



# NVIDIA 3D Stereo

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Immerse yourself in the world of 3D content like never before. Monsters, bullets and landscapes jump out of your flat screen and into your imagination. You become part of the game. With nVidia 3D Stereo, gaming will never again be the same!

NVidia 3D Stereo is the most compatible solution ever available. That's because it works on the broadest range of applications. Previous implementations were proprietary to specific graphics cards, stereoscopic glasses, and special versions of games.

The new nVidia 3D Stereo brings stereoscopic support for nVidia TNT graphics cards graphics processing unit (GPU), nVidia GeForce GPU and nVidia Quadro GPU. This allows games developed with the Direct3D application program interface (API) and OpenGL API to run *without* requiring special versions of your games.

**In other words, 3D Stereo works with your existing games!**

## BACKGROUND

3D imaging has been around for years, but advances in computer graphics hardware has brought it into widespread use. The availability of monitors capable of 100Hz, low cost Liquid crystal (LC) glasses and advances in graphics technologies has made the stereoscopic experience even better.

Four major implementations of stereoscopic 3D technologies for gaming have taken place.

The *first* generation forced game developers to modify their code to make their game code to work the proprietary LCD, which limited the number of games using the technology.

The *second* generation, created by Megabyte Inc, was a low-level override in which stereoscopic 3D rendering was executed independently of the game. Megabyte used an over/under approach to cut the vertical resolution in half so that hundreds of Direct3D and openGL games could work in stereo.

The disadvantages were lower performance and grainy images due to the lower resolution.

The *third* generation of stereoscopic 3D, from ELSA, modified the graphics driver to produce page-flipping stereo. Even though it was still an override, it allowed many games to work without cutting the vertical resolution in half. However, there was insufficient implementation. nVidia believed that this was the best implementation and partnered with ELSA to create the fourth generation of stereoscopic 3D.

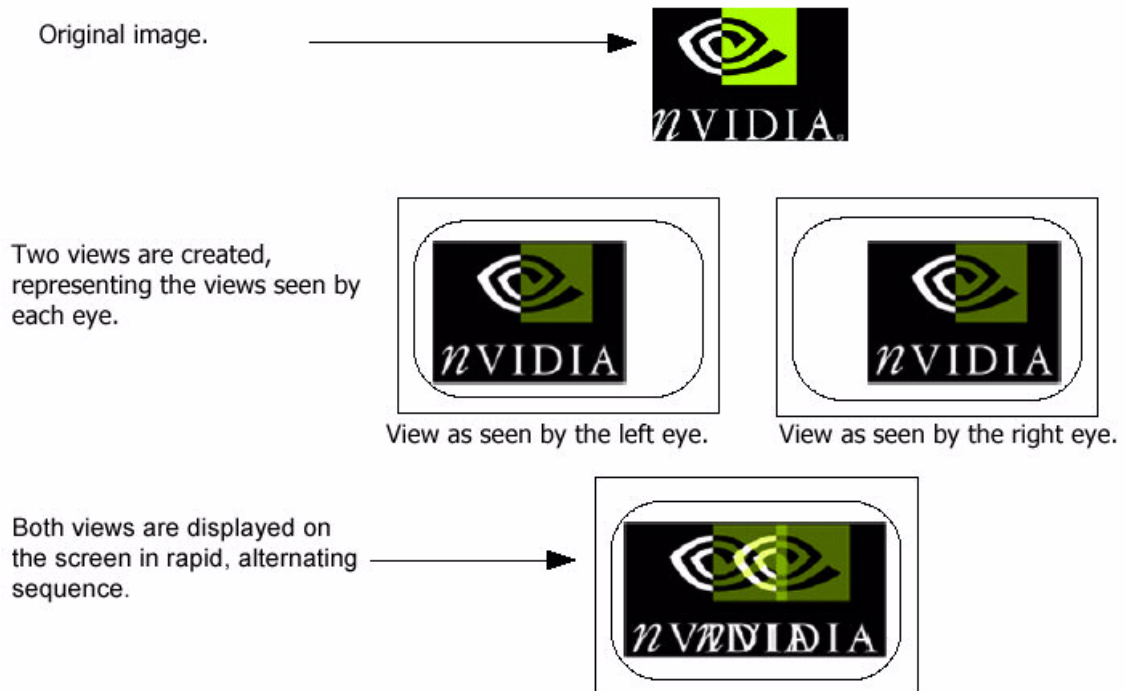
nVidia Corporation developed the *fourth* generation. nVidia extended ELSA's implementation by adding custom stereoscopic 3D configuration for each game. Because games are not written for stereoscopic viewing, some abnormalities may occur, and in most cases, nVidia's game configuration can remove these.

## How stereoscopic viewing works

Stereoscopic 3D creates more realistic games by adding depth to the objects. This is achieved by presenting a unique view to each eye – the same as in real life.

