are inexpensive (~\$2-10)



Polarizing glasses



Stereo projectors

Stereo Imaging: Active Stereo

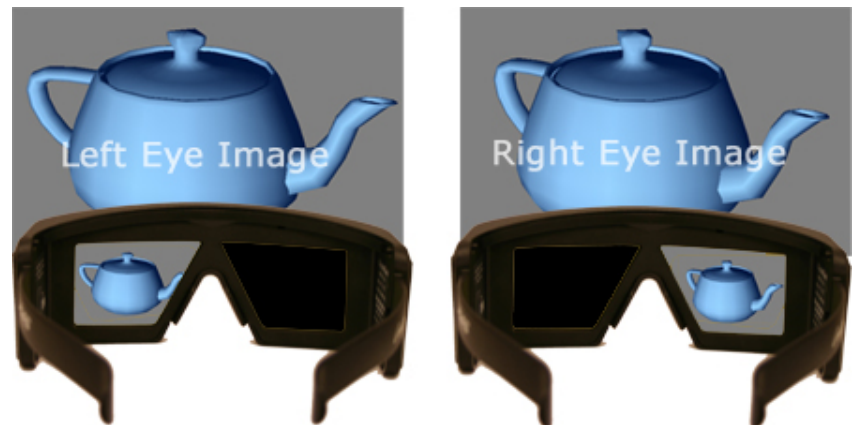
Display alternates between images for left and right eyes at 120+ Hz

Shutter glasses

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



3D shutter glasses



Stereo Imaging: Infitec

Clever technology, based on wavelength multiplexing

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

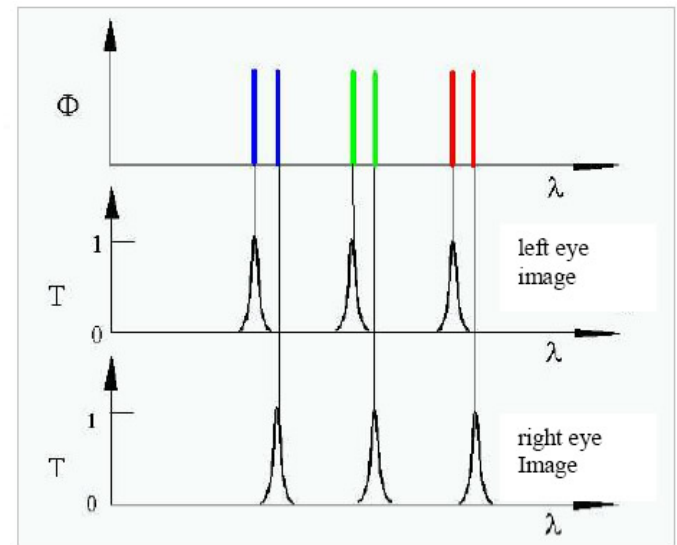
Infitec resulted from a research project at DaimlerChrysler



Projectors with Infitec filters



Infitec glasses



Primary color triplets

Autostereoscopic Displays

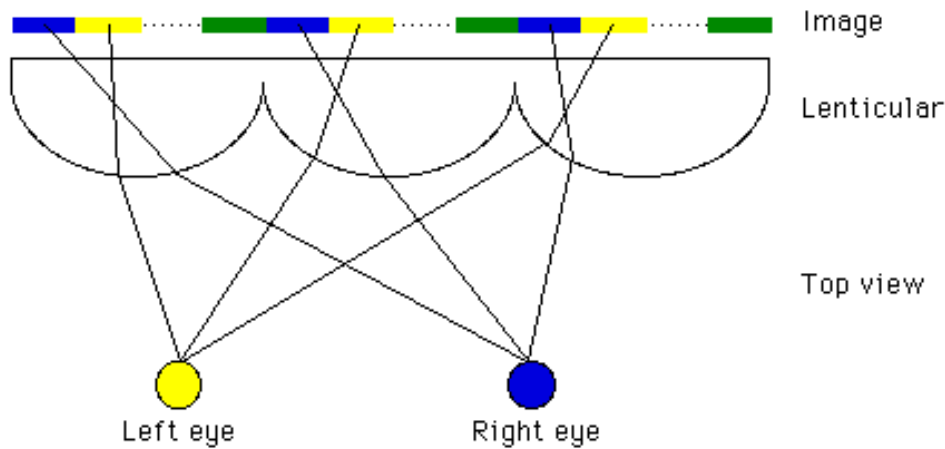
Light sent separately to each eye from a monitor

No headgear required

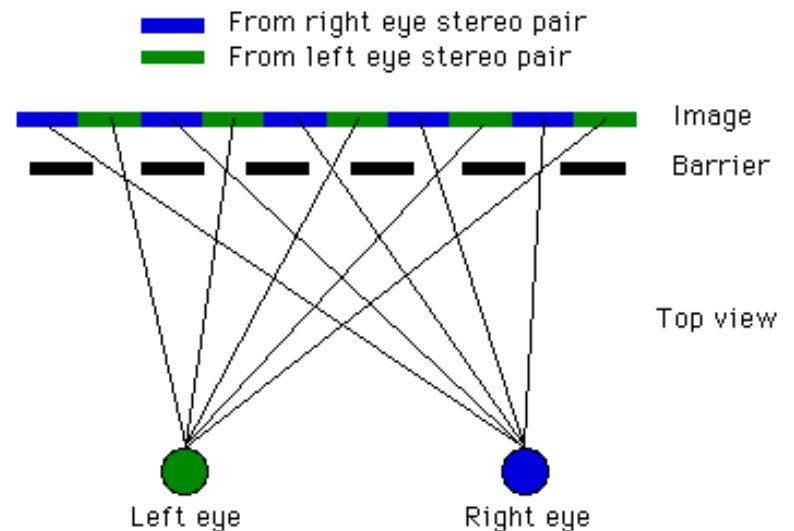
Tracked (dynamic) vs. non-tracked (static, sweet spot)

Approaches:

- lenticular screen
- barrier screen



Lenticular screen



Barrier screen