RV - AULA 07 - PSI3502/2018

Displays

Outline

Discuss various types of **output devices**, also known as displays.

Examine the video displays as one of the most widely used and most diverse group of displays.

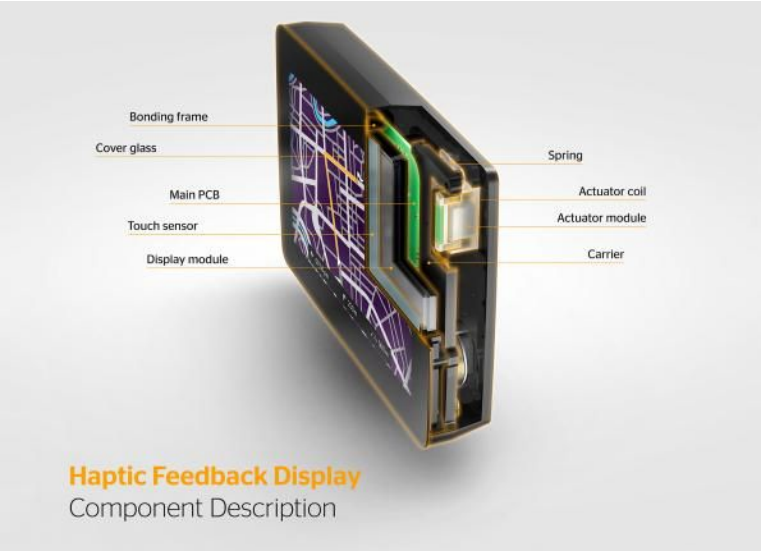
Examine two types of audio output devices: headphones and speakers.

Output Devices

Output Devices

The second part of the human computer interaction feedback loop.

Means by which artificially generated stimuli are presented to the human user.



Properties of Video Display

Video displays are intended to show computer-generated and prerecorded images and video in a full range of colors and in a frame rate needed for impression of the full motion.

Modern displays are raster-based devices.

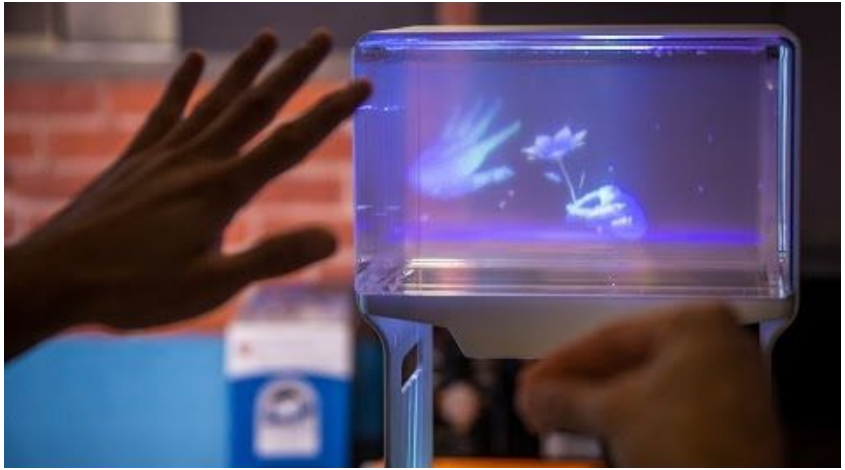
Properties: resolution, brightness, contrast ratio, color gamut, pixel latency.

