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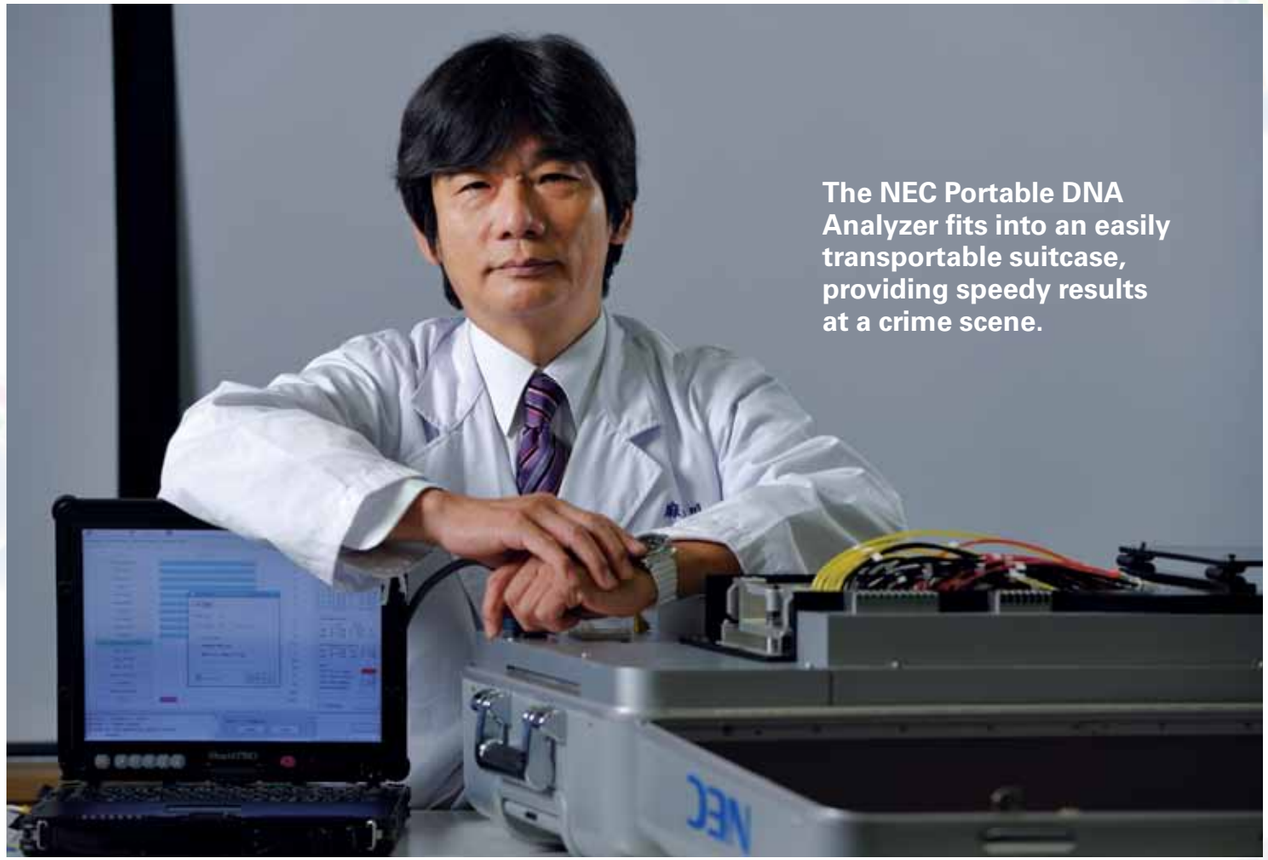
NEC Innovation Series

DNA Analysis On Location—and On Time

The introduction of NEC's Portable DNA Analyzer is establishing a new standard for crime scene investigation, and costs little more than a high-end police vehicle



The NEC Portable DNA Analyzer fits into an easily transportable suitcase, providing speedy results at a crime scene.

AKIO KON/BLOOMBERG

NEC is no stranger to innovations in biometric security. Facial recognition technology developed by NEC, known as NeoFace, is acknowledged as the best in its class by the U.S. National Institute of Standards and Technology (NIST). Providing positive identification, this noninvasive identification method provides excellent accuracy, and is used for multiple applications, including law enforcement and border control with real-time screening, and area access control.

NEC's ID verification technology using fingers provides a unique and innovative solution, featuring a newly developed Hybrid Scanner, employing both fingerprints and the newer near-infrared vein matching technology. This touchless unit provides rapid verification and matching of finger patterns with a high accuracy rate. The combination of the two biometric technologies addresses the fact that about 1 percent of the population cannot be verified through fingerprints by traditional scanners, as a result of epidermal wear, and a small number (0.3 percent) are reportedly unable to be enrolled using vein technology. The result, according to Etsuya Nakamura, Chief Manager in NEC's Government and Public Solutions Unit, is that the Hybrid Scanner's combination of fingerprint and vein matching allows easy enrollment into a security system. "Since May 2011, there have been more than 100,000 users of our Hybrid Scanner," says Nakamura. "We have yet to come across a user who has been unable to enroll, and we are very proud of this."

Nakamura looks forward to a day when such technology is deployed "where you can use your fingers instead of a credit card." He expects that NEC's experience in the implementation of large, scalable systems—with back-end software interfaces, databases and so forth—will support multi-model biometric developments and clear the path to that day.

It's all in the genes

As well as the more commonly deployed biometric methods of finger and facial recognition, NEC is hard at work in other areas of the field. In criminal investigations, DNA analysis provides one of the most reliable and error-free methods of identification. The process involves counting base pairs in the microsatellites contained in the "junk DNA." DNA composition varies massively in individuals, and—except in the case of monozygotic twins—a match of two samples of DNA almost always indicates that they are from the same person.

DNA analysis begins by taking a sample, adding reagents, washing it to amplify the DNA and then using electrophoresis to separate the different gene loci. This process typically requires large, sophisticated equipment and trained laboratory technicians, as well as waiting days for results. Under the direction of Dr. Minoru Asogawa, also a Professor at the University of Tokyo, NEC has fitted a complete DNA analysis laboratory into a suitcase, allowing the unit to be easily transported to a crime scene. Requiring only a 12-volt power source, the portable analyzer performs analysis in just over 25 minutes.

NEC looks forward to the day when its Hybrid Scanner allows finger-based verification to take the place of credit cards.

Easy to learn, inexpensive to use

Asogawa claims "less than three to four hours of training" are needed for investigators to learn the ropes of the user-friendly analyzer. For example, reagents are contained in cartridges similar to inkjet cartridges, allowing for simplified operations. Additional innovations, including use of a flexible molded plastic "chip" to hold and process the samples, as opposed to etched glass plates, and use of air pressure rather than syringe pumps to force liquids along channels, will also significantly reduce the cost per analysis.

The various methods of identification and verification described here can be combined to produce composite, interlocking, individual profiles. NEC and its key partners are working together to integrate these different technologies into a system that will realize NEC's goal of a safer, more secure society. — *Hugh Ashton*

Learn more about NEC's innovations at: **www.nec.com/dna**

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