

The World of 3D Television

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Home Theater Specialists of America

INTRODUCTION:

“The world of television viewing will no longer be flat.” That statement could have easily been the resounding theme for this year’s CES show. Everywhere you looked there was some form of demonstration with 3D technology. The following document is designed to provide a fundamental understanding of 3D technology and what the future holds for our television viewing experience.

“The ultimate goal of the viewing experience is to create the illusion of a real environment in its absence. If this goal is fully achieved, there is no way for an observer to distinguish whether or not what he sees is real or an optical illusion.”

Written by John Watson

Let’s start with that basic statement: In essence the goal of recreation, whether for music or video, has always been to create the illusion of reality. 3D is our reality.

“Human beings feel the 3D impression because each of the left and right eyes recognizes different images.”Yoshi Yamada

There are only two ways that a 3D experience can be delivered to a consumer at home. The first is with the use of glasses to view a stereoscopic or holographic image. The second type of system is with no glasses. It uses an internal lens system at each pixel point on the screen. Phillips WOWvx is the most prominent example of this technology.

The glasses can be done two different ways; passively with red and blue polarized lens’ or actively with electronic shutters built in to the glasses. The passive lens system has been around for years and is considered acceptable at best. The active lens system is much better and was the system of choice on many technologies that were being shown at the 2009 CES show.

Initially, the problem will be what format to use and how fast can consumers get content, but the inevitable belief is, once adopted, **3D is the future** and not-so-distant at that.

Panasonic

Panasonic has developed the world’s first 3D full HD Plasma Theater System, which enables the viewing of true-to-life 3D images by using a 103-inch plasma television and a Blu-ray Disc (BD) player, distributing full high-definition (HD) (1920 x 1080 pixels) images to left eye and right eye.

**** World’s first system to create true-to-life 3D images by providing full HD images to left eye and right eye, as of September 22, 2008***

Human beings feel the 3D impression because each of the left and right eyes recognizes different images. Panasonic’s system comprises a 103-inch plasma television and a BD player that plays back BD onto which 3D images, consisting of left- and right-sided 1080p full HD images, are recorded. By wearing active shutter glasses that work in synchronization with the plasma television, the viewer is able to experience 3D images formed with twice the volume of information as regular full HD images, and enjoy them together with high quality surround sound. This system enables full HD signal processing on each of the left and right images in every process — recording, playback and display.

Previous consumer 3D display systems have encountered many different problems, including reduced vertical resolution caused by a 3D display method that divides the scanning lines between the left and right eyes, and picture quality degradation caused by pixel skipping that results from the squeezing of two (left and right) screens’ worth of full HD images into one screen’s worth

of data capacity for image storage and transmission. Until now, there has not been a system capable of displaying the equivalent quality to original master of Hollywood 3D movies.

Panasonic has developed the following technologies for realizing the new system.

- Plasma display: The performance of Panasonic's plasma panels, whose self-illumination allows for excellent video response, has been brought out to the fullest extent in the development of a 3D driving system that displays the left and right images together as full HD images.
- BD: Using the optical disc technology cultivated by Panasonic over many years, and the authoring technology developed by Panasonic Hollywood Laboratory (PHL), it has been possible to record 3D images — consisting of respective left and right 1080p full HD images — onto a single, standard BD.
- BD player: Panasonic has developed a technology to decode and play back the left and right full HD image data recorded to the BD in real time.
- 3D images: Panasonic has produced 3D contents that allow the viewers to experience fascinating 3D images, including dynamic images of athletes at the Olympic Games, and animated movies by Hollywood.

3D television: a desirable reality?

For both technologies, the biggest barrier is that the only viewers able to watch anything would have to have a specific 3D screen and available content or at the very least some processor like the ones mentioned below, in order to convert 2D to 3D.

"Broadcasters are likely to want to push 3D only if it makes a strong business case. If you were to look at the uptake of HD content and screens, 3D is going to require a similar overhaul to that of the DTV conversion, for both the homeowners and with broadcasters," said Tom Morrod, senior analyst, head of TV technology at *Screen Digest*.

Technology is "pretty tried and tested" in 3D cinemas using projectors. "In the home, we could see projectors or screens with a polarized display. Both of these would need two signals, the left and right eye. This technology will always be glasses-dependent. For television broadcast, the main problems are that two signals must be sent, which would double the amount of bandwidth required to send them."

The glasses-less technology Philips has come up with is completely different and uses little in-built lenses over each pixel, which deflect the image to the right and left eye. "This means that the 3D effect is created completely in the screen, and so this technology would not work for projectors, it would be a fully 3D hologram," Morrod said.

