Biometric Device Analyzes Travelers' Intents

by Jonathan Karp and Laura Meckler / The Wall Street Journal
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At airport security checkpoints in Knoxville, Tenn., this summer, scores of departing passengers were chosen to step behind a curtain, sit in a metallic oval booth and don headphones.

With one hand inserted into a sensor that monitors physical responses, the travelers used the other hand to answer questions on a touch screen about their plans. A machine measured biometric responses -- blood pressure, pulse and sweat levels -- that then were analyzed by software. The idea was to ferret out U.S. officials who were carrying out carefully constructed but make-believe terrorist missions.

The trial of the Israeli-developed system represents an effort by the U.S. Transportation Security Administration to determine whether technology can spot passengers who have "hostile intent." In effect, the screening system attempts to mechanize Israel's vaunted airport-security process by using algorithms, artificial-intelligence software and polygraph principles.

Neither the TSA nor Suspect Detection Systems Ltd., the Israeli company, will discuss the Knoxville trial, whose primary goal was to uncover the designated bad guys, not to identify threats among real travelers. They won't even say what questions were asked of travelers, though the system is generally designed to measure physical responses to hot-button questions like "Are you planning to immigrate illegally?" or "Are you smuggling drugs."

Suspect Detection Systems Ltd.

The Israeli-developed system combines questions and biometric measurements to determine if a passenger should undergo screening by security officials.

The test alone signals a push for new ways to combat terrorists using technology. Authorities are convinced that beyond hunting for weapons and dangerous liquids brought on board airliners, the battle for security lies in identifying dangerous passengers.

The method isn't intended to catch specific lies, says Shabtai Shoval, chief executive of Suspect Detection Systems, the start-up business behind the technology dubbed Cogito. "What we are looking for are patterns of behavior that indicate something all terrorists have: the fear of being caught," he says.

Security specialists say such technology can enhance, but not replace, existing detection machines and procedures. Some independent experts who are familiar with Mr. Shoval's product say that while his technology isn't yet mature, it has potential. "You can't replicate the Israeli system exactly, but if you can incorporate its philosophy, this technology can be one element of a better solution," says Doron Bergerbest-Eilon, chief executive of Asero Worldwide consulting firm and a former senior official in Israel's security service.

To date, the TSA has more confidence in people than machines to detect suspicious behavior. A small program now is using screening officers to watch travelers for suspicious behavior. "It may be the only thing I know of that favors the human solution instead of technology," says TSA chief Kip Hawley.

The people-based program -- called Screening Passengers by Observation Technique, or SPOT -- began undergoing tests at Boston's Logan Airport after 9/11 and has expanded to about a dozen airports. Trained teams watch travelers in security lines and elsewhere. They look for obvious things like someone wearing a heavy coat on a hot day, but also for subtle signs like vocal timbre, gestures and tiny facial movements that indicate someone is trying to disguise an emotion.

TSA officers observe passengers while consulting a list of more than 30 questionable behaviors, each of which has a numerical score. If someone scores high enough, an officer approaches the person and asks a few questions.

"All you know is there's an emotion being concealed. You have to find out why the emotion is occurring," says Paul Ekman, a San Francisco psychologist who pioneered work on facial expressions and is informally advising the TSA. "You can find out very quickly."

More than 80 percent of those approached are quickly dismissed, he says. The explanations for hiding emotions often are innocent: A traveler might be stressed out from work, worried about missing a flight or sad because a relative just died. If suspicions remain, the traveler is interviewed at greater length by a screener with more specialized training. SPOT teams have identified about 100 people who were trying to smuggle drugs, use fake IDs and commit other crimes, but not terrorist acts.

The TSA says that, because the program is based on human behavior, not attributes, it isn't vulnerable to racial profiling. Critics worry it still could run afoul of civil rights. "Our concern is that giving TSA screeners this kind of responsibility and discretion can result in their making decisions not based on solid criteria but on impermissible characteristics such as race," says Gregory T. Nojeim, associate director of the American Civil Liberties Union's Washington legislative office.

Mr. Shoval, the Israeli entrepreneur, believes technology-based screening is the key to rolling out behavior-recognition techniques in the U.S. With experience in counter-terrorism service and the high-technology industry, Mr. Shoval developed his Cogito device with leading former Israeli intelligence officials, polygraph experts and computer-science academics.

Here is the Cogito concept: A passenger enters the booth, swipes his passport and responds in his choice of language to 15 to 20 questions generated by factors such as the location, and personal attributes like nationality, gender and age. The process takes as much as five minutes, after which the passenger is either cleared or interviewed further by a security officer.

At the heart of the system is proprietary software that draws on Israel's extensive field experience with suicide bombers and security-related interrogations. The system aims to test the responses

to words, in many languages, that trigger psycho-physiological responses among people with terrorist intent.

The technology isn't geared toward detecting general nervousness: Mr. Shoval says terrorists often are trained to be cool and to conceal stress. Unlike a standard lie detector, the technology analyzes a person's answers not only in relation to his other responses but also those of a broader peer group determined by a range of security considerations. "We can recognize patterns for people with hostile agendas based on research with Palestinians, Israelis, Americans and other nationalities in Israel," Mr. Shoval says. "We haven't tried it with Chinese or Iraqis yet." In theory, the Cogito machine could be customized for specific cultures, and questions could be tailored to intelligence about a specific threat.

The biggest challenge in commercializing Cogito is reducing