

# NIJ Tests New Technologies

By Jack Harne and Frances Scott

*Authors' Note: Findings and conclusions reported in this article are those of the authors and do not necessarily represent the official position or policies of the U.S. Department of Justice.*

The National Institute of Justice is sponsoring research projects and pilot programs to test technologies that will help correctional managers detect contraband and run safer institutions.

While the problem of cell phone use by inmates has received much publicity in recent months, cell phones and the electric chargers that power them are just one form of contraband that correctional institutions contend with. Correctional officers regularly face attempts to smuggle drugs and weapons into and within their facilities. In addition, some inmates fashion weapons out of everyday materials.

Ongoing NIJ projects include testing contraband detection technologies, using radio waves to track prisoner movements within an institution and using a computer program that identifies potential trouble spots in a prison.

## Testing “Airport” Scanners in a Prison

An NIJ-sponsored pilot program used a millimeter wave imaging system to scan visitors at the Graterford State Correctional Institution in Pennsylvania. The imaging system can detect cell phones, weapons and nonmetallic objects hidden beneath clothing. The Transportation Security Administration (TSA) uses the systems to scan passengers at airports. At Graterford, a maximum-security facility that houses about 3,100 inmates outside Philadelphia, the system scanned 400 to 600 visitors a week.

To be scanned, a person steps into a “portal,” which looks like a booth.

The system uses radio energy in the millimeter wavelength range from antennas that rotate around the person. The reflected energy is picked up by scanners that produce an image of the body and any hidden objects that lie beneath the clothing. Each scan generates less radiation than a cell phone transmission, according to the manufacturer.

Millimeter wave systems are controversial because they produce such clear images of bodies that some people find them too intrusive. TSA has won acceptance of the systems by establishing a policy of deleting the images immediately. Millimeter wave systems have the same capabilities and limitations as backscatter X-ray systems that are also used for scanning, but millimeter wave systems produce images that are a little less explicit.

The system at Graterford did detect some cell phones, but its greatest strength was its deterrent effect. To address privacy concerns and increase public acceptance, prison officials used a privacy screen that obscured the most explicit views, but still signaled when detecting a hidden object under someone’s clothing. Graterford officials also set up some laptop computers when they introduced the system that allowed visitors to see how the images might look. This also helped to win public acceptance.

NIJ coordinated the project because it was an opportunity to evaluate millimeter wave technology in a correctional setting using commercially available hardware. NIJ also sponsored a similar test in a jail setting earlier this year at Georgia’s Gwinnett County Jail.

While this technology can detect items covered by clothing, it does not detect contraband hidden in body cavities. NIJ is currently funding the development of a system that can do

that. Quantum Magnetics Inc. is working on the project.

Millimeter wave systems can be effective, but they are large, in a fixed location and expensive. Some corrections officials have told NIJ they want the option of using relatively inexpensive handheld systems that could be used to make spot checks and as a backup to metal detectors.

## The WANDD

While firearms rarely make it through the metal detector screenings at correctional institutions, various other devices do. Correctional officers and inmates face dangers when improvised weapons fashioned from wood or other nonmetallic substances such as hard plastics enter prisons and jails.

Corrections officials report that prisoners, using various materials, can turn salvaged and vandalized items — and even items bought from the commissary — into weapons. Pointed and sharp-edged weapons that cause the most concern in correctional institutions are often made out of toothbrushes, safety razors, personal locks, mop and broom handles, fencing materials, and even dustpans.

NIJ sponsored development of a new handheld device that can detect contraband ranging from plastic knives to cell phones. Dubbed the WANDD, for weapons and nonpermitted devices detector, the system is integrated into an existing handheld metal detector to scan fully clothed prisoners or visitors for contraband hidden under their clothing. The portal systems and handheld systems have similar scanning capabilities; the primary difference is the portability of handheld systems. Luna Innovations Inc. of Virginia developed the WANDD after receiving an NIJ grant in 2006, and initial testing took place at the Virginia Peninsula Regional Jail in January and February 2008.

Scientists and engineers at Luna specifically designed the WANDD to ferret out nonmetallic objects, but it also detects metal. Similar to a sonar system, the WANDD uses sound waves to detect objects. It includes an ultrasonic wave transmitter and a low-frequency acoustic receiver. The sound waves differ depending on what they strike, but the differences are so subtle that the human ear cannot detect them. Therefore, the WANDD includes electronics that show an operator when an object is hidden under clothing.

Engineers worked with VPRJ to test the WANDD with a variety of clothing fabrics, including standard jumpsuits. The WANDD prototype successfully detected various objects, including plastic knives, pikes, guns, credit cards, dollar bills and cell phones. A red or yellow light comes on to alert the operator that an object has been detected.

The eventual goal is to produce a low-cost, small device for commercial mass production. Other uses for the WANDD include schools, airports, large public venues or any place where certain nonmetallic items, such as beer bottles, are not permitted.

## Tracking Prisoners and Hotspots

Corrections officials are starting to test technologies that may help with other challenges as well. One approach involves radio frequency identification (RFID) technology,

which uses small transponders called “tags” to track movements. The tags can be incorporated into devices such as wristbands. They have integrated circuits and tiny antennas to handle radio signals, and they can be used with a network of sensors called RFID readers to track movements. A few correctional institutions have used the systems to track prisoner movements. For example, the system can alert staff to an unusual concentration of people in a particular area. The tracking information can be stored on computers and could be used in investigations to learn who was present in a particular part of a building at a certain time.

RFID technology has been used to track inventory in warehouses since the 1970s, but its use in correctional facilities is relatively new. Correctional managers have been cautious about buying these expensive systems because of uncertainty about how well they will work in prisons and jails.

NIJ is working with the RAND Corporation and the District of Columbia Department of Corrections to assess the effectiveness of an RFID system. Researchers are collecting information about violent incidents in the D.C. jail system, so they can measure how much of a difference the new system makes. Besides evaluating the new system, the project involves surveying correctional institutions across the country to see how many are using RFID technology and how well it is working.

To advance correctional technology, NIJ has teamed up with the Florida Department of Corrections to test a computerized system that predicts potential trouble spots within prisons. The effort involves using data warehousing and data mining techniques to pinpoint where trouble is most likely to occur. Dubbed COTAS (Correctional Operational Trend Analysis System), the system uses computerized analysis of information to give supervisors a reading of the “climate” of a facility or parts of it, right down to individual cells. COTAS uses prisoner information, such as gang membership, escape attempts and psychological conditions, to predict potential trouble spots.

The Florida DOC developed the system, and NIJ provided funding to expand its use and test it. COTAS is now available to administrators in Florida’s 137 correctional facilities and is being independently tested this year. If COTAS is found to be effective, the Florida DOC will make copies of the computer program available to correctional institutions outside Florida next year.

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