



New LEVA laboratory is a giant step forward for video analysis training

Written by Dale Garrison

(Photographs courtesy of LEVA)

A DEDICATION CEREMONY on February 26 represented a paradigm shift in the way that forensic video analysts are trained. The event celebrated the opening of the United States' first training facility dedicated to forensic video analysis:

The LEVA Digital Multimedia Evidence Processing Lab at the University of Indianapolis

The new lab is staffed and operated by the Law Enforcement and Emergency Services Video Association (LEVA). Establishment of this facility is the result of five years worth of work by this pioneering organization. For the first time, the nation's only dedicated training for the recovery and analysis of video evidence has a full-time home. Now, the latest equipment is permanently set up for training purposes. And, in addition to the educational advantages, the laboratory also creates a potentially

invaluable resource for Department of Homeland Security officials should a major emergency require such state-of-the-art services.

The permanent laboratory houses cutting-edge equipment such as multiple, dual-monitor stations with an interactive multimedia instruction system. The system allows an instructor to effectively stand at the shoulder of every student in the laboratory—simultaneously.

"He can sit at the head of the class with a flat monitor that is mirrored by the individual monitors at each student's workstation," explained Jan Garvin, LEVA forensic-video training vice president. "He can feed content to each work station, instead of forcing students to strain to see a projector screen. They can see in detail exactly what the instructor is discussing. We've found that, as a result, the students are paying attention and they are retaining more."

Intense Focus

The work is more than a "point-and-click" tutorial, however. The coursework is sometimes surprising to incoming students because it emphasizes a rigorous curriculum that puts a priority on individual learning, covering topics such as multiplexed decoding, image stabilization, automatic image tracking, time lapse and real-time video analysis, digital video recovery analysis, videotape repair, and authentication. There's even a training section on legal "dos and don'ts" taught by a prosecutor from Calgary, Alberta, Jonathan Hak.

"Those who graduate are eligible to enter the only certification program in the world for forensic video analysis," Garvin noted. "There are some in-house programs at several departments, but this is the only one of its type that provides a recognized certification."

Students run the gamut, from patrol officers with little in-depth computer

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[1] Here are the instructors and consultants who were present for the initial class: (front row) Amy Wheeler, Minneapolis (MN) PD; Craig Thrane, Target Corporation; John Kennedy, Forensic Science Service; Grant Fredericks, principal forensic video instructor; (back row) Jim Wood, Louisville (KY) Metro PD; Dave Hallimore, Houston (TX) PD; Jonathan Hak, principal legal instructor; Casey Caudle, Target Corporation; (not pictured) Dorothy Stout, digital forensics instructor.

[2] Thomas Lewis and John Laycock of Ocean Systems load and test the forensic software.

[3] Jim Wood, a detective with the Louisville (KY) Metro Police Department, puts together a workstation.

[4] Amy Wheeler, a forensic scientist with the Minneapolis Police Department and LEVA-certified forensic video analyst.

experience to individuals who already have some forensic video experience.

The intermediate program focuses on processing digital video evidence, from computer or other digital-recording devices. In the advanced program, students work on their own, literally processing evidence in preparation for a moot court where they face primary instructor, Grant Fredericks, alias "Defense Attorney".

"A lot of them are sweating bullets going into that," Garvin said with emphasis. "There are many professional analysts who hope they don't have to testify in a case across from Grant. For the students, there's real fear. But if they can survive that, they can handle the real thing."

The star attraction, however, is the jaw-dropping technical capabilities of the new laboratory. "When people see what you can do with demultiplexing a tape or clarifying a dark tape, they can't believe it," Garvin said. "That's where we get a lot of our future students. Many people go back and tell their supervisors what they could do if they only had this technology available at their department."

ROM to Spare

Fredericks also noted the lab can be activated for use by the Department of Homeland Security in the case of a national emergency. There's little doubt the lab is capable. In digital storage, it has an immediate capacity of 28 terabytes, and the potential for expansion to several *petabytes*. Think about it: A terabyte is approximately 1,000 gigabytes, while a petabyte is approximately 1,000 terabytes.

"That holds a lot of video," said Fredericks. "But if you were involved in an instance where you had 6,000 to 7,000 video sources, all of those could be managed here with a trained team of analysts. And since they use the same systems in most locations nationally, it would be relatively easy."

That concept of uniformity and interoperability is crucial in itself. The U.S. Department of Justice and International Association of Chiefs of Police (IACP) recently announced that four operational forensic video laboratories are to be located in the states of Massachusetts, Washington, Texas, and Ohio. Although they will offer some training, their primary effort will focus

on analysis. All will share similar technology such as the Unity™ LANshare by Avid Technology, Inc., and Ocean System's dTective software, the same Avid nonlinear video editing system used at the LEVA lab.

One example of how such equipment serves law enforcement is multiplexing—the process of analyzing images from multiple cameras, such as several security cameras in a single store. In many cases, these multiple feeds are stored in a recorder that actually keeps only a fraction of a second from each angle. Pulling coherent images from these devices—or de-multiplexing—requires both advanced equipment and advanced knowledge.