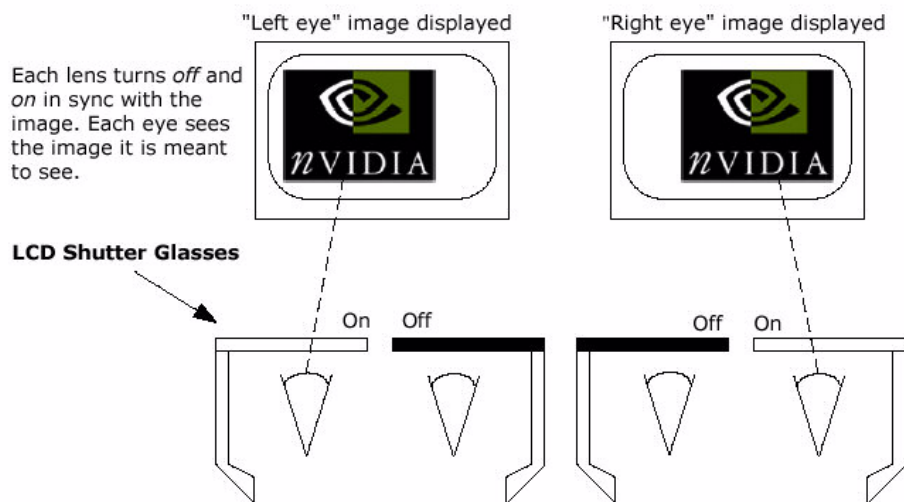
The problem is that the two views, the left eye and right eye, must be presented on a single flat surface, the monitor. The most economical way to do this is by using a time-based swapping of views. That is, the image for the left eye is displayed for a short time and then the image for the right eye is displayed. Then the process is repeated. By doing this fast enough, the eye does not notice the change.

Figure 1 shows how traditional 2D images are prepared for 3D stereo.



**Figure 1 – Preparing images for stereo 3D**

To ensure that each eye sees its respective image, the use of 3D LC shutter glasses are used. While one view – say the left eye – is being displayed, the LC shutter for the right eye will darken, blocking the view to the right eye. If the views are alternated quickly enough between the left and right eyes, the mind will see the two images as a single three-dimensional image.



**Figure 2 – View for each eye is isolated**

## BETTER VIEWING

Improvements in technology have made stereoscopic viewing in consumer products better than before.

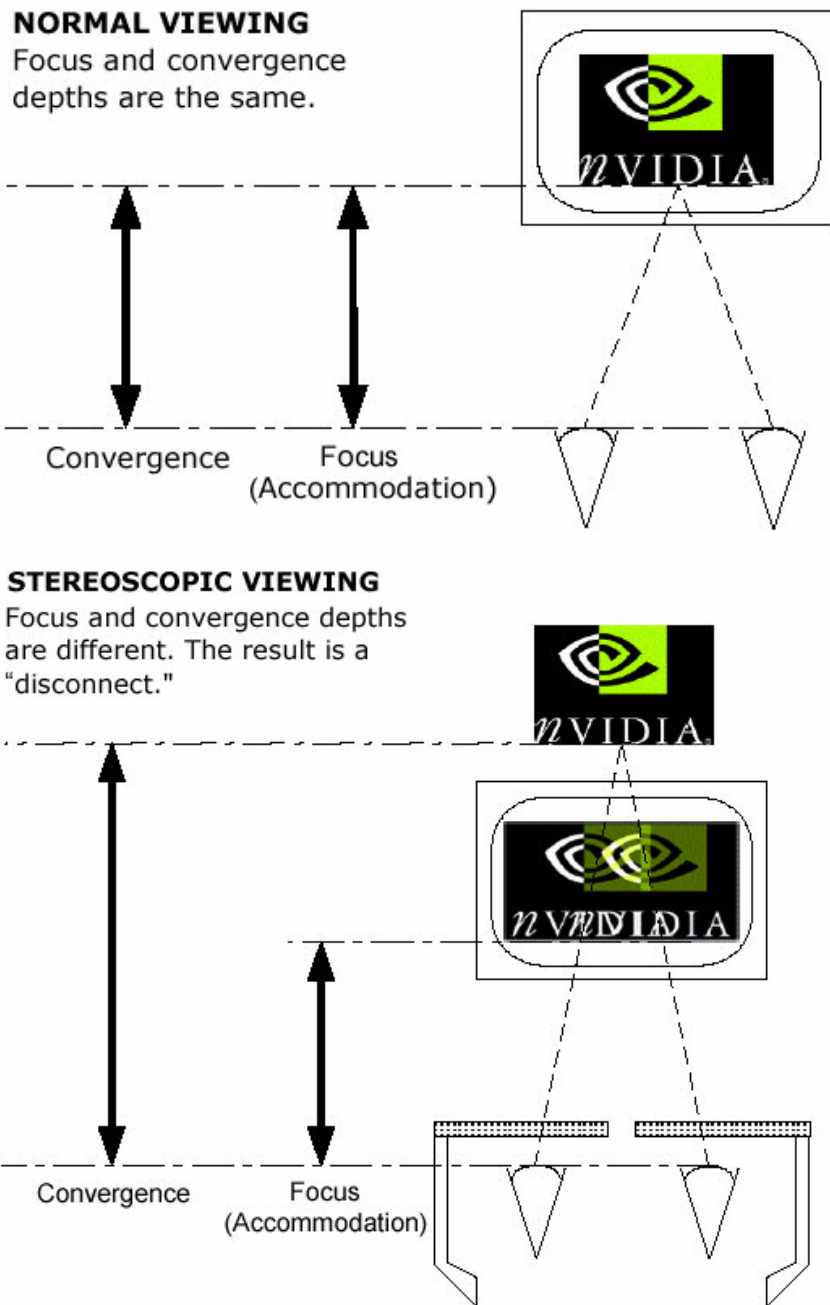
- Monitors are now capable of refresh rates of 100Hz and above.
- The LCD is of higher quality and prevents ghosting and headaches.
- Fewer stereoscopic abnormalities.

