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Hollywood's New 3-D Age

Digital-cinema technology improves the stereoscopic effect.

By Kate Greene

Moviegoers are getting a better 3-D experience thanks to the rise of digital cinema, in which film is replaced with data that's stored on hard drives and tapes. New kinds of 3-D equipment are being integrated into digital projectors and giving rise to a new generation of 3-D movies.

The basic idea behind today's 3-D movies is the same as it was in the early 1900s, says Matt Cowan, chief scientific officer at RealD, a company based in Beverley Hills, CA, that makes 3-D movie technology. Essentially, two versions of a film taken at slightly different angles are projected at once: one for the right eye and one for the left eye.

The earliest 3-D movies used a method called anaglyph in which one version of the film is dyed red and the other is dyed blue. The function of the red- and blue-tinted lenses is to filter the appropriate version for each eye.

Today's 3-D technologies separate the left- and right-eye content in different ways. RealD's system uses special lenses on the movie projector that polarize the light it emits, essentially adjusting the orientation of the light waves differently for the left and right eyes. The light from the projector is reflected off a special screen at the front of the theater that's coated with a silvery paint to maintain the polarization of light. The audience members wear polarizing glasses to filter out the light for each eye. Despite the glasses, some images in a 3-D movie are inadvertently seen by both eyes--an effect called ghosting. RealD uses special digital processing software to try to compensate for images that are likely to ghost.

A second type of technology relies on shutter glasses, which are synchronized with the flicker of left-eye and right-eye images that are projected onto a traditional movie screen. For this technology, the projector sends right-eye images to the screen half the time, and left-eye images the other half. It also sends out an infrared signal, detected by the shutter glasses, which keeps the glasses in sync with the images. These glasses are more effective at minimizing ghosting than other 3-D systems are, says Howard Lukk, vice president of technology at Walt Disney Studios, in Burbank, CA. However, because shutter glasses use optoelectronics and batteries, he says, they cost significantly more than polarizing glasses do. And since they cost more--around $50 a pair--they are usually collected at the end of a movie and sanitized for future use, which requires personnel and other expenses.

The third type of system is being developed by Dolby, the technology company that

created the surround-sound system found in many theaters. Dolby's system uses a technology licensed from Infitec, a company based in Ulm, Germany. A color wheel inside the digital projector divides the red, blue, and green bundles of light, explains Dave Schnuelle, Dolby's director of image technology. The colors are divided so that the shorter wavelengths that correspond to red, blue, and green are sent to one eye, and the longer wavelengths that correspond to those colors are sent to the other eye. Audience members wear glasses that filter out the colors for each eye but don't alter the perceived color of the film as anaglyph glasses do. While the system does not require a painted screen, as RealD's system does, the glasses are currently expensive to produce, says Schnuelle, because they are still in development.

Each approach has its drawbacks and benefits. "The beauty of [Dolby's system] is that it can use a standard screen," says Lukk. "Some people find issues with the silver screen." One of the main challenges is to ensure that the light reflects evenly across the screen's surface so that even viewers near the aisle seats get a good view. But, Lukk adds, polarizing systems are attractive to many because the glasses cost so little and, unlike shutter glasses, don't have any electronics in them, hence don't require special maintenance.