

Three-dimensional musical instrument

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1 Introduction

2 Écrans 3D

- Two-view 3D displays
- Horizontal parallax multiview 3D displays
- Full parallax multiview 3D displays
- Second categorisation
- Second categorisation : Visual cues
- Second categorisation : 3D Display definition
- Second categorisation : 3D Display taxonomy
- Second categorisation : Novel points

3 Le DRILE

4 Conclusion

- **Context** : Conceiving a modern musical instrument that can be used in conjunction with a 3D display.
- **Goals** :
 - Understand 3D displays technologies
 - Implement 3D-enabled visualization methods for two new musical instruments : DRILE and the Aerial Percussion
- **Problem** : There are numerous kind of 3D displays. What is the most adapted to the situation ?

Écrans 3D

Two-view 3D displays

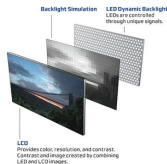
- Wavelength Selective Displays :
 - Each eye receives the image intended for it
 - Images are filtered
- Advantages :
 - Any color display device can be used to present the stereoscopic
- Inconvénient :
 - Each eye is seeing a different color stimulus



- Time-Sequential Two-View Displays :
 - Time-Sequential Polarization :
 - Pair of passive polarizing glasses
 - Each lens is polarized in one direction
 - The image displayed on the screen is actually composed of two images



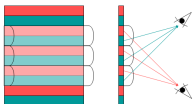
- Time-Sequential Two-View Displays :
 - Time-Sequential Backlight :
 - Auto-stereoscopic technology
 - Backlight technique
 - Having a light source in each side of the screen with a waveguide surface between them.



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Horizontal parallax multiview 3D displays

- Parallax Barrier Displays :
 - This is an autostereoscopic technique.
 - It provides a terrain vision without wearing glasses.
- the disadvantages :
 - It must be placed precisely in relation to the screen.
 - Must be stable.
 - It does not allow viewing of the stereoscopic image at the same time several viewers.



- Multi-Projector Displays :

This technique involves a position in a circle several video projectors displaying all an angle different image after these images are projected on a special screen.

- Advantage :

- Size of the 3D image can be much larger it is no limit.

- the disadvantages :

- Multiple projectors are needed (projector view)
- Headlamps must be accurately aligned.

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Full parallax multiview 3D displays

This type of display allows viewers to view a 3D scene from any angle.

- Integral Imaging Displays :
 - It is a way of auto-stereoscopic 3D display, which was originally proposed by Lippmann in 1908.
 - This technique consists in using a network of micro-lenses in front of each lens where the image is different depending on the viewing angle.

Analyse

- For a 3D display :
 - Eye position
 - Resolution (pixels) display area
 - Constraints on the position of the head
- Application :
 - cinema
 - reporting and advertising
 - 3D for mobile devices
- The Stereoscopic Stereoscopic technologies and
- holography

- Based on "A Comprehensive Taxonomy for Three-dimensional displays".
- Paper problematic :

Profusion of technologies \implies Classification difficult.

- 1 First part : visual cues used by the human brain to define 3D vision.
- 2 Second part : Definition of the properties of 3D screens.
- 3 Third part : Presentation of the taxonomy created in this article.

Physiological cues

Binocular disparity

Convergence

Accommodation

Psychological cues

Static cues

Shades and nuances

Occlusion

Perspective

Dynamic cues

Movement parallax

Cinetic depth

A 3D display makes use of at least one physiological cue.

Hence, it cannot be emulated strictly on the software side.

- Two axes
 - Number of views : Duoscopic, multiscopic, omniscopic
 - Depth : Flat, deep
- Two novel points in the article :
 - Multi-directional display : deep multiscopic.
 - Virtual volume display : flat omniscopic.

1 Virtual volume display

- Either adaptative optics and Pepper Ghost derivatives or holographic systems :
<http://www.youtube.com/watch?v=Y1m7xEzlhWA>.
- Only method that is able to present every single physiological cue.

2 Multi-directional display

- Finite number of subdivisions but up to a 360 deg FoV.
- Two possibilities :
 - Rotative screen
 - Multiple anisotropic screens. Light has to go in a single direction.

- Drile : an immersive environment for hierarchical live-looping
- Drile : live-looping presentation

C'est cool le per