Types of Video Displays

Immersive or non-immersive

2D or 3D

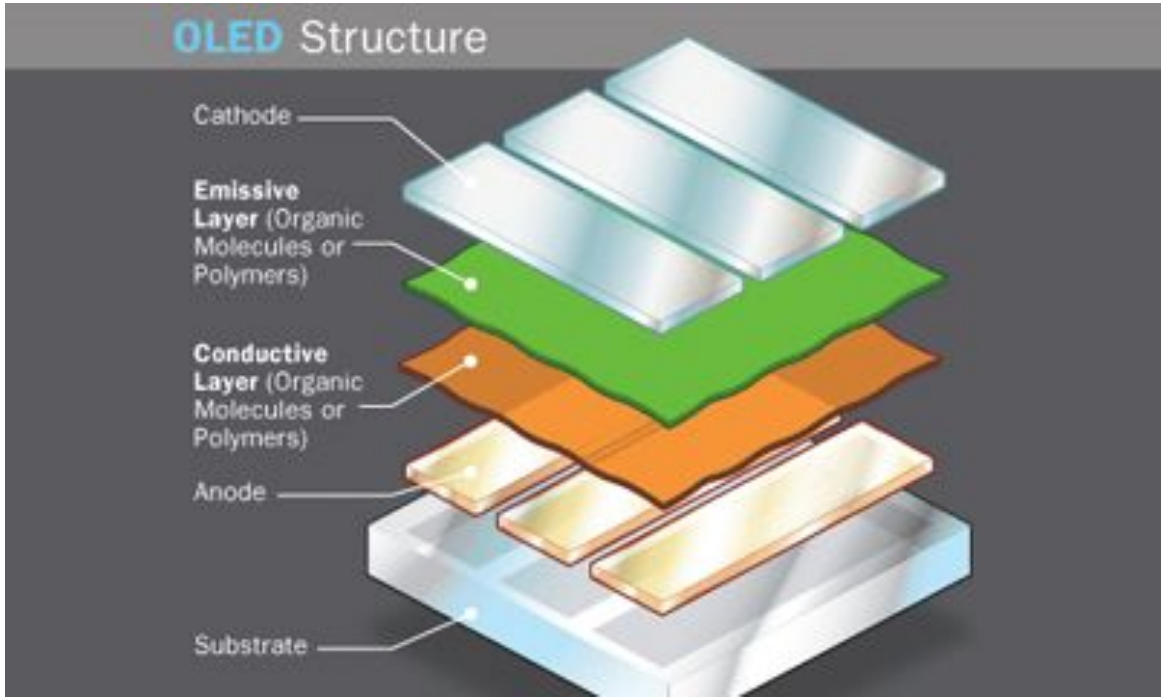
Stereoscopic displays with active and passive glasses, autostereoscopic displays, head-mounted displays and virtual retinal displays



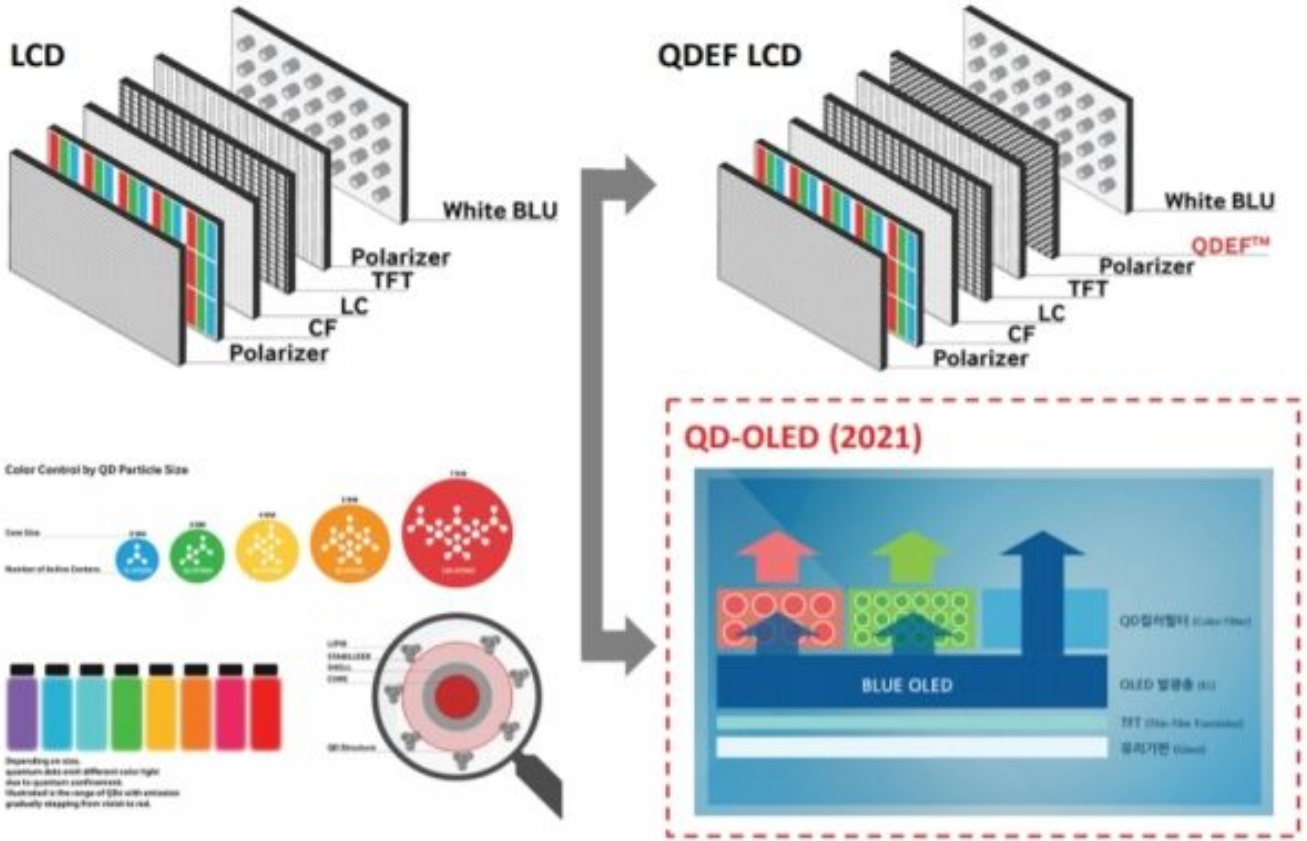
https://www.racer.lt/play/640465/hands-on-with-a-volumetric-3d-display.html

