

The advent of digital cinema projection, aka **eCinema**, looks set to close the curtain on celluloid.

The digital menace

One century at the movies has seen the advent of sound, colour and multi-channel digital surround, but the core technology of shining light through film has remained essentially unchanged. But in an ironic twist, public cinemas are about to embrace a technology used in those very home theatres which try so hard to emulate the big-screen experience. Cinema projection is about to go digital, which could spell curtains for celluloid.

As ever, the driving force is not the push for superior quality, but a financial saving for the studios, and it's not hard to see why they're excited. A feature film resides on huge 1.5m diameter reels – weighing as much as 30kg each and costing over £1,000 to duplicate. If you consider that a major movie requires up to 5,000 prints to satisfy US cinemas alone, you've got an expensive duplication and distribution job on your hands. To make matters worse, film prints quickly become plagued by dirt and scratches.

Digital, or eCinema, however, could mean electronic movie distribution using satellites – eliminating duplication and vehicular transport costs, as well as greatly reducing physical storage requirements. Each showing would look the same, without image deterioration. Cinemas could also show live sporting or concert events, or juggle which movies are shown right up to the last minute according to demand. The only hurdle has been the development of a digital projector to match the quality of 35mm film.

The SMPTE (Society of Motion Picture and Television Engineers) publishes guidelines for cinema print projection and is currently developing guidelines for eCinema, but this hasn't stopped Hughes-JVC and Texas Instruments (TI) from building and demonstrating their own systems.

TI is, unsurprisingly, advocating its Digital Light Processing (DLP) and Digital Micromirror Device (DMD) technologies, which use a device not unlike a disco mirror ball to reflect light onto the screen using an array of tiny mirrors. TI's proposed DLP cinema projector boasts 13,000 lumens, better than 800:1 contrast ratio, and a squarish resolution of 1,280 x 1,024 pixels, which can be stretched to widescreen using 1.5x and 1.9x anamorphic lenses, just like today's film systems. In fact TI's DMD 1210 chip measures within one millimetre of a frame



Courtesy of Lucas films and 20th Century Fox

▲ **THE PHANTOM MENACE HAS ALREADY AIRED IN DIGITAL FORMAT IN SOME US THEATRES**

from an anamorphic release print.

Hughes-JVC favours its Image Light Amplifier (ILA) system, which employs a crystal light valve and a somewhat conventional CRT. Its ILA-12K projector boasts over 12,000 lumens light output, contrast exceeding 1,000:1 and a wide aspect resolution of 2,000 x 1,280 pixels.

But who's making digital films? Until digital cameras are employed when making movies, studios have to digitise existing film in Telecine suites. Always an adopter of new technology, George Lucas has digitised his already heavily computer-generated *Star Wars* prequel, *The Phantom Menace*, for digital trials in selected theatres. On the 18th June it previewed in four cinemas on the east and west coasts of the United States, using both Hughes-JVC and TI technologies. Lucas also plans to shoot the next two *Star Wars* prequels entirely digitally.

Hughes-JVC appears to be winning the race, at least in terms of publicity. CineComm has announced an end-to-end digital cinema solution employing the ILA projector and QualComm's compression and encryption algorithms. It's already been seen as far afield as Rio de Janeiro, and rumour has it that the Odeon Leicester Square is fitting one, too.

However, questions still remain. Is the quality as good as film, particularly on the larger first-run screens? Who'll pay the £100,000 plus for the projectors? With the savings on offer, Hollywood is unlikely to care about quality, and may subsidise or even foot the whole bill. We may soon never see another film at the cinema.

GORDON LAING

The **thumbnail-sized** microdisplay is the latest exciting development in monitor technology.

Seeing is believing

After much anticipation, the microdisplay – those tiny displays, sometimes called miniature flatpanels – are moving from labs into real-world products. What makes microdisplays so exciting is their huge potential.

Microdisplays present product designers with a chance to increase the displayed image size and resolution, yet physically shrink the display device itself. Their physically-smaller size means products will be less bulky and heavy, and will run longer on the same battery. They will be used mostly in mobile phones, headgear,

cameras and pagers. David Mently, a vice-president at Standford Resources, one of the industry's flatpanel display research companies, said there are also opportunities for microdisplays in 'rear-projection monitors for desktop and HDTV monitors and ultracompact, very-high-resolution front projectors.'

According to research from Microdisplay Report, liquid-crystal-on-silicon (LCOS) microdisplays are perhaps the hottest emerging display category. More than a dozen companies will soon offer LCOS displays in high-volume quantities. The next six to nine months will be critical for this industry. 'Competition will be fierce, and manufacturing issues are not yet ironed out,' said Chris Chinnock, editor of the Microdisplay Report.

Included in the competition is a new Hewlett-Packard partnership with Displaytech. The two companies will jointly design, make and sell the company's 'reflective microdisplay' components for consumer electronic products.

According to HP, the microdisplays, which are smaller than a fingernail, pack the imaging capability of a television or computer monitor onto a silicon chip and can be combined with an illumination source and/or optics. The high-volume component products will be sold under the combined HP and Displaytech brands.

Displaytech's microdisplay technology, called LightCaster, actually generates an image on the surface of a thumbnail-sized microchip.

A tiny, LCD-like panel on the silicon face packs high-resolution imagery and colour into a 10.4mm diagonal image. Display manufacturers can then use a variety of optical techniques to enlarge this fingernail-sized, crisp image. The company said the technology might find a home in full-sized, high-definition TV, or a handheld computer screen that might be seen through a viewing lens. In either case, the result is a sharp, 1,024 x 768 pixel image with 16.7 million colours.

The partnership initially will focus on selling the components to TV and projection display manufacturers, then move to PDA markets. And further down the road, the technology might find a home in wearable computing devices such as head-mounted computer displays. Headset maker, Virtual Vision, recently announced the eGlass, a 4-ounce headset with a 1in³ monitor that creates a full-colour, full-motion virtual image of between 16in in diagonal at a distance of 2ft, and 60in at 6.6ft. It incorporates a reflective LCOS display from Colorado MicroDisplay. The eGlass will target low-volume industrial and medical markets.

A Massachusetts-based company, MicroOptical, plans to produce portable displays that attach to ordinary eyeglass or safety glasses. The company's Integrated Eyeglass Display includes a concealed electronic display. When the user wears the glasses and turns the display on, an image of a video or computer screen appears at a distance of several feet. A focus adjustment allows the user to place the image at a comfortable distance.

'The glasses provide the user with a convenient, portable means of carrying a display that may be connected to a notebook computer, wearable computer or other electronic device,' said Tom Holzel, vice-president of sales and marketing at MicroOptical. Applications that seem particularly relevant, Holzel said, include hands-free reading of instrumentation by technicians and telephone linemen, as well as infantry infra-red night-vision use in conventional military eyewear such as goggles and gas masks. In addition, various medical uses such as anesthesiologists and surgeons watching their patients, are also prevalent.

BARBARA GENGLER

