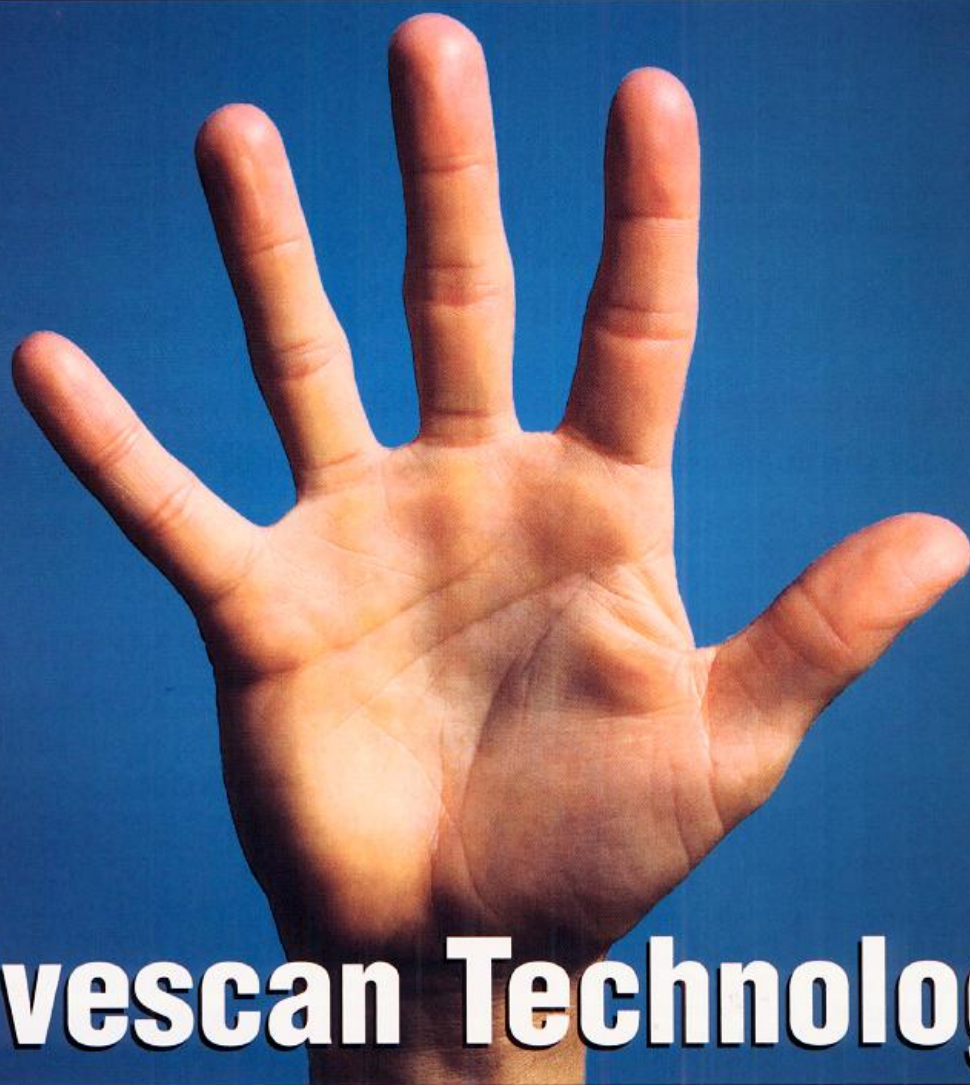


# EVIDENCE TECHNOLOGY MAGAZINE

The magazine dedicated exclusively to the technology of evidence collection, processing, and preservation  
Volume 4, Number 4 • July-August 2006



## Livescan Technology

### SOME OF THE TOPICS IN THIS ISSUE

- Developing faster livescan technology
- Researching tools for Level 3 identification
- Preserving crime-scene glass evidence
- Finger rehydration produces clearer ridge detail



# FAST CAPTURE

## Collecting fingerprints in record time

Written by Kristi Mayo

**I**N THE CHANGING WORLD, an individual's identity may be called into question at any time and in any place: at the workplace, in police booking stations, at the borders of the United States, or in the middle of a battlefield. This driving need to verify identity in the criminal-justice and civil sectors has pushed biometric technology forward at an impressive pace.

Some of the biometric technology being developed to meet the demand for increased security include iris scan, facial recognition, vein reading, and gait analysis. Not surprisingly, however, a good deal of interest in developing new biometric technology revolves around one of the oldest methods of identifying an individual by physical measurements and characteristics: fingerprint identification.

For more than a century, fingerprint technology existed primarily as a way to

identify criminals. Ten-print cards were painstakingly collected—one arrest at a time—and filed away to be used in future comparisons and identifications.

