

Here is a truly handheld display

At the GlobalPress Summit one evening, I kept getting distracted by images from the film *Cars* flashing overhead as we editors innocently ate our meal. Who, or what, had turned the white ceiling tiles into a projector screen, wondered **CAROLINE HAYES**

More importantly, could I eat my chicken while watching the ceiling without choking? (I could, but drinking the wine was more problematic.)

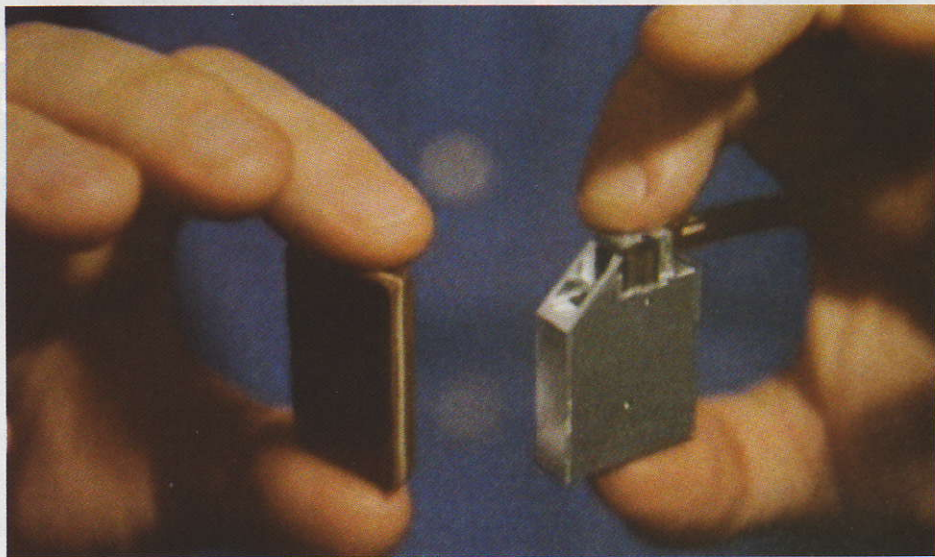
The cause of my indigestion-inducing table manners was Alexander Tokman, CEO of MicroVision, demonstrating the PicoP ultra-miniature display system. He had in his hand a palm-sized, battery-operated, colour pico projector which he was directing at the ceiling, walls, and tablecloths to show the film.

Later, he explained the technology behind the product which is used in a prototype pico projector called SHOW, which is intended to be integrated into portable devices such as mobile phones, MP3 players, laptops and gaming devices. It will cost around \$100 if embedded in a mobile phone or MP3 player or \$300 as a standalone gadget, and weigh between 30g to 50g, although batteries could boost this up to 200g.

At the heart of the PicoP is a bi-axial MEMS scanner, developed by MicroVision (www.microvision.com). The silicon device has a small mirror at the centre, which oscillates vertically and horizontally. A low-power RGB light beam is directed by the scanning MEMS mirror to 'paint' an image as a series of lines, similar to a CRT TV image.

There are four functional blocks in the display engine. Firstly, the image is deconstructed into electrical signals that drive red, green and blue laser light sources with intensity and colour information. The spectrally pure light delivers brilliant colours using red, green and blue lasers.

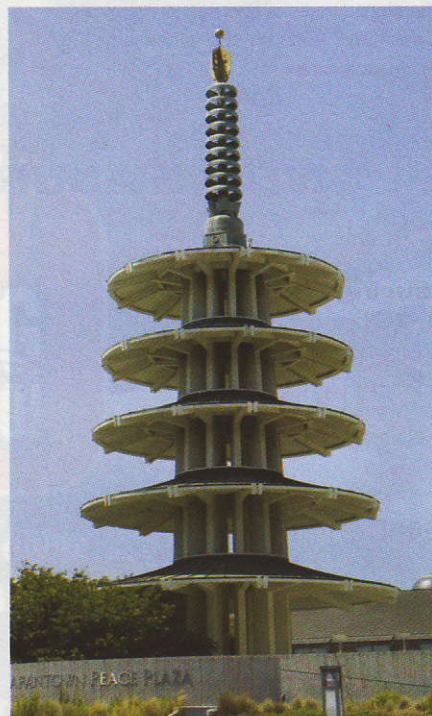
The laser light parts are combined into a single, modulated light path that represents the full pallet of colours. The light output from the optic is directed onto the MEMS scanning



mirror, which reproduces the desired image, pixel by pixel.

The display engine uses proprietary software and the image is reproduced in WVGA format on any surface. I have seen it project clear images against t-shirts people are wearing, walls on a conference centre as well as ceilings.

more power efficient as it only uses light where and when it is needed instead of draining power and adding heat as LCD, LCOS and DLP arrays do. The lasers are only on when they are required to save dissipation saving 50 to 70 per cent of the power budget. As a result the projector can be powered for one to one and a half hours continuous viewing, using 1.5W to 3W with batteries.



JapanTown, San Francisco, was the venue for the GlobalPress Summit

The PicoP 2D MEMS scanner is critical to the design as it does not have the pixel irregularities that can make images grainy or fragmented. It is also, according to Tokman,



As the sharp image is always in focus, there is no limit to the enlargement possible, so a small handheld projector can produce clear, high-resolution pictures at any range, from 20cm to 10m, which can be expanded without detriment. There is also no projection lens, which adds size and cost.

The result is a portable device that can be integrated into mobile devices, using them as a projector. Tokman speculates that an iPod can project onto a TV screen without focus adjustment, using this technology. Business presentations will not have to rely on an office or conference's A/V equipment - the wall will do!

The PicoP display engine is set to go into production at the end of this year.