In order to create this, broadcasters need only a normal 2D image + depth information, which allows the 2D image to be appropriately "stretched and pushed around the screen so that the viewer gets a 3D sensation. This means that the transmission is only about 10-20% more than a regular 2D transmission since the 'depth' information is not a full image."

The only currently deployed broadcast network for 3D is with Telefonica in South America, which is using Philips technology. In the meantime, **Panasonic** has submitted a proposal for 3D implementation on the Blu-ray format. This requires the use of special glasses that convert two separate 1080i60 video streams into one 1080p24 3D image. The Blu-ray Disc Association (BDA) is expected to begin official discussion by the end of the year, and if formally adopted, expect that the system would be made commercially available by 2010.

Conversion Technology:

The substantive technologies are starting to emerge from the pack with strong support from tier 1 manufacturers, but there are key technology companies who may also have a great impact on what 3D becomes as it evolves into a consumer friendly product category. These companies are primarily firmware or software developers working in the gaming quadrants or they came out of the medical fields.

Please see two examples of conversion or implementation technology below:

About Tri Def DDD

DDD Group is transforming the viewing experience with applications for 3D displays. Its patented technologies enable 3D viewing with and without glasses, simple integration of computer graphics applications with 3D displays, a supply of 3D content through 2D-to-3D conversion, and 3D transmission over existing networks.

Altera Corporation (NASDAQ: ALTR) and DDD Group plc (LSE: DDD) today announced a partnership that is bringing 3D digital cinema-quality images to your living room.

DDD has qualified its TriDef Core embedded 3D image processor to run on Altera's Arria® GX FPGA. As a result, DDD is delivering a custom circuit board that integrates with the existing 2D video electronics to deliver enhanced 3D features including automatic 2D-to-3D conversion. This allows the playback of original 3D content from a wide range of sources including Blu-ray discs and DVDs.

The capability opens a direct in-home distribution channel for the latest generation of 3D movies in production for the growing 3D digital cinema market. This technology will be displayed on the Hyundai IT 46" 3D LCD HDTV at the 2009 International Consumer Electronics Show (CES) at the Las Vegas Convention Center in January.

Altera's Arria GX FPGAs make it possible for our TriDef processor to turn 3D television into a familiar plug-and-play approach that is equivalent to the existing 2D TV experience, while substantially reducing manufacturing and support costs for 3D TV manufacturers."

"3D television is creating immense consumer interest in next-generation flat-panel televisions," said Robert Blake, vice president of automotive and consumer business unit at Altera. "Arria GX functionality allows real-time 2D-to-3D conversion and 3D reformatting with DDD's TriDef Core processor. This is one of many examples of how Altera's FPGAs deliver innovative solutions for advanced high-definition applications in the consumer video arena."

Sky

Sky is set to launch a 3D TV service over the next few years. They believe that they will be able to send 3D TV images straight to the Sky+HD set-top box.

Sky itself has been filming a number of events using 3D cameras over recent months. It recently screened clips of sporting events filmed in 3D, including footage from a recent rugby international and Champions League football match. The matches were shot using two cameras filming the action side-by-side. The new technology allows these two images to be merged and played out simultaneously on the same TV screen. Viewers wearing polarized glasses will see a different image with each eye, tricking the brain into believing that it is seeing a three-dimensional image.

Summary:

3D is still in its infancy, but is recognized by the major manufacturers, as the next big thing in television. HD 3D will be the performance standard driving the category.

Step 1: Acquisition and transmission of a 3D signal must be adopted and agreed upon

Step 2: There has to be some standardized way of converting 2D information to 3D. This will allow older content to be viewed in some sub-standard form of 3D.

Step 3: Content is on the rise. More and more studios have agreed to shoot and / or encode software with 3D technology. Blu-Ray appears to have the leading edge and best performance capabilities.

Step 4: Most of the major manufacturers have agreed to begin implementation of 3D chipsets in their display devices.

Step 5: Flat Panel has to reduce the performance gap to DLP and projection for HD 3D images

HTSA Vendor Partner Focus



Mitsubishi LaserVue. This 10" deep, wall-mountable, DLP rear-projection display uses red, green and blue lasers to generate the projected light. According to Mitsubishi, the lasers save power over LCD and Plasma TVs while delivering substantially more color information than conventional HDTVs. The best part is that the TI SmoothPicture technology built-into Mitsubishi DLP HDTVs makes it possible to get stunningly good 3D. What could better than having 3D frickin' laser beams shooting at your face? Mitsubishi claims that the lasers will work indefinitely without burning out or fading.

Follow the link to learn more about which 3D glasses are the best and why:

<http://3droundup.com/2009/01/shades-of-glory/>

Follow the link to learn more about the topic of 3D and courses of study:

<http://www.3dtv-research.org/course/>

Please contact HTSA with any questions or concerns at: 610-363-9055