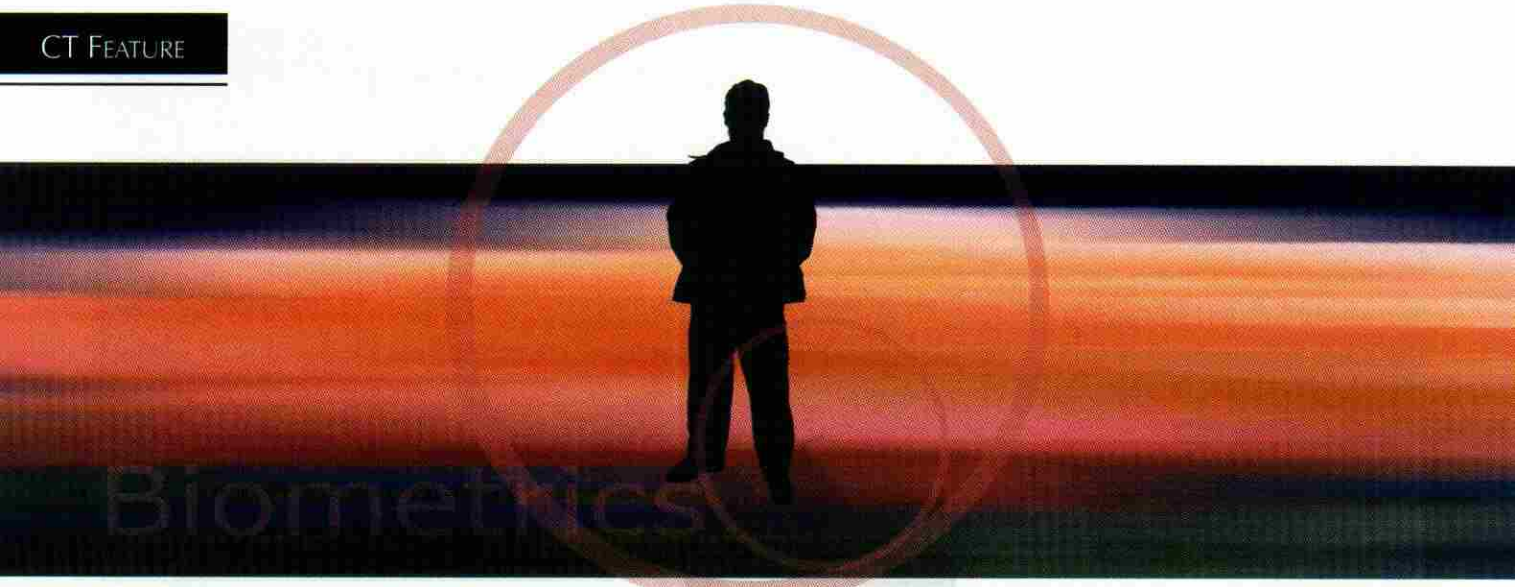

Biometrics in Corrections:
Current and Future Deployment

By Allan Turner

In the February 2001 special issue of *Technology Review* magazine, the editors chose 10 emerging areas of technology that they believed would have a profound impact on the way individuals live and work. Biometrics was one of them.[1]

Indeed, since the publication of that article, biometrics technology has rapidly expanded into numerous areas of society. Applications can been found in such diverse activities as entering amusement parks, accessing bank and credit union accounts and obtaining passports or driver's licenses. At the same time, the use of biometrics in corrections has expanded steadily as the price of these high-tech devices has decreased substantially, and the complexity of integration and implementation has been reduced. The result has been the increasing attractiveness of biometrics as a tool for correctional management. In fact, it could be argued that biometrics will radically change the corrections field.

How Biometrics Works

Simply stated, biometrics is the automated identification or verification of human identity through measurable physiological and behavioral traits. Major biometrics technologies include fingerprint and iris scanning, facial recognition, hand geometry and voice recognition. In addition, many different types of biometrics are being researched for future use, including body odor, ear biometrics, facial thermography, gait analysis and thermal imagery.[2]

For the most part, biometrics operates using a three-step process. First, a sensor makes an observation. The type of biometric device used determines the type of sensor and its observation. For example, with facial recognition, the sensor is a camera and the observation is a picture. The observation captures the chosen biometric and produces a biometric signature, or template, that is stored in a local repository, a central repository or a portable token such as a smart card. Next, the sensor captures a new observation of an individual and produces a biometric signature. A computer algorithm normalizes the captured biometric signature so that it is in the same format as an individual's signature that is stored on the system repository or token. Finally, a matcher compares the new normalized signature to the signature in the repository or token database. A measure of similarity or difference is computed for a comparison of normalized signatures.[3]

The biometric recognition can be used in the identification mode or the verification mode. In the identification mode, the system identifies a person from the entire population by searching a database for a match. In the verification mode, the biometric system authenticates a person's claim of identity from his or her previously enrolled pattern.[4]

Biometrics in Corrections

As the deployment of biometrics technology has grown steadily in corrections during recent years, two develop-

ments have become apparent. First, the application of biometrics in prisons and jails is primarily in the verification mode and focuses on entrance and egress. In other words, biometric technology has been used mostly to monitor staff and inmates entering and exiting an institution. Identifying people entering and leaving a facility is a major security concern. A warden or jail administrator must ensure that only authorized people enter and exit an institution. Especially important is the need to ensure that they accurately identify inmates and do not release the wrong person. Also, the warden or jail administrator must be able to quickly account for all staff and visitors inside an institution in the event of an emergency. Second, it appears there is an emerging consensus that fingerprint, hand geometry, iris recognition and, to a lesser extent, facial recognition are the biometric technologies most readily applied in corrections.

