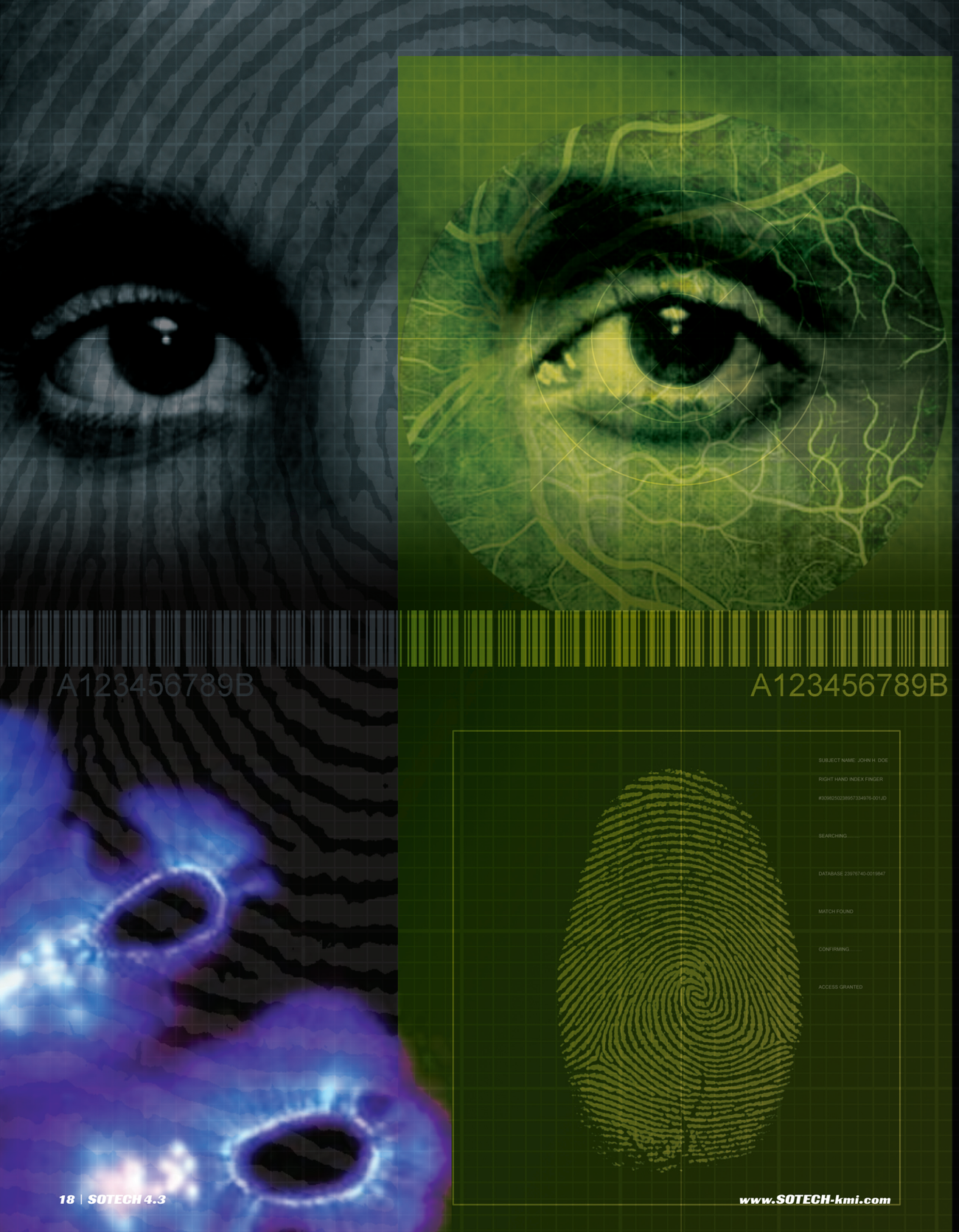

A Multimodal Future

U.S. DoD EYES BATTLEFIELD BIOMETRIC SYSTEMS THAT MEASURE AND EVALUATE MORE THAN ONE CHARACTERISTIC.

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Biometric systems have become invaluable tools for law enforcement, corporate security and other communities. Biometrically enabled applications successfully support an expanding list of public- and private-sector activities, some of which are the issuance of identification cards and passports, and processing suspected criminals.

These advancements have not gone unnoticed by the DoD, which is sponsoring programs to place militarized versions of these systems in the hands of its warfighters for use on the battlefield.

EMERGING CAPABILITY

Biometrics are measurable physiological characteristics or personal behavioral traits used to recognize or verify the claimed identity of an individual. The most common physiological characteristics used in this expanding science are fingerprints, face, hand, iris, voice, retina, DNA and personal scent. As the research and development tempo quickens and the knowledge base expands, there is increasing interest in other characteristics, including the vascular system.

