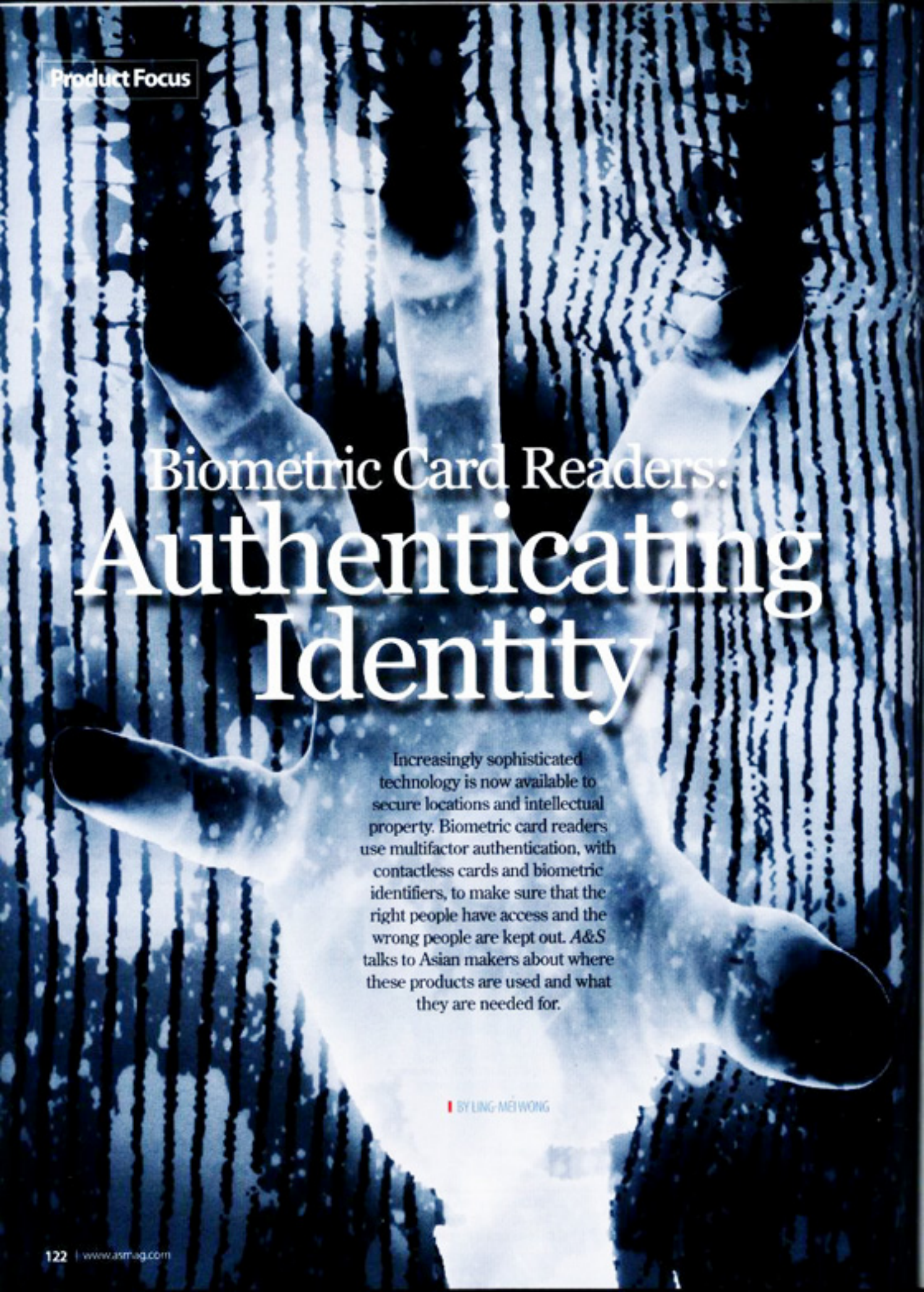

Biometric Card Readers: Authenticating Identity

Increasingly sophisticated technology is now available to secure locations and intellectual property. Biometric card readers use multifactor authentication, with contactless cards and biometric identifiers, to make sure that the right people have access and the wrong people are kept out. *A&S* talks to Asian makers about where these products are used and what they are needed for.

BY LING-MEI WONG

Swiping a door access card is a daily work ritual for many people, routine to the point of being forgettable. One mode of verification, however, is no longer sufficient in highly secure locations. In the Fox television series "24," terrorists steal a door card to the Counter Terrorism Unit, allowing them into the government facility to release nerve gas. While the events of "24" are fictional, the possibility of a door card falling into the wrong hands is all too real.

Biometric card readers are the answer to deficiencies in single-factor authentication, said John Mao, General Manager of China-based Foshan Wewin Technology. Users can be verified with cards and biometric identifiers, making sure that unauthorized individuals do not access restricted areas.

