

Testing Technology: From the Lab To The Field With Facial Recognition

By Lee Mockensturm

Author's Note: *Points of view expressed in this article do not necessarily represent those of the U.S. Department of Justice (DOJ).*

If you walked into the Prince George's County Correctional Center in Upper Marlboro, Md., earlier this year, you would have been greeted by a busy construction scene. Today, as major renovations are nearing completion, you are greeted by an advanced facial recognition system.

Upon entering, you swipe your smart ID card across a scanner and it alerts the system that you are entering the facility. Using the information from your card, the system pulls up an existing image from a database and, using the biometrics of your face, compares it to the one captured by the camera. If the system finds a match, you advance; if it does not, the admitting officers are alerted and take necessary actions.

Lt. Col. Carl Crumbacker, chief of security at the Prince George's County Correctional Center, needs to know who is in the building at all times and be able to positively identify those who enter and leave. "With 300-plus employees, it's very hard to have an officer identify each one," he says. With the facial recognition system, Crumbacker does not have to rely on just his officers. "Logging employees as they enter and exit the facility allows officers to find out who is in the facility in case of an emergency," he adds. Lt. Stewart Bybee has been instrumental in working with the technology and preparing it for integration into the facility operations and says the main benefit is the system's exact identification.

From a technical standpoint, enrolling uniformed and civilian staff into the system is simple. It only

involves entering basic information into the system and taking a picture that is used on ID cards and in the database. The system will be phased in gradually to overcome the difficult transition of having staff adapt to and become comfortable with the system. According to Crumbacker, the next phase of the system will include visitors. In addition, the system will be tied to door activation, in which some doors will be operated automatically by the facial recognition system.

Facial Recognition Research and NIJ

The facial recognition technology installed in the Prince George's County Correctional Center is part of a pilot project funded by the National Institute of Justice (NIJ), a research agency of DOJ. The project is being conducted by the Department of Defense Counter-Drug Technology Development Program Office at the Dahlgren Division of the Naval Seas Systems Command (NAVSEA).

The pilot test resulted, in part, from Dr. Allan Turner's — a visiting scientist at NIJ, professor at George Mason University and former federal warden — experience during the 1987 Cuban Riots at the U.S. Penitentiary in Atlanta. According to Turner, the Cuban detainees held approximately 100 hostages for 11 days. It was extremely difficult to identify all the staff being held hostage since procedures had not accurately accounted for all staff who had entered and exited the institution.

When Turner came to NIJ and saw facial recognition work being performed, he recognized the obvious fit for using technology to accurately account for staff and visitors entering

and leaving an institution. NIJ began funding facial recognition projects in 1996 and initiated a video-sensing program to develop and demonstrate video techniques that can be used with facial recognition technologies to extract and identify subjects.

NIJ has funded a number of researchers who have been instrumental in developing the basic facial recognition algorithms that allow the databases to work. The research also has developed performance standards and software used in field demonstrations, and helped transition the technology to local agencies.

In the years that NIJ has been involved with facial recognition technology, it has gone from concept to reality. Trent DePersia, director of NIJ's Research, Technology Development and Demonstration Division, has worked with facial recognition technology since his days at the Defense Advance Research Projects Agency in the mid-1990s. "What we found was that the [facial recognition] technology was ahead of its time in the sense that the technologies it harnessed, computers and video cameras, weren't advanced enough to make it work, especially when it came to replicating in the field what was done in the lab," he says. Now those technologies have advanced to the point at which facial recognition systems can work effectively in operational environments. Cameras are smaller and produce high-quality images and relational databases, and the computers they run on are faster and have a greater storage capacity.

Beyond technical issues, general acceptance into the everyday routine of an agency is a challenge all technologies face during implementation. The more the technology changes

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everyday routines, the more policy, procedure and training are needed to implement the technology. According to DePersia, "Not too many years ago, extensively using surveillance cameras might have been a radical change, but now they are becoming more and more ubiquitous."

Moving beyond the use of still mug-shot images to video images drastically increased the power of facial recognition, especially in less controlled environments. Using still images alone, the system had only one image to match to existing images in the database. By using video images, the system has multiple shots from which to make a match. A good analogy is skeet-shooting with one or multiple shells. With only one round, that shot has to be right on. But if there are multiple shells, there is a better chance of hitting the pigeon. Facial recognition performance has improved by 43 percent because of a 150 percent increase in the speed of finding faces in a video stream of images and increased use of multiple images of the same person.

Field-Testing Technology

There was no single breakthrough invention that made facial recognition a viable tool for corrections and law enforcement. Bringing all the technical pieces together is the real challenge, according to DePersia. It has to be done in a way that makes the technology a convenient, accepted part of routine operations. Pilot, or test-bed projects, such as the one in Prince George's County, are a good way to make that determination. When done well, test beds benefit the practitioner agency, technology developers and the corrections field at large.

Providing Access to Advance Technology. Crumbacker faces the same budget constraints as many other agencies across the country. Installing an advanced facial recognition system would likely have been out of the question if he had not got-

ten involved with NIJ and NAVSEA. By hosting the pilot program, his correctional center takes advantage of a tool that could make securing the facility significantly easier.

Making Technology a Good Fit. While officers at the Prince George's County Correctional Center monitor the system as employees enter and leave, another computer, conveniently located under a counter, monitors the system's performance. This computer is not there for correctional staff; it is there for NIJ and the technology developers. As the correctional center benefits from the system, the evaluators benefit from the facility by watching how the system works in a real-world situation.

Developing a technology is only the initial step in introducing an operational system into the field. Many new technologies have seemed feasible until agencies tried to put them into practice. Pilot projects and test beds allow developers and researchers to see how a technology will interface with existing systems, what new infrastructure is necessary and what operational adjustments may be required.

NIJ uses operational test beds to integrate, test and evaluate technologies. Test beds can be used to:

- Demonstrate the capability and possible shortfalls of existing technology;
- Investigate policy and procedure issues associated with the introduction of technology;
- Identify the impact of technology on the agency organization; and
- Share the results of the evaluation with the entire criminal justice community.

Sharing the Findings. The most significant beneficiary of this and all NIJ-sponsored pilot projects is the greater criminal justice community. While beneficial to the agency hosting the technology evaluation and to the technology's developers, NIJ's mandate is to improve the adminis-

tration of justice and promote public safety across the entire nation, not just specific facilities. To do that, NIJ takes the findings from projects such as the one at the Prince George's County Correctional Center and communicates the lessons learned through Web sites, technical reports and other publications.

Testing the facial recognition system in an operational facility benefits the facility, technology, developers and the corrections community. Jails benefit from the use of advanced technology by knowing exactly who is in the building. Technical developers benefit from the opportunity to test the equipment in real-life settings. Finally, the community benefits from seeing if and how a technology works in a facility.

For More Information

In 2000, NIJ and the Department of Defense's Counterdrug Technology Development Program and Defense Advanced Research Projects Agency, brought together facial recognition technology developers for the Facial Recognition Vendor Test 2000. The report of this test can be viewed online at www.dodcounterdrug.com/facerecognition/FRVT2000/documents.htm.

NIJ also has been instrumental in developing the *Online Biometrics Catalog*. This tool allows practitioners to search through various available biometric technologies, including facial recognition, to find the best fit for their agencies. It can be found at www.biometriccatalog.org.

For more information on the technology and program discussed in this article, contact Chris Miles at (202) 616-1110, Allan Turner of the Office of Science and Technology at (202) 616-3509, or Carl Crumbacker at (301) 952-7024.

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