Recognized behavioral traits are signature, gait, voice and keystroke.

A biometric system is an automated tool for measuring and evaluating these characteristics or traits for the purpose of human recognition. DoD is eyeing systems with more than one (multimodal) characteristic to provide the highest levels of accuracy and probability of personal identification.

Portable, lightweight and ruggedized biometric systems—slimmed down versions of those used in police stations and other offices—are envisioned to be deployed and would transmit electronic files with the attributes of a person of interest. The data would be processed and compared with existing databases, with the results returned to the warfighter in minutes or seconds.

The requirement to support the warfighter with biometric matches through DoD biometric systems is an embryonic one. "That activity is about a year-and-a half old," Dr. Joseph Guzman, director, policy, planning and liaison, DoD Biometric Management Office (BMO) told *SOTECH*.

Dr. Guzman's office and the Biometrics Fusion Center (BFC) are the focal points for enabling government, industry and academia to field these systems.

The Enablers

The BMO reports to the staff of the Secretary of the Army and the DoD executive agent for biometrics. Four of the BMO's responsibilities in its ever-expanding portfolio include oversight, planning-budgeting, establishing information-sharing programs and processes across the user community and continuing to make progress on standards and hardware development.

The BFC's mission includes test and evaluation, repository management and other duties.

Fingerprints Most Popular

While DoD is unable to provide the number of biometric systems deployed on the battlefield, department-wide usage figures are available.

An early 2005 department-wide data call asked the military components to report on biometric systems being used or planning to be used. Eighty-three systems were reported. The physiological characteristics on which the systems were based and their part of that population were: fingerprints (65 percent), hand geometry (12 percent), iris (6 percent), multiple (16 percent), and other/DNA (1 percent).

Three of the applications supported by the systems included identity background check, physical access and detainee processing. The community's next challenge is tailoring the systems for more battlefield-specific applications.

Battlefield Uses

The potential use of these systems on the battlefield can be gleaned from recent tests, experiments and actual missions.

The BFC has reported that the warfighter support team at the center embarked USS Mustin (DDG-89) to demonstrate the use of a portable biometric collection system in maritime interception operations. During these operations, merchant vessels are monitored, queried and boarded to support the global war on terrorism and U.N. resolutions. Once data was collected about the crew members of interest on a visited merchant ship, it took approximately six minutes to transmit the biometric files to shore and identify the mariner.

While the service is not currently using biometrics to support at-sea operations, it "plans to in the future," said Lieutenant Trey Brown, spokesman in the office of chief of information. "The Navy has begun to procure biometrics equipment, develop policy to support operations and train shipboard personnel on its use," he added.

An Iraqi man receives a retina scan at Brahma Park, in Fallujah, Iraq, from a member of the Marine Wing Support Squadron Three Seven Three. U.S. Marines are using a Biometric Analysis Tracking System (BATS), an identification system that involves taking thumbprints, a photograph of the face and a retinal scan. [U.S. Army photo]

Ground forces during Operation Iraqi Freedom have used biometrics during processing of detainees.

While DoD and industry remain tight-lipped about some aspects of the military's current and future uses of these systems, it has been noted that other envisioned biometric-supported battlefield missions include identifying latent fingerprints on the remnants of improvised explosive devices and enhancing blue (own) force tracking.

Successes

SOF has been a full partner in placing biometric systems in the hands of warfighters. Indeed, DoD's first biometric match of fingerprints for a suspect of interest involved Naval Special Warfare Command at a location not specified for operational reasons.

"We provided the ability to send that information directly to us wirelessly, and that was a match off of our search of the Federal Bureau of Investigation database (Integrated Automated Fingerprint Identification System)," Guzman recalled. "We match the electrons, and we share the matches with all of our intelligence community—and we have quite a few matches to point to," he added.

BMO: What's Needed

Standards and protocol compatibility are at the top of the office's requirements list. This will ensure that current and future deployed biometric systems are compatible with DoD and other government protocols. The office noted two particular specifications.

"We released a DoD-specific protocol called Electronic Biometric Transmission Specification [EBTS] that is fully compatible with the FBI's Electronic Fingerprint Transmission Specification [EFTS]," Guzman remarked.

In the final stages for a scheduled mid-February 2006 release was the Bio Application Programming Interface conformance test suite. The suite will provide the government-industry team with software designed to give a "go, no-go" assessment of the compatibility between a piece of biometric peripheral equipment and a protocol. As the conformance test suite is being developed in conjunction with National Institute of Standards and Technology, the software can be operated by any party. The BMO is also seeking to bolster two individual characteristic technologies, enabling them to better serve as building blocks for multimodal solutions.

To enhance fingerprint-collection capabilities, in particular those of SOF, BMO is collaborating with other U.S. government agencies on developing rapid fingerprint capture devices. "These would shorten the capture time for a 10-print set of fingerprints from minutes down to seconds," Guzman said. "And we would find tremendous value in more inexpensive means of DNA encoding."