Fingerprint Scan. A greater variety of fingerprint devices are available than for any other biometric. In addition, fingerprint devices are relatively low in cost, smaller in size and easier to integrate. Fingerprint scanning has a high accuracy rate and works extremely well where users are well-trained and the devices are operated in a controlled environment.[5] The California Department of Corrections has used biometrics for years to monitor staff. The system uses a blacked-out bar code, which is invisible to the naked eye, on an ID card in combination with a fingerprint reader. Alarms are tripped if a correctional officer fails to check in with the system after a given time.

Hand Geometry. Hand geometry is accurate, easy to use and easy to integrate into other systems and processes.[6] It is best used to identify staff and visitors, and to monitor time and attendance. The Federal Bureau of Prisons has used hand geometry for several years to identify staff and visitors entering federal prisons and jails.

Iris Scan. Iris scan uses a fairly conventional camera element and requires no close contact between user and reader. Iris scan is considered one of the most precise biometric technologies available today. It is highly accurate and works well in the verification mode. Iris scan is the biometric of choice when a high degree of accuracy is required, such as identifying inmates who are to be released.[7] Several facilities, including Lancaster County and York County prisons in Pennsylvania and Sarasota County Detention Center in Florida, use iris scanning technology as part of their release procedures.[8] In fact, the total database at York County Prison, which numbers in the tens of thousands, represents one of the largest collections of iris templates in existence.

Facial Recognition. Facial recognition requires a digital camera and a very controlled environment to be effective. Such devices are greatly affected by lighting and camera angle. Unfortunately, excessive claims have been made by some vendors concerning the capabilities of facial recognition devices. Facial recognition can be effective, but it must be used under tightly controlled conditions, requiring that

the subject stare directly into the camera under adequate lighting. The National Institute of Justice Office of Science and Technology, in cooperation with the Prince George's County Correctional Facility in Maryland, has established a demonstration facial recognition system to process staff into and out of the facility. The project is closely evaluating the application of facial recognition technology in a jail environment. The precise requirements for camera angle and adequate lighting in order to achieve accuracy have been confirmed by the experiment.[9]

Biometrics in the Future

The future deployment of biometrics in corrections will depend on how innovative correctional administrators will be and the continued improvement in the technology's accuracy. Current projects have demonstrated the usefulness of certain biometrics, such as iris and fingerprint scan, hand geometry and facial recognition in specific applications. For example, there is little doubt that institutions using iris scan greatly reduce the probability that the wrong inmate will be released.

In the near future, the type of biometric devices that are now most widely applied in corrections — iris and fingerprint scan, hand geometry and facial recognition — are not anticipated to change. However, the present devices can be expected to become less expensive, easier to use and more accurate.

As the cost decreases and ease of use and accuracy increases, the feasibility of expanded use improves. The use of biometrics for entrance and egress will continue to expand to a greater number of institutions. In addition, biometrics can be expected to take over more functions inside correctional facilities. It is entirely feasible that a combination of biometrics will, in the near future, replace the paper pass or other inmate accountability systems currently in use in most correctional facilities.

As is adequate control of entrance and exit, inmate accountability is essential to institution security. All inmate movement should be controlled and supervised by staff, including individual and group inmate movement to and from work and program assignments. Most correctional facilities use a pass system to accomplish this objective, which requires a paper pass to be issued to an inmate who is going somewhere inside the institution. The passes must be signed by appropriate staff and accounted for at the end of the day. Such a system is cumbersome and inefficient, and easily breaks down when there is a lack of supervision.

The NIJ Office of Science and Technology, the Space and Naval Warfare Systems Center and the Naval Correctional Facility are developing a prototype inmate accountability system that will use a combination of biometrics to control inmate movement. The system will use fingerprint scanners to control inmate movement, and iris scanners to record inmates entering and leaving the facility. Research at the Naval Correctional Facility revealed that fingerprint scanning devices provide the accuracy and rapid throughput required for recording the movement of large numbers of inmates. On the other hand, the high degree of accuracy of iris scan biometrics is required to provide adequate security for inmate receiving and discharge activities.

Conclusion

Biometrics technology will continue to have a tremendous impact on corrections. The technology has proved to be a useful management tool in the never-ending quest within corrections to provide a safe living and working environment for staff and inmates, as well as to protect the community. All indications are that the application of biometrics to help achieve these objectives will expand as the technology continues to mature and correctional administrators become more knowledgeable in its application.

ENDNOTES

[1] Strikeman, A. 2001. The technology review ten: Biometrics. *Technology Review*. (January/February).

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