## ADAPTING TO STEREOSCOPIC VIEWING

Even with the very best professional stereoscopic 3D systems, users initially experience eye-strain and other symptoms that disappear within a short time. This strain is caused as a result of viewing three-dimensional objects in real life as apposed to viewing them on a flat surface.

In real life, your eyes focus on an object at a specific depth, as well as converge on the same object. During normal viewing (figure 3), these two processes happen at the same time. In viewing stereoscopic 3D on a monitor, the focal point is away from the objects, the focus point is in fact the monitor screen.

This confusion (“disconnect”) between the eyes and the brain causes some eye-strain until the brain adapts to viewing 3D objects in this way.



**Figure 3 – Normal vs. stereoscopic 3D viewing**

There is a solution to this “disconnect” between the eyes and the brain. Reduce the separation to a more comfortable setting until the viewer gets use to the two processes running independently. Over time, the distance can be increased, thereby enhancing the 3D experience. The manual contains details on how to do this.

## Epilepsy warning

A small percentage of individuals may experience epileptic seizures when viewing certain types of TV or video games that contains flashing patterns of light.

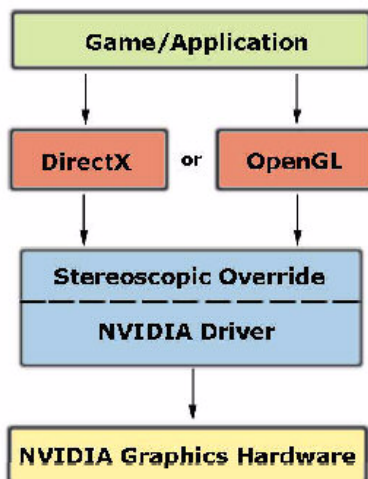
The following individuals are cautioned to see a physician before viewing stereoscopic images:

- Children under 5 years of age.
- Anyone with a history of epilepsy, or who has a family with a history of epilepsy.
- Anyone who has experienced epileptic seizures or sensory disturbances triggered by flashing light effects.

## NO GAME MODIFICATION

nVidia's method of Stereoscopic 3D is an override, which means that no modification to the game code is required. Since the data that the graphics driver receives from the game is highlevel, its possible to create the two views without any modification to the game.

nVidia Stereoscopic 3D supports DirectX and OpenGL API for performing this override. The benefit of this approach is that hundreds of games work in stereo without requiring devbpers to add 3D stereoscopic support. (figure 4).



Since most games were not developed with stereoscopic 3D in mind, some abnormalities may occur that are not evident when viewing in 2D. nVidia resolves this by providing a custom, per-game configuration mechanism that allows the removal of most of the abnormalities.

A small number of issues cannot be resolved, and nVidia uses a rating system that helps a user decide whether they should play the game in Stereoscopic 3D.

Figure 4 – 3D Stereo driver model

# **NVIDIA STEREO VIEWER**

Viewing stereo pictures is now possible on your GPU. Screenshots you take from you your game or with a special camera are viewable on your computer. The 3D Stereo kit ships with a Stereo Viewer application for viewing and manipulating static stereo pictures. Stereo viewer displays JPEG Stereo (JPS) images, or standard JPEGs of side-by-side images, including displaying them as an anaglyph image.

## **SUPPORTED PRODUCTS**

### **nVidia GPUs**

NVidia 3D Stereo was designed with everyone in mind, from serious gamers to the casual user. 3D Support has been added to the Detonator XP Software for support of the following nVidia products: TNT/TNT2, GeForce 256, GeForce 2, GTS/MX/Ultra, GeForce 3, Quadro, Quadro 2 MMR/Pro, Quadro 2 FX, Quadro DCC.

### **Operating systems**

Microsoft Windows 95/98/ME/2000/XP

### **API**

nVidia Stereo driver supports games developed with DirectX and OpenGL API.

Some games will not work. Please consult your game list contained in the stereo properties panel for details about each game.

Open GL is not supported on TNT and TNT2-based graphics boards.

### **Recommendations**

To enable nVidia 3D Stereo, you must have the following components: Detonator XP driver, the 3D stereo driver kit, an approved 3D monitor or 3D stereo glasses with an analogue (not DVI) CRT monitor capable of 100Hz.

The optimum monitor setting is 120Hz.

The more powerful the GPU, the better the performance since 3D Stereo requires double the fill-rate as compared to games without the 3D Stereo enabled.

**Information provided by nVidia and recompiled by  
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