Other Requirements

Dr. Joseph Guzman

USSOCOM, too, established the priority that any of its biometric collection systems will meet current or future biometrics standards, in particular EFTS or EBTS, reported Lieutenant Commander Steve Mavica, a command media relations officer.

This will "allow data to be shared by others engaged in counterterrorism operations or to be shared with international law enforcement authorities," he explained.

In a complementary effort, the command is working with the U.S. Army Biometrics Management Office to establish standardized architecture for rapid identification of suspected combatants.

Industry was notified of another requirement through a USSOCOM Small Business Innovation Research announcement: the Tactical Biometric Registration and Recognition Suite.

The customer wants to develop a lightweight and portable biometric toolset to allow in-theater registration and near real-time recognition of personnel. In line with DoD's interest in obtaining multimodal biometric devices, the biometric toolset would provide automated personnel tracking through multiple recognition criteria including fingerprints, iris scan, voice printing and facial recognition.

The Navy is interested in obtaining fingerprint-collection equipment and other technologies as they mature, such as iris scans, facial and voice recognition, Brown said. "Next generation equipment needs to be easy to operate and maintain, ruggedized to help prevent breakage, and light in weight to facilitate carrying. Technologies that enable the secure wireless transmission of biometric data are also of interest," he remarked.

The Marine Corps is also committed to the research, development and fielding of biometrics technology to better enable the service to identify and track personnel. The Marine Corps Combat Development Command (MCCDC), in cooperation with Headquarters Marine Corps Plans Policy and Operations and the Marine Forces Reserve, is researching the applicability of biometrics technology to increase the capability to positively identify personnel, both friendly and potential adversaries, Lieutenant Colonel Mike Johnson, deputy director, force protection integration division, MCCDC, told *SOTECH*.

"Currently, we have been using the Biometrics Automated Tool Sets in Operation Iraqi Freedom with great success. The Marine Corps Systems Command has procured 312 biometric automated tool set clients and nine servers for our forces operating in the U.S. Central Command area of responsibility. This action was in response to two urgent universal needs statements from I and II Marine Expeditionary Forces, approved by the Marine Requirements Oversight Council," he added.

This procurement has joint context, as it was done in close coordination with and with the assistance of the office of the Chief of Staff, U.S. Army and the U.S. Army Language Technology Office in Fort Huachuca.

"Our intent for the future is to see what improvements can be found to enable us to utilize the family of biometrics technologies and codify them as USMC programs and requirements," Johnson remarked.

Multimodal Solutions

Identix is working on a special project for a branch of DoD, said Frances Zelazny, director, corporate communications. The project involves the in-field deployment of the Identix Mobile Identification System (IBIS). The system is a dual biometric (fingerprint and facial) mobile identification system that utilizes a patented, hand-held wireless device to provide on-the-spot identification information.

"It is ideal for use in the field where soldiers may come into contact with insurgents and detainees and need to know who they are dealing with on a real-time basis," said Zelazny. "By being able to capture and search against existing fingerprint and photo databases, soldiers have a reliable means of identifying people they come in contact with in the field," he added.

IBIS is fully compliant with the FBI's EFTS specifications and reportedly can:

- Collect and verify high-quality identification information in real-time from remote locations;
- Search against multiple Automated Fingerprint Identification System databases simultaneously;
- Provide single-handed use to enhance operator safety (weighing less than 2.5 pounds); and
- Enable accurate identification of potential insurgents.

Law-enforcement officers are using the baseline IBIS in the field in six U.S. localities.

A second effort, being completed under a DoD Small Business Technology Transfer Research (STTR) Phase II contract, has Ultra-Scan designing a tri-modal biometric identification system (hardware and software). The product will be anchored by the company's proprietary ultrasonic fingerprint-scanning solution (Livescan Ultrasonic Identification System) and will add both facial recognition and iris scanning technology. The envisaged unit will carry the moniker Automatic Multimodal Biometric Identification System and will "provide an almost foolproof method for 100-percent identification of individuals in a harsh field environment," predicted John Schneider, CEO, Ultra-Scan.

The project is building on Ultra-Scan's fusion logic developed as part of a STTR I Phase initiative.

Multimodal Advantage

The trend to include more than one biometric system in an end product is well-founded, opined one corporate leader.

"Ultra-Scan has analyzed several databases of what most industry experts would consider poor-quality fingerprint data in which, due to the poor quality of the data, the system was achieving only an 80-percent accuracy rate," Schneider observed. With the introduction of a secondary biometric measurement, Ultra-Scan was able to drive the system to greater than 99-percent accuracy, he added.

Ultra-Scan's fusion-logic techniques are said not only to ensure that the optimum system performance is being obtained, but also to guarantee that no combination of biometric measurements will ever perform worse than either of the individual biometrics. ★

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