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s facial-recognition technology protects privacy as well as property.

-conscious world, better access control—whether it's a company restricting entry into vernment monitoring entry into a country—has become a priority. One solution is biometrics, systems that use specific biological traits such as fingerprints or facial individuals. Face recognition is an especially appealing technique, because e of the face is simple and nonintrusive. But using face recognition for applications ntrol can require querying a database of thousands to millions of photos, which is nd raises privacy concerns.

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To get around these problems, OmniPerception, a spinoff from the University of Surrey in England, has combined its facial-recognition technology with a smart-card system. This could make face recognition more robust and better suited to applications such as passport authentication and building access control, which, if they use biometrics at all, rely mainly on fingerprint verification, says David McIntosh, the company's CEO. With OmniPerception's technology, an image of a person's face is verified against a "facial PIN" carried on the card, eliminating the need to search a central database and making the system less intimidating to privacy-conscious users.

Josef Kittler, head of the Centre for Vision, Speech, and Signal Processing at the University of Surrey, founded the company in 2001. OmniPerception is now collaborating with a Spanish firm to test its technology in controlling access to secure areas at a mint. It's also working with IBM on possible pilot trials for the British government's project to

OmniPerception

Headquarters: Surrey, England

University: Surrey

Investment raised: $940,000

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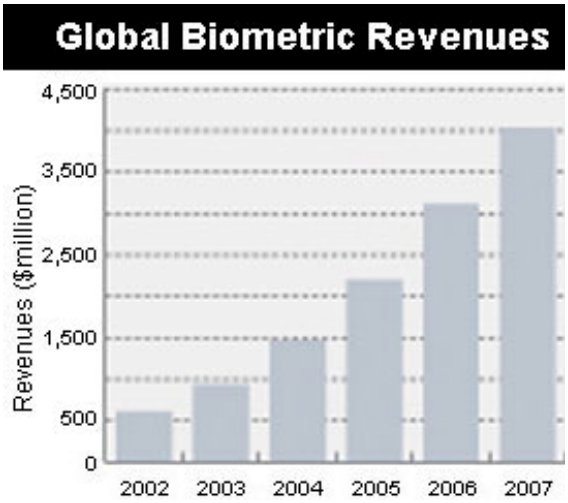
use biometrics with its passports. One of OmniPerception's biggest deals is with Japan's Sharp Electronics, which is incorporating the technology into its own smart cards, which are themselves used in Japan as national ID cards.

Lead investors: University of Surrey, U.K. government

Key Founders: Josef Kittler, Charles Galambos, Kieron Messer

While combining biometrics, such as fingerprinting, with smart cards isn't new, OmniPerception is among the first to move facial recognition on smart cards to market. And not having to transmit biometric images to a central database is better for security, says Anil Jain, a biometrics researcher at Michigan State University. "You don't want to transmit your face image," he says. "Somebody may intercept it" and use it for identity theft.



Source: International Biometric Group

OmniPerception's technology creates a PIN about 2,500 digits long from its analysis of the most distinctive features of a person's face. The number is embedded in a smart card—such as those, say, that grant access to a building—and used to verify that the card belongs to the person presenting it. A user would place his or her card in or near a reader and face a camera, which would take a photo and feed it to the card. The card would then compare the PIN it carried to information it derived from the new photo and either accept or reject the person as the rightful owner of the card. The technology could also be used to ensure passport or driver's license authenticity and to secure ATM or Internet banking transactions, says McIntosh.

The key differences between the various face recognition systems hitting the market reside mainly in the algorithms that create digital code from their analysis of faces. Kittler says his algorithms require less computation, allowing all the processing to happen on the card, instead of in an external computer, which results in nearly instantaneous identity verification. Fast processing would be particularly useful at, for example, a busy airport or ATM.

Biometrics companies typically validate their technologies by participating in competitions that test their accuracy at identification. OmniPerception won a European competition last year but has yet to go head-to-head with more prominent U.S. players in the field's premier competition, which is sponsored by the U.S. government. And it must also contend with more established biometric techniques—namely fingerprinting.

Even so, with plans to demonstrate its technology this year to U.S. passport authorities, British and U.S. driver's-license agencies, and security companies worldwide, OmniPerception believes it has a head start toward the future of face recognition.

Others in Facial Recognition	

A4Vision (Cupertino, CA)	3-D facial recognition for access control and surveillance
Acsys Biometrics (Burlington, Ontario)	Neural-network facial recognition for building and border access control
Identix (Minnetonka, MN)	Facial-feature analysis for access control and surveillance
Viisage (Littleton, MA)	"Eigenface" technology for access control and surveillance

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Erika Jonietz is a contributing editor to *Technology Review*.

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