But now there is a growing demand to identify not only known criminals, but also new employees or individuals entering the United States from foreign countries. In the face of these applications, collection of fingerprint records can no longer be slow and deliberate. It must be fast and efficient.

### Fingerprints go flat:

#### Application of the “slap-capture”

Digital fingerprint capture devices, which are frequently referred to as *livescan* devices, offer an improved method of collecting ten-print records from individuals. Instead of using an ink pad and a traditional ten-print card—which must later be scanned at an appropriately high resolution in order to be enrolled into a local AFIS system or

IAFIS—*livescan* technology shortens the process significantly by allowing an officer to collect the same kind of image simply by rolling the finger over the capture device, which then captures a digital image at the appropriate resolution and, in many cases, provides immediate feedback regarding quality of the rolled impression.

While this technology works well for law-enforcement applications, it still may require several minutes to complete the process. This does not prove fast enough for most civil applications, according to Tom Buss, senior vice president of product development and management for Cross Match Technologies, Inc., a provider of a variety of biometric products and solutions.

“Since 9/11, the need for knowing who it is that you have employed in your company is growing in importance,” said Buss. “The type of fingerprint records that are being created for these types of

background checks are quickly moving away from the traditional rolled-print type of capture to what's called a *plain-impression flat capture*—sometimes referred to as the *slap capture*.”

Instead of rolling one finger at a time on the capture device, the slap capture involves placing all four fingers of the left hand on the capture device, then all four fingers of the right hand, followed by both thumbs at once. In three “slaps,” all ten fingerprints are collected.

#### The government issues a challenge to the industry

In September 2005, a joint federal government user group challenged the biometric industry to come up with a faster and easier way of performing plain-impression flat captures. The user group included the Department of Homeland Security, the Federal Bureau of Investigation (FBI), the Department of State, the Department of Defense, the National Institute of Standards and Technology, and the National Institute of Justice (NIJ), which is the research and development arm of the Department of Justice.

The challenge required a device and software that could collect a ten-print flat capture in 15 seconds or less. The device had to weigh less than 5 pounds and measure less than 6 x 6 x 6 in. The resulting images had to meet the FBI's quality standards. And the challenge had to be met in less than 12 months.

Cross Match Technologies was the first vendor to meet the challenge. After getting certification from the FBI in March 2006, Cross Match unveiled its new L SCAN® Guardian™ livescan system on April 18, 2006.

“I believe this product is going to be a benchmark for the rest of the industry as time goes by, because it addresses all of those applications that require plain-impression flat capture,” said Buss.

While the Guardian livescan system is capable of collecting rolled prints as well, Buss said he expects slap capture to continue to grow as the format of choice in the civil sector.

“Rolled prints are somewhat limited to only criminal-type applications, whereas plain impressions apply almost everywhere. Internationally, when they start to put fingerprint data into passports, they're going to use the same

## Digital tools for fingerprint capture are commonly called *livescan devices* ...and these tools offer an improved way to collect ten-print records from individuals for use in criminal-justice and civil matters.

type of a plain-impression flat capture. To me, the greater opportunity for growth—and the thing that's going to have the greatest impact on our country—is the proliferation of equipment that facilitates very rapid capture of plain-impression flat fingerprint records.”

#### Fast Capture Initiative:

##### Getting rolled prints up to speed

The ability to capture plain-impression flat fingerprints in less than 15 seconds is exciting for the civil sector, but many professionals in the criminal-justice

field may wonder what is next for the collection of rolled impressions. After all, the traditional, full “nail-to-nail” roll provides much more information for future comparison and analysis.

In early 2004, agencies in the Department of Justice—the NIJ, FBI, and Drug Enforcement Administration (DEA)—began a series of discussions on the need for a faster way to capture rolled fingerprints. These talks soon expanded to include the Department of Homeland Security, the Department of Defense, and the Department of State. Glenn Schmitt, deputy director and acting director of the NIJ, chaired the series of meetings held through the summer of 2004.

“In the fall of 2004, the NIJ issued a solicitation—a Request for Proposals (RFP)—to the field of researchers to develop devices that would meet the needs we had discussed,” said Schmitt.

These needs were identified as a device that would capture 10 rolled-equivalent fingerprints in 15 seconds or less—as well as the ability to capture both palms in a minute or less. “Plus, the images that were produced by the device had to meet or exceed the current FBI standards for image quality, so that they would work in the FBI's Integrated Automated Fingerprint Identification System (IAFIS) database,” added Schmitt.



