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THE EDITORIAL VIEW

PICOPROJECTORS HIT THE MAINSTREAM

By Tom R. Halfhill {9/28/09-02}

Another future has arrived. Last year, my colleague Max Baron analyzed competing technologies for picoprojectors—tiny video projectors occupying less than a cubic inch of space. (See *MPR 12/8/08-01*, "The New Peripheral is Almost Here.") Although picoprojector modules began appearing in small presentation projectors and other specialized devices, the technology hadn't quite hit the consumer mainstream.

Then, in August, Nikon revealed the world's first digital camera with a built-in projector. The Coolpix S1000pj, available now, displays still photos and video clips at VGA resolution (640 × 480 pixels). It can project images on a screen or light-colored wall at distances up to six feet, producing an image up to 40 inches wide.

For a while, at least, the S1000pj has a feature that distinguishes it from the hundreds of imitative designs that are turning digicams into low-margin commodities. The projector allows the S1000pj to command a higher price ($429) than similar digicams. (See *MPR 6/26/07-02*, "Commodity Products Make Commodity Markets.")

Picoprojectors herald a new age of video. Fifty years ago, transistors and ICs replaced power-hungry vacuum tubes, liberating electronics from tethered power. More recently, LCDs have replaced bulky CRTs, liberating television and computer video from tethered screens. Eventually, picoprojectors will replace bulky video projectors and will liberate portable video from the confining dimensions of tiny LCDs. More important, embedded picoprojectors will allow inventors to create new products we haven't dreamed of yet.

It's obvious that digital cameras, camcorders, and camera-equipped cellphones can put a built-in projector to good use. Think how often you've seen people crowding around a digicam or cellphone, craning their necks and bumping heads while squinting at photos displayed on a small LCD with a narrow viewing angle.

Portable videogame machines with embedded picoprojectors are an intriguing possibility. Portable movie players and TVs are obvious candidates. A small e-book reader for

Nikon's Coolpix S1000pj is the first digicam with an embedded picoprojector. It uses liquid crystal on silicon (LCoS) technology and LEDs. Nikon announced the camera in August and began shipping it in September. (Photo illustration: Nikon)

the sight-impaired would be useful. There are all sorts of opportunities for advertising displays and marketing promotions. Someday, opening a greeting card might even play a video.

Resurrecting an Art Form

When built into digital-audio players, picoprojectors will finally redress one of my pet peeves. They will compensate for losing the wonderful 12- × 12-inch canvas for album art when recorded music abandoned vinyl in favor of cassettes, then CDs, then disembodied MP3 files downloaded from the Internet.

In a column written four years ago, I anticipated that tiny projectors would someday become multimedia substitutes for classic album covers: "If we can build video cameras into cellphones, it should be possible someday to build video projectors into audio players. At a touch of a button, the player will project music videos, artwork, and liner notes onto the nearest light-colored surface. Eventually, the display might even be a self-standing holographic image." (See *MPR 12/27/05-02*, "The Oblique Perspective: Merry Virtual Christmas.")

However, there are still obstacles to overcome. Today's picoprojectors aren't very bright, so their range and viewing environments are severely limited. With the Nikon S1000pj, you'll need a dark room to see a clear image at its maximum range of six feet. Its picoprojector is rated at a mere 10 lumens.

In comparison, my Kodak Carousel 760H slide projector from the 1970s has an incandescent lamp rated at 525 lumens. It shines like a lighthouse, throwing a bright, clear image of a 35mm slide onto a 60-inch screen from 20 feet across the room.

The trade-off is heat—lots of it. The Kodak lamp dissipates 300W, requiring a cooling fan to avoid melting the slides. Even so, you'll see the slide pop into a different plane of focus in about 30 seconds, forcing the projector's autofocus lens to whir as it resharpens the image. Projecting a slide for more than a minute degrades the color dyes in the film emulsion and shortens the slide's life.

Modern video projectors for business presentations and home theaters are even more powerful. Their lamps are rated from 1,000 lumens to more than 3,000 lumens, so they can project bright images without requiring a completely darkened room. But again, the trade-off is lots of heat and the steady hum of a cooling fan.

The Cooler Alternative

Picoprojectors have none of those problems. Their cooler light sources of LEDs or low-power lasers are much more efficient. As partial compensation for their lower brightness, picoprojectors concentrate their light into a highly directional beam. A conventional projector lamp radiates light in all directions, wasting most of it.

Over time, picoprojector technology will improve, opening brighter environments to their images. As costs for picoprojector modules decline, more products will incorporate the technology.

Many of today's engineers vividly remember the famous opening scene in the first *Star Wars* movie, in which R2D2 projects a holographic recording of Princess Leia's distress call. Now grown up, some of those engineers are reducing science fiction to science—and making another future come to pass. ◇