Displays Technologies

TFT-LCD, Plasma, OLED, CRT

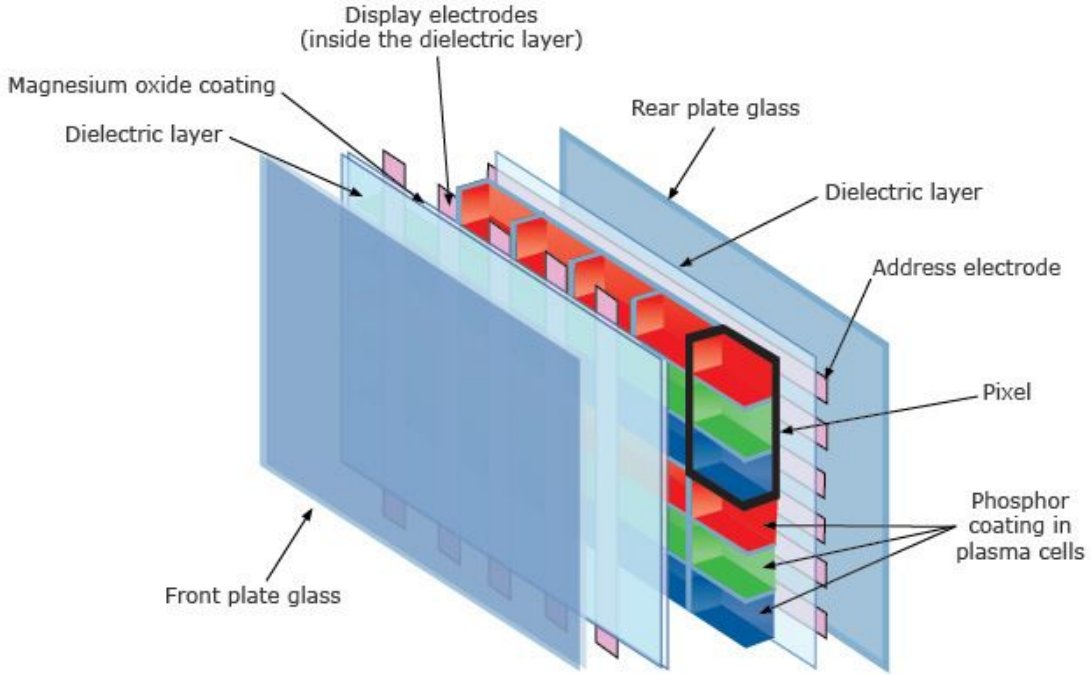


http://ambientenergia.altervista.org/2012/02/oled-lampade-piu-efficienti-ad-un-prezzo-accessibile/



https://www.sharewise.com/kr/news_articles/TV__QDOLED__Samsung_Electronics_NEWSPIM_20180420_0010