Applications for Biometric Card Readers

Access control and attendance are the most common applications. The Malaysian market is more about access control, said Min-Wee Ng, Senior Manager of Biometric Solutions at Elid. While attendance is another use, cost is a significant factor for Malaysian buyers, who gravitate toward single-mode readers. Ng said Elid's higher-end readers are mostly exported to India, Saudi Arabia and China.

For Korea's Suprema, access control accounts for 35 percent of revenue, said Young Soo Moon, Director of Marketing and Sales, with another 35 percent from time attendance. Inside the time-attendance market, biometrics accounts for 30 percent to 40 percent, he said. Suprema's triple-factor Biostation RF includes a card reader, fingerprint scanner and personal identification number (PIN) pad.

In China, demand for biometric card readers is booming, said Mao, especially at driving schools. As Chinese citizens become more affluent, car ownership is becoming more common. Would-be car owners flock to driving schools to earn driver's' licenses. Biometric card readers are tools for checking attendance, verifying student identities and keeping track of hours. Previously, driving schools documented on paper whether each student had completed the required number of driving hours--no easy feat, given large enrollment figures. Card readers authenticate attendance by scanning fingerprints, ensuring students are physically present. They eliminate fraudulent reporting of practice hours by recording time students spent at the schools.

Handheld readers are being developed for the practice cars themselves, Mao said, allowing students to log in by swiping smart cards and placing fingers on a fingerprint scanner, which is verified against fingerprint templates stored to the cards. This ensures the time students log at driving schools is spent actually driving, instead of resting or waiting for instructors. The issue of privacy is avoided, since student fingerprints are stored on the smart cards, instead of in central databases. This allows for one-to-one, rather than one-to-many, comparison.

Radio frequency identification (RFID) cards used in Chinese driving schools have integrated circuits to make them "smart," with reading and writing capabilities for data--popular for attendance.

Locations using biometric card readers are secure, said Louis Lo, Corporate Communication Executive at RCG in Hong Kong. "Industries demanding high security levels, such as banking, airports, casinos, government, finance, border control (and) law enforcement, will use biometric card readers for access control the most," he said. "The international terror threat is stimulating demand of biometric card readers from private and public sectors globally."

In the case of casinos and airports, readers document access and attendance of employees, not of the public. But government documents, such as e-passports, are used by the public and require biometric card readers to read RFID tags and scan for individual biometrics.

China also uses biometric card readers for logical access control, or access to nonphysical areas such as company computers or intranet, Mao said.

Other countries also use readers for logical access. Elid readers protect server rooms and intellectual property, Ng said.

Readers help prevent fraud in online banking, Lo said. Some computers have external biometric scanners, with fingerprint scanners being most common because of their cheap silicon parts.

Takamitsu Yoneyama, Assistant Manager of Communications at Hitachi

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John Mao, General Manager of Foshan Wewin Technology

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Types of Technology

In Japan, biometric technology is used in the financial sector for access control. Vein recognition is preferred over fingerprint, since fingerprinting is associated with crime.

"Fingerprint scans and face recognition ID methods are associated with the police by some people, on a psychological level," said Shigeru Sasaki, Director of Fujitsu's Media Solutions Laboratory, in a prepared statement from 2005.

"The financial sector is one of the most successful market sectors for Hitachi vein-recognition card readers," said Takamitsu Yoneyama, Assistant Manager of Communications at Hitachi. "However, we also provide biometric card readers for physical

access into buildings; these are sold in Japan as well as in Asia." Hitachi finger-vein ATMs use light to identify vein patterns underneath skin surface. Veins are verified against smart cards containing stored patterns, with customers no longer entering PINs.

Yoneyama said that 70 percent of the Japanese financial institutions that have adopted biometrics use finger-vein recognition. He said finger-vein patterns are difficult to duplicate and have a higher accuracy rate than fingerprints, since they are not affected by dryness or roughness. Hitachi clients include the Japan Post, Mizuho, Sumitomo Mitsui and Risona.

Fujitsu is promoting its own vascular-recognition system, scanning the whole hand for palm-vein patterns rather than just fingers. It is also targeting the financial sector, with its palm-vein ATMs going head to head with Hitachi's finger-vein version.

Since vascular recognition uses infrared light, users need not touch sensors, unlike fingerprint devices. "Many people do not like touching objects that have been touched by a great number of other people for sanitary reasons," Sasaki said.

Fingerprint templates, though, are the most popular biometric identifiers in the rest of Asia. "Fingerprint is the largest portion of the market, since it is related to police records," Mao said. "Police get suspects' photos and fingerprints (when booking them)." For fingerprinting, individuals must voluntarily give biometric information, Mao said, unlike photography or recording.

