

HP Invention Lets Police, Historians Read Lost Writing

By Sheila Riley
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The San Francisco Police Department is waiting for the perfect crime.

That's the one that will enable its forensics lab, with the help of Hewlett-Packard Co., to bring wrongdoing into the light — literally.

HP's contribution to law and order? A technique that uses a digital camera with 50 miniature computer-controlled flashbulbs to photograph objects from 50 angles.

The process, polynomial texture mapping, can take as little as five minutes.

The possible use in the cop shop is just one example of the many uses — most of them far from traditional tech corners — that might come up with texture mapping. It's not a moneymaker for HP now, and won't be anytime soon. But it's opening doors to a lot of fields most tech companies seldom enter, forensics, archaeology and dermatology among them.

And when the department gets the "right" crime, HP will begin work on specific applications that will help investigators use texture maps to illuminate evidence. It's all on an informal basis, but both parties are excited.

"With the right case, it could happen tomorrow," said Tom Malzbender, department manager of visual computing at HP Labs.

In fact, although it wasn't planned that way, the Palo Alto, Calif., computer maker's invention seems perfect for police work, says Susan Morton, SFPD forensic document examiner.

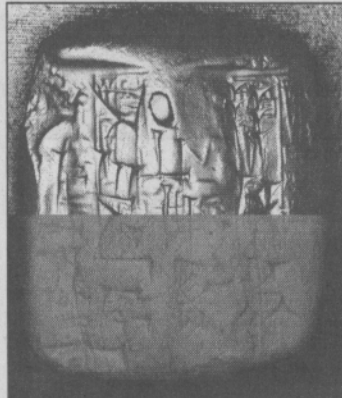
"We will find something to apply it to. It's a solution in search of a problem," Morton said.

Reading Invisible Writing

Possible uses? Well, take ransom and bank robbery notes. Suppose one of the bad guys long ago casually wrote his phone number on the top sheet of a notebook. Then he uses a later page of the same notebook to pen his demand for cash.

Today, forensic investigators do have ways to "read" that earlier writing — impressed on paper but not visible to the naked eye. But their methods don't work with every kind of paper. And if the document has been treated for fingerprints, then police are stuck.

That's where texture mapping could save the day.



ILLUMINATING: HP's texture mapping makes this ancient writing easier to read.

And police say it potentially has plenty of other uses, some a bit gruesome. They might use texture mapping to reconstruct destroyed serial numbers on guns or to identify assailants through bite marks they leave on victims.

"The live ones can tell us about it," said Morton of assault victims. "The dead ones can too, but they speak a different language." Texture mapping might help decode that language.

Besides police, others also are intrigued by texture mapping.

Scholars at the West Semitic Re-

search Project at Los Angeles' University of Southern California have worked with HP since 1999 to test and develop texture-mapping gear.

The USC effort specializes in photographing ancient inscriptions for analysis and preservation, says the project's associate director, Marilyn Lundberg.

She says texture mapping is particularly good for Mesopotamian cuneiform tablets — the earliest examples of phonetic writing that followed Egyptian hieroglyphics.

Scholars don't know much from this period, Lundberg says. "Any data that we can gain is a plus for those of us who study these ancient texts," she said.

More Photos, Better Data

The West Semitic Research Project spends some \$10,000 to photograph and catalog artifacts on its two- and three-week trips to sites, Lundberg says. But for the same cost, with the HP technology researchers can get 50 times more photos. And they get more information from those texture-mapping photos.

With texture mapping, previously invisible 4,000-year-old writing can suddenly become clear.

Texture-mapping technology — the process projects images onto the surface of a computer-generated model

— has been around for some time. Computer graphics software and especially computer games use texture mapping in simpler forms.

But HP's polynomial texture mapping uses light to find previously hidden information, making it a potential godsend to academic institutions and forensic labs, says Malzbender.

Making it any sort of viable commercial product, though, might be tough, he says. "It's really just in the interest of science," Malzbender said.

Malzbender and two HP colleagues started work on texture mapping in early 1998. HP didn't start out trying to develop products that archaeologists and police might want to use.

"Sometimes you just stumble across something like this," Malzbender said.

For example, HP and Stanford University are talking about using texture mapping in dermatology. It could be a way to measure skin lesions quickly, Malzbender says.

In the meantime, the SFPD is bidding its time.

"It's such a brilliant idea," said SFPD's Morton. "It's a simple idea, but some of the best ideas are really simple."

"We just eagerly await the right case. You know it's going to work on something."