PLASMA



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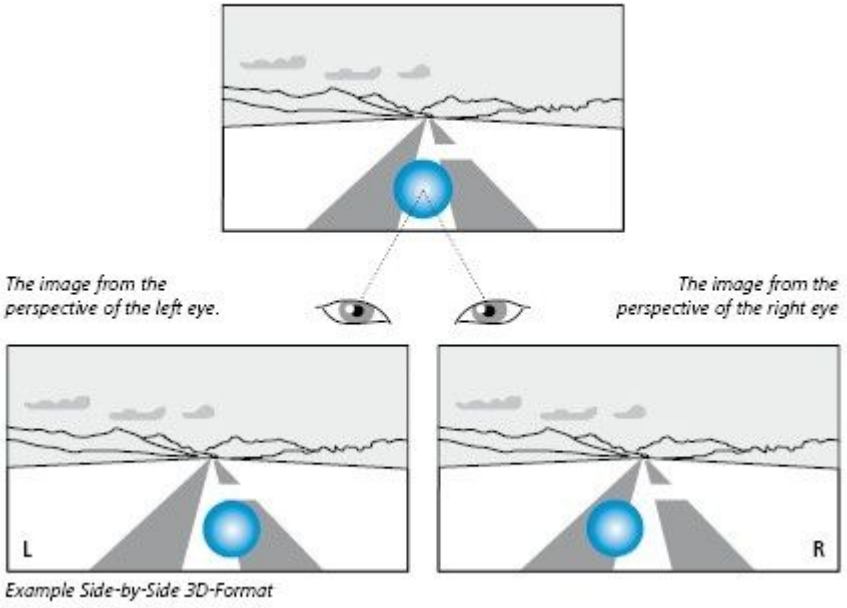
www.sciencelearn.org.nz

https://www.sciencelearn.org.nz/images/235-plasma-display-panel

Stereoscopic Displays

Usually marketed as 3D displays.

They create the illusion of scene depth or presence of the third dimension by exploiting features of human binocular vision.



https://www.zeiss.ca/vision-care/en_ca/better-vision/zeiss-precision-optics/fascination-zeiss/how-3d-glasses-work.html

Stereoscopic Displays with Glasses

There are several types of glasses-based stereoscopic systems belonging to two big categories:

1. Active systems that make use of active shutter glasses;
2. Passive systems that use either glass with polarizing light filters or color filters to block one of the images from being seen by the wrong eye (Anaglyph 3D systems).

Active Shutter Glasses

https://3dvision-blog.com/6041-the-wired-3d-vision-active-shutter-glasses-still-hard-to-find/

Active Shutter Glasses

Left and right eye images are displayed in a sequence.

Active glasses can change from completely transparent to fully opaque.