"If you view these images, they would look like a series of fast-moving frames," Garvin explained. "You might only have seven frames—say one-third of a second—from one camera at a time. What you do is shuttle through a tape slowly to see if one of the cameras captured an image of interest. That is very time-consuming and impractical. Our equipment can digitize and isolate one particular camera and track it.

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Then you press a button and the software can stitch together all of the frames from that camera. When we teach that in the lab, that's where you see a student sit back wide-eyed and say, 'I can't believe this!' That's exciting, but it is actually only one of the things that this technology can do."

Other, even more complicated techniques include raising certain photographic values to make a car license readable, or filtering background noise to isolate relevant sound. Although many of these techniques have been available to some degree for years, today's equipment makes the work far faster and more powerful.

"But this is a science, not a video game," Garvin stressed. "People have got to realize that shows like *CSI* and similar programs do not accurately portray reality."

"This is another piece to the forensic puzzle," added Tom Christenberry, with the university's school of adult learning and the university liason with LEVA. "Statistically, there is probably more video evidence at most crime scenes than any other evidence. The average person today is captured on video 16 to 20 times a day—and does not even know it."

Seeing is Believing

Christenberry cited a case in which a police officer was accused of using excessive force. A bystander's video seemed to support the accusation, but as many as four other cameras had also captured the event. When viewed from the other angles, it was obvious the officer had not touched the individual as described.

"It's like instant replay in football, where a play can look so different from different angles," Christenberry said. "In that case, we were able to look at it all and could tell the officer was defending himself."

Christenberry is also chairman of an Indiana Homeland Security advisory board, a group that examines training programs with the hopes of making improvements and avoiding duplication. He said his contacts with LEVA and the university made the lab's location a natural fit, and he hopes to follow with similar programs that may be initiated in Indiana or elsewhere.

"Maybe someone else can develop a biology angle," he said. "We can't be parochial about this. That way we all end up sharing the positive experience. The lab fits nicely into that network."

The Beginning Steps

The story actually began in 2000 at the FBI training facility at Quantico, Virginia, when LEVA officials partnered with the Department of Justice to begin providing a basic video forensics training course. The program quickly grew to include a second, third, and fourth level, but, just as quickly, space became an issue. And after 9/11, simply getting the students in and out of the security-conscious FBI building was difficult.

Christenberry had been in charge of the FBI unit that hosted the LEVA training at Quantico before retiring and joining University of Indianapolis. He suggested that a partnership between the university and LEVA might be beneficial. In October 2004, LEVA held

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their first course at the university. That was only the beginning.

"It went extremely well," Garvin said. "It was like the Red Sea parted. We thought, 'This is going to work extremely well.'"

The only serious problem involved equipment and the lack of delegated space. LEVA staff members, many of whom are volunteers like Garvin, were required to set up and tear down "labs" before and after each class. Considering the extensive and delicate nature of the equipment, the process often meant hours of tedious work "building" their classroom lab, only to tear it down at the end of the day.

"They would be there another two or three hours putting everything on wooden skids and shipping it out the next morning," Christenberry recalled. "This is a much nicer arrangement. It's good for LEVA and good for the university."

Beginning two years ago, LEVA began seeking the funding to help create a lab. With a budget of \$300,000 just for equipment, it was not a small endeavor. A major hurdle was overcome when the university stepped forward and agreed to offer space for up to 12 courses a year, with the dedicated and equipped space to also be available for university classes in related areas such as video editing and processing.

"That was a huge step," Garvin noted. "In my mind, when you look at the definition of partnership, you see LEVA and University of Indianapolis. They provided the infrastructure and the security, and we brought in the equipment and expertise."

Impressive Results

To say the laboratory has attracted wide attention is an understatement. Students have come from across the nation and around the world. Another source of exposure involves media reports, including accounts of the lab's rare assistance with solving a local crime.

As a rule, the program does not offer crime-lab services, but this one exception is a good example of the kind of technology available:

During the lab's first semester, a woman was abducted and parking-lot videos were found to have recorded the kidnapping. Fredericks reviewed

the videos for local police and provided technical advice.

"It helps people in law enforcement understand what can be done," said Christenberry. "That is really the first challenge: to communicate just how powerful a tool this can be."

Garvin is even more complimentary of the program's instructors, whom he credits for communicating the intricacies of the work. "It's not the hardware," he stressed. "The reason this works, in my opinion, is the laboratory's cadre of competent, dedicated instruction-team members who have the time to devote and conduct this training."

Garvin sees a similar strength in the organization's connection with the University of Indianapolis. "At this point, we have had people ask why we don't go to a larger university," he said. "But we have been truly fortunate to become affiliated with this institution because they have been so eager to support us. It's been a really good match." There has been interest by other schools nationwide to develop similar programs.

LEVA's original identification of the training lab and increased awareness by law enforcement is the key to its success, however. "Law enforcement around the world is beginning to understand the benefit of having a video analyst on staff," said Garvin. "Now that they have seen what a trained professional can do, they are beginning to make room on their payroll for this expertise. And that fact has increased our demand."

To date, nearly 1,000 students have graduated from the program.

"There is nothing else like it in the world," Fredericks concluded. "But I think it's only going to get better—which is good for everyone."

For more information

about LEVA training and certification, you can visit their website:

www.leva.org

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