The Cross Match L SCAN® Guardian™ is shown here and on the facing page. This digital fast-capture device measures only 6 in. wide, 6 in. deep, and 4.7 in. high. It weighs only 4 pounds, but it can capture plain-impression flat fingerprint images in 15 seconds or less. Several initiatives driven by federal agencies are enabling the rapid development of new digital fingerprint-capture technology.

The RFP also required the device to be rugged, portable, and affordable, as well as easy to operate.

"We needed to advance the state of fingerprint science by several steps at once," said Schmitt. "We thought that the state of the art was such that with a significant input of money and a bold challenge to the field, they would be able to respond and ratchet up the state of the technology two or three notches in a short period of time."

In the spring of 2005, after receiving a number of applications, awards were granted to three groups to begin the development process. These groups were Carnegie Mellon University, Cross Match Technologies, and TBS North America.

Schmitt outlined the basic premise behind the three groups' concepts:

❑ **Carnegie Mellon University**—

This group's approach consists of a box with a hole where the entire hand can be inserted. "You put your whole hand in the box and you hold it in the air—and the computer will capture a digital image of the whole hand, getting the palm and fingers all at once," Schmitt explained. "No matter where you put your hand in the box, the computer will be able to sense where the hand is and then take the pictures accordingly."

❑ **Cross Match Technologies**—

This company's concept consists of a "flexible foil contact sensor." According to the description, the flexible foil of the sensor would conform to the shape

of the finger and a two-dimensional sensor array would capture the impression.

❑ **TBS North America**—"The TBS approach is to have a series of cameras and mirrors in a box. The system will take—all at once—a series of photographs of the fingers at different angles. Then the computer will take different slices of each picture and merge them together to get the complete rolled-equivalent view of the finger."

The three concepts are still under development, and the end of the project is scheduled for 2007. "We have already seen a prototype from TBS," Schmitt said. "We expect that in early 2007, we will have the final prototype from TBS, and later in 2007, we expect to see the final prototypes from both Cross Match and Carnegie Mellon."

Funding for this ambitious project has come primarily from the Department of Justice and the Department of Homeland Security. By the time the project ends in 2007, Schmitt said the departments expect to have invested \$7 to \$7.5 million for developing the concepts.

Although one driving impetus behind this program is to develop capture devices that are more easily deployable and more efficient in the field (such as at borders and on the battlefield), Schmitt emphasized that the need for this kind of technology covers the spectrum from civil applications to law enforcement.

"When we're matching a latent print from a crime scene, we have to have the

best-quality image possible," he said. "That's why, up to this point, we have stressed that you must always get a rolled fingerprint, because there are parts of a latent fingerprint that do not always show up in the process of plain-impression flat capture."

"By ensuring that we maintain the rolled-quality standard, we're going to ensure that we can continue to solve criminal cases."

The requirement that the device capture palmprints as well as all ten fingerprints is one step toward this kind of forward-looking demand for quality. After all, approximately 30 percent of all latent prints gathered at crime scenes are from parts of the palm and lower joints of the fingers.

"It's a dramatic change in the way we've thought about friction-ridge images," said Schmitt. "California has a palmprint file in their own fingerprint database, and they have solved a number of crimes just through palmar images."

Image resolution is also a key factor in this development program. Although the FBI currently requires digital fingerprint images to be recorded at 500 dpi, the devices now under development must have the ability to capture prints at 1000 dpi.

"Whether it is for a law-enforcement purpose or for a border-security purpose, or even a military purpose in a foreign country," said Schmitt, "we are going to revolutionize the way in which we capture fingerprints." ○○○

## IMPRIMUS®

*Imprimus Forensic Services, LLC*

### Training for the Crime Scene Professional

**Crime Scene Investigator's School  
Footwear & Tire Track Evidence  
Photography & More**

*We feature programs held in conjunction with the  
Northeastern Illinois Public Safety Training Academy.  
Visit our website for more information.*

P.O. Box 1532  
Arlington Heights, IL 60006  
847.804.8420

[www.imprimus.net](http://www.imprimus.net)

## CSI TRAINING, HOME STUDY

Courses of Study include:

Fundamentals of Forensic Investigation,  
Criminal Investigation, Firearms ID,  
Fingerprint ID, Henry Fingerprint  
Classification, Handwriting Comparison,  
Arson & Explosion Investigation, and much  
more! Dantes and VA approved. Accredited  
by the Accrediting Commission of the  
Distance Education & Training Council.  
If you are interested in CSI, either as a  
career or hobby, go to our website at

[www.iasinc.com](http://www.iasinc.com) or call

800-354-5134 for a free catalog.

American Institute of Applied Science,  
100 Hunter Place,  
Youngsville, NC 27596