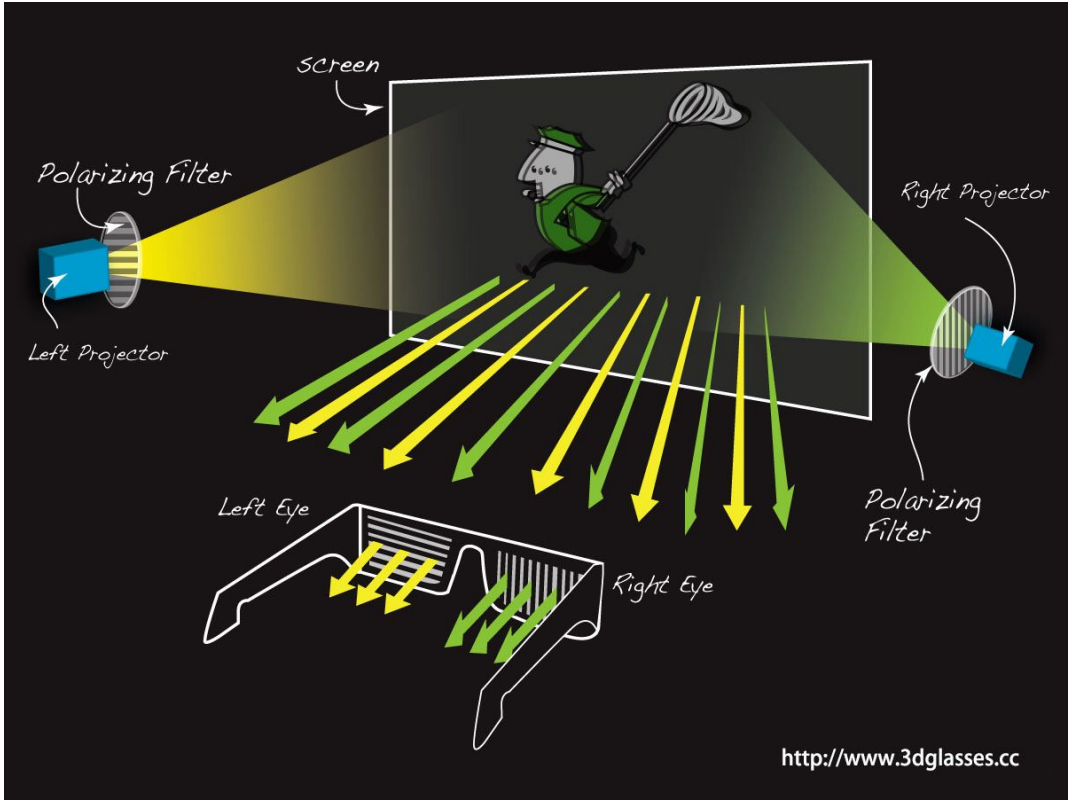
Polarizing Filter Glasses

Left and right eye images are displayed at the same time on a single screen.

These two images are superimposed by using polarization filters.

https://the3dglassstore.wordpress.com/

Polarizing Filter Glasses



Anaglyph 3D Displays

Anaglyph 3D displays date back to 1852 and the experiments of Wilhelm Rollmann in Leipzig.

The system use colors to encode the separate left and right eye image.

https://www.flipkart.com/boss-3d-anaglyph-glass-red-blue-video-glasses/p/itmet7tfzqwbnvue

Head-Mounted Displays and CAVEs

HMDs could use to separate screens or a single screen to display the left and right eye image. Single screen devices display both images side by side. They are somewhat cheaper to produce, however require some optical splitting system to ensure that each eye sees only the appropriate image.

CAVEs: the user needs to wear a pair of active glasses that synchronized with wall panel displays. The system tracks the position and orientation of the user in order to render the appropriate view of the 3D scene.

https://www.evl.uic.edu/entry.php?id=2016

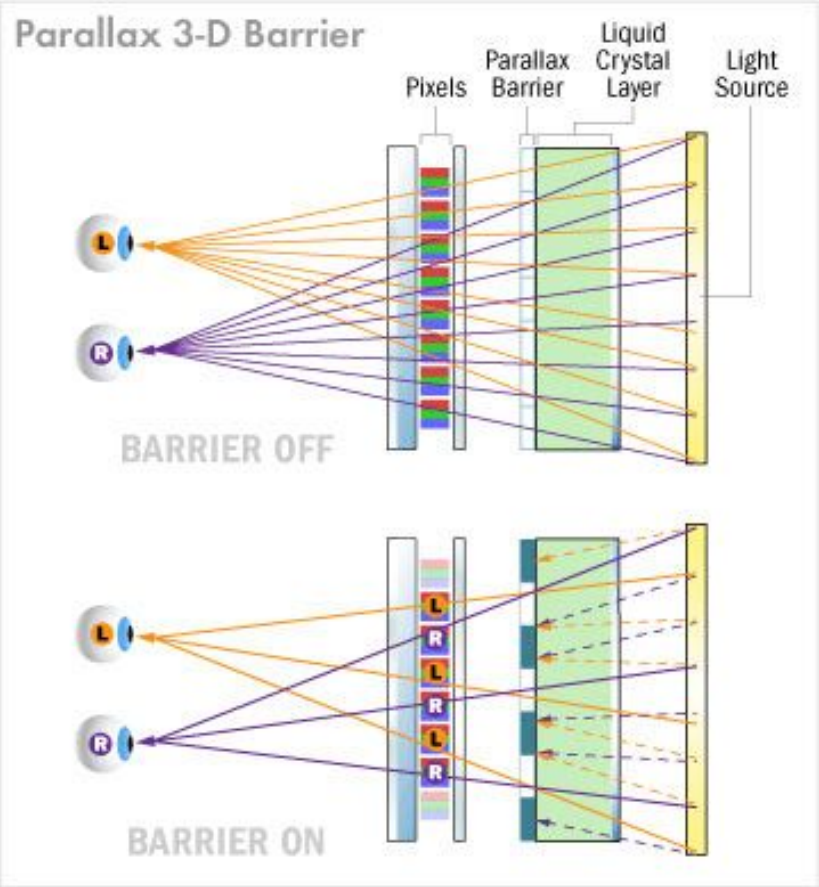
Autostereoscopic Displays

These devices are capable of producing the illusion of the scene depth using a single screen alone.

