

## PERSONAL IDENTIFICATION BY THE IRIS OF THE EYE

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Imagine being able to go to an ATM to withdraw money without the need for a card or a password. You simply look into an ATM camera, which detects the pattern of the specks on your iris and releases funds from your account. The convenience of this technology is not limited to your banking transactions. Proponents of the technology predict that iris recognition systems will soon become popular for use at work, home, and for retail and online purchases.

The core algorithms that underlie iris recognition were developed in the 1990's by Professor John Daugman, Ph.D. These were licensed to many developers of commercial iris cameras and systems including LG Electronics, Oki, Panasonic, Sagem, IrisGuard, and Sarnoff Labs. As of 2008, Daugman's algorithms are the basis of all commercially deployed iris recognition systems, although many alternative approaches have been studied and compared in the academic literature in hundreds of publications. Iris recognition remains a very active research topic in computing, engineering, statistics, and applied mathematics.

Iris recognition is an automated method of biometric identification that uses mathematical pattern-recognition techniques on video images of the irides of an individual's eyes, whose complex random patterns are unique and can be seen from some distance.

Iris recognition uses camera technology with subtle infrared illumination to acquire images of the detail-rich, intricate structures of the iris. Digital templates encoded from these patterns by mathematical and statistical algorithms allow unambiguous positive identification of an individual. Databases of enrolled templates are searched by matcher engines at speeds measured in the millions of templates per second per (single-core) CPU, and with infinitesimally small False Match rates.

This technology not only offers convenience, but also promises greater safety and security. Top airport security officials have recently recognized iris identifiers as an important tool for increasing airport security and for improving upon current immigration practices. The United States is now experimenting with technology which European banking institutions and airports have been using experimentally for over a decade with much success.

Iris recognition is becoming increasingly attractive to American consumers. Historically, the U.S. market has been reluctant to accept any form of biometric technology due to the fear of identity thefts and out of concern for other privacy matters. Recent studies have shown, however, that iris identification systems are actually the least susceptible, of any biometric technologies, to violations of privacy and wrongful identification by authorities.

Like other biometric devices, iris recognition systems act primarily as a screening tool to allow or deny access to a particular place, rather than as a law enforcement tool to track down suspected criminals, as are DNA and fingerprints. Iris identification systems, like many other less imposing biometric devices, are used to screen individuals who are trying to gain access to more highly secure places or accounts, not to scan the general public at random.

British Airways and Virgin Atlantic Airways at Heathrow Airport in London are hoping to use the technology more for convenience and efficiency purposes – to expedite the passport control process. As a trial-run, 2,000 American and Canadian passengers, who previously had their iris' scanned at the airport, are allowed to proceed to a special line in the passport control area of the airline terminal to have their identity quickly and accurately verified by an iris reading camera. The first time the camera scanned a passenger's iris, the image was converted into a code and stored in a database. When the passenger goes through customs, he/she stands approximately 14 inches from a camera, waits a few seconds as the system attempts to match the image of the passenger's iris with those stored on the server, and is either granted or denied passage through customs based on this assessment.

Another important use of iris detection systems is in immigration security. The U.S. government and the INS are exploring various iris identification programs for use by border control facilities. Another system that will very likely become standard procedure for tracking immigrants is the use of a smart card, or ID card, like the ones used for airport security, where the immigrant's iris code, along with other biometric information, is stored on the card. This is a technology that also has incredible prospects in the terrorist-tracking industry.

Many industry observers predict widespread use of cameras, scanners, and smart-card readers, especially at airports. Too much reliance on such devices could be hazardous to national security since, like all computerized systems, any biometric system is vulnerable to skilled hackers. In fact, according to the most recent National Institute of Justice Research Report on Entry-Control Technologies, retina or iris pattern scanners are considered the most accurate of all biometric devices.

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