As individuals have been identified by fingerprints for some time, the technology is the most developed and the cheapest. "Fingerprint will continue to prevail as it is recognized as a more affordable, reliable, efficient and mature identification system," said Lo.

The low cost of fingerprint biometrics is attractive in Malaysia, but biometric solutions are being adopted slowly due to price concerns. "We are a bit of a slow market, not as fast as other countries," Ng said. "Biometric card readers are still not popular yet; the market needs more education." As only basic functions for access control and attendance are needed, proximity cards are sufficient, resulting in less demand for smart cards, which have more functions but cost more. "It is due more to cost-consciousness and convenience," Ng said. "It is a waste to buy smart cards for a few doors and people."

Korea is a different story, as biometrics are common. Keico products, which include fingerprint card readers, are used in diverse locations, including the Presidential Palace, Incheon International Airport and the National Museum of Korea, according to the company Web site. Its KF-2000 is a door lock combined with a fingerprint sensor, RFID card reader and PIN keypad.

Other Korean companies also use fingerprints as their biometric identifier of choice. Suprema fingerprint sensors include waterproof sensors for outdoor usage and high-resolution (500 dpi) scanners for clearer images of fingers.

Technology Limitations

While biometric card readers are touted as a better security solution than single-mode verification, there are limitations. Foshan Wewin's North American clients first noticed door cards were insufficient, but after adding fingerprint scanners to back up existing security, they had technical problems. "Not everyone leaves a usable fingerprint template, so there is a small portion of the population that cannot use fingerprints," Mao said. "For example, with access control for 100 people, two people cannot leave templates. These two people need another way in, so security staff gives them each a proximity card or PIN. This affects the access control system, leaving a back door open for unwanted people."

No biometric identifier provides a 100-percent guarantee, especially for individuals with fingerprints lacking definition in ridge patterns for templates. This results in rejection of authentic users when fingerprints are scanned or failure to enroll. Other users are able to enroll, but are incorrectly rejected at a later time (false rejection rate or FRR). Finally, scanners may not read enough points in biometric identifiers and may wrongly identify non-users as authentic (false acceptance rate or FAR).

To reduce FRR and FAR, Mao predicts the market will move toward facial or iris recognition. Facial and iris recognition use existing hardware--cameras--and can use low-resolution images, at just three megapixels, to verify identity. However, the software is still being developed, so current facial and iris recognition systems are more expensive than fingerprint scanners.

Other Concerns

Reliability is a key issue for all makers of biometric card readers, regardless of country or application.

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reliable it is," Moon said. The challenge for Suprema is to reduce the error rate when external factors interfere with reader scanning ability.

Mao agreed, adding that processing is a key factor as well. "Processing means how quickly the reader can deal with data," he said. "CPUs develop quickly, so speed is not a major problem, but for large databases with thousands of fingerprints, fast processing speeds are very important."

This is a concern for big companies with many employees, Mao said, but less so for smaller companies. For access control, large companies expect systems to allow many people to enter quickly, with a preferred scanning time of one to three seconds.

Along with processing speed and reliability, Yoneyama said user-friendliness is another concern. Device and data size are other variables.

Then, as biometric card readers are linked to computer databases, compatibility is key. "In today's competitive environment, manufacturers are developing all-in-one readers with large storage capacity and faster authentication speed," Lo said. "Expandable, programmable, compatible and IP-enabled devices will be the global standard of the next-generation security products."

Makers must understand customer needs to tailor products. "We have to know what customers are looking for and how much money they have; then we can put in the right things," Ng said.

Strategies of Asian Makers

Chinese companies face language barriers when it comes to expanding sales in Southeast Asia. "We are developing the Southeast Asia market," Mao said, "but access control needs technical know-how, which is often lacking locally."

Meanwhile, RCG will continue informing users on how to use biometric card readers properly and cater to local languages. "In RCG's experience, it takes time to educate Asian customers who are not so familiar with the proper way of placing fingerprints," Lo said. "We also have to tailor our interface to local languages." This is evident in the company's i-series readers, as the i4+ and i4 Flexi support English, Arabic and Chinese, including simplified and traditional characters.

Additional modes of authentication, including more than one biometric identifier, will become standard for biometric card readers. "The trend is to combine more than one biometric authentication--face and fingerprint--into one integrated system to enhance security," Lo said.

In any case, reverting to cards and PIN codes is not likely. Cards are too easily lost, stolen or borrowed, thereby lowering the security level, as the televised example of "24" so ably demonstrated. And PIN codes can be cracked, with criminals accessing restricted areas or assets such as buildings and bank accounts. Despite their limitations, biometric card readers remain a part of the Asian security sector. **AS**