Images are horizontally interlaced: the odd and even pixel columns correspond to the left and right eye image, respectively.

Parallax barrier displays use a physical barrier placed in front of the LCD display.

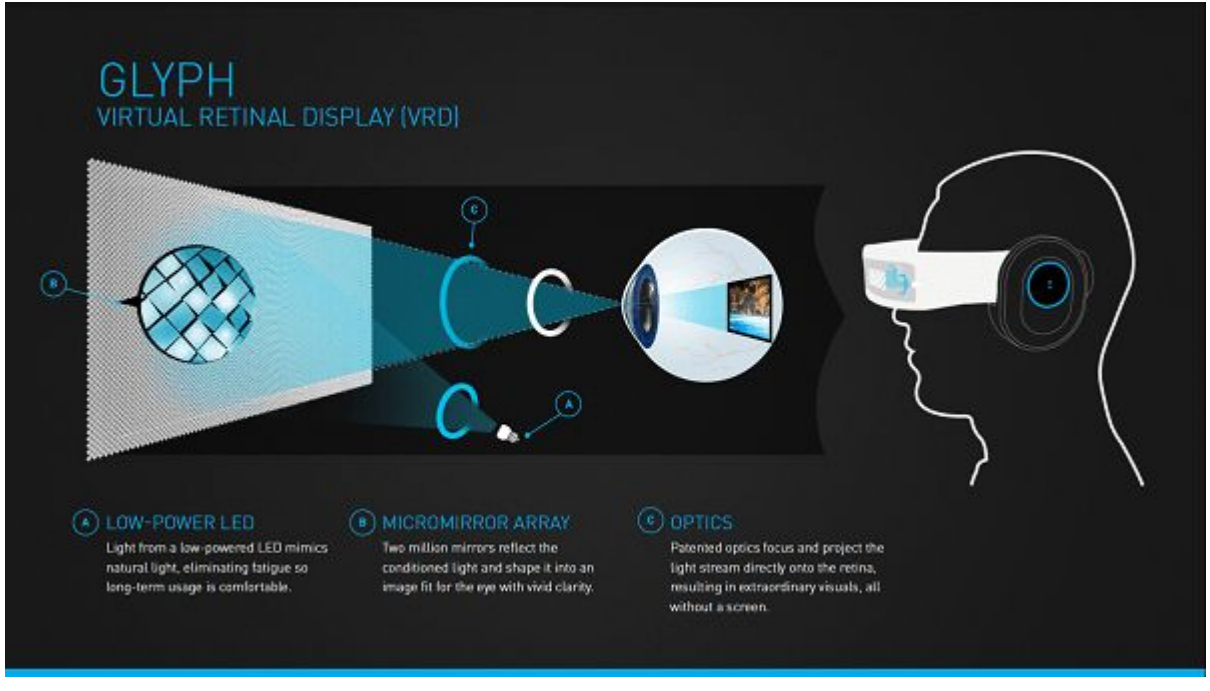
Nintendo
NINTENDO 3DS
new
NINTENDO 3DS XL



https://electronics.howstuffworks.com/nintendo-3ds5.htm

Virtual Retinal Displays

VRD is an experimental new technology.



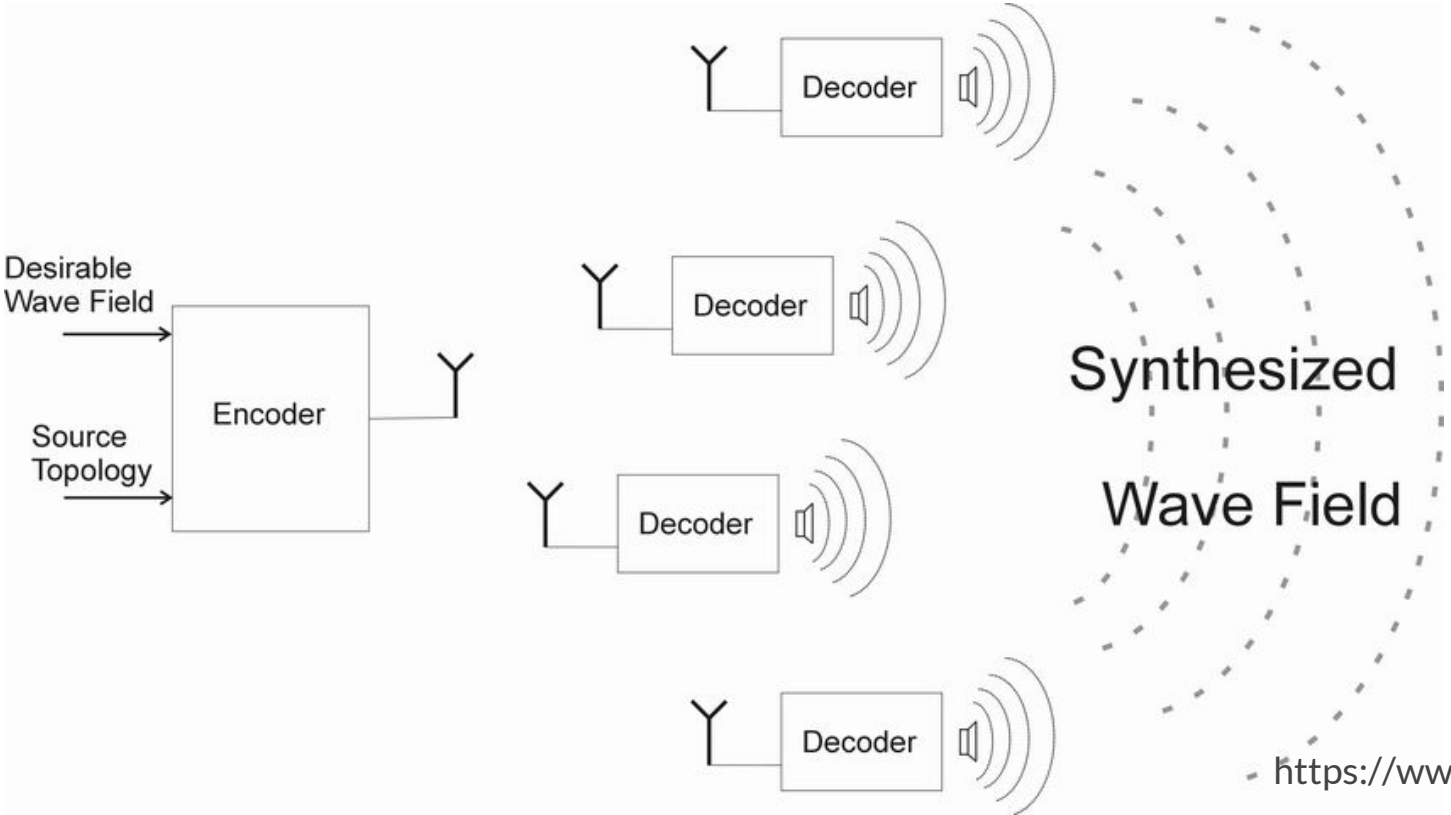
https://opticalvisionresources.com/avegant-introduces-glyph-head-mounted-virtual-retinal-display-technology

Audio Displays

Audio displays are devices capable of reproducing the prerecorded or artificially-generated sounds within the human hearing range.

Loudspeakers, headphones, Wave Field Synthesis systems (WFS).

Wave Field Synthesis



https://www.researchgate.net

Force Feedback

Force feedback is the artificial sensation of the force exerted on human limbs, including arms, legs and especially hands and fingers.

https://www.obutto.eu/pt/volantes/42-thrustmaster-t150-pro-force-feedback.html

Referências

Virtual Reality and Virtual Environments in 10 Lectures - Stanislav Stankovic

P. Benzie et al., “A Survey of 3DTV Displays: Techniques and Technologies, Circuits and Systems for Video Technology,” *IEEE Trans on Circuits and Systems and Video Technology*, Vol. 17, No. 11, November 2007, pp. 1647-1658.

K. Brandenburg, S. Brix, T. Sporer, “Wave Field Synthesis,” *Proc. 3DTV Conference: The True Vision - Capture, Transmission and Display of 3D Video*, 2009, pp. 1-4.

N. A. Dodgson, “Autostereoscopic 3D Displays,” *Computer*, Vol. 38, No. 8, August 2005, pp. 31-36.

K. Yoshinaka, *Virtual Retinal Display*, US patent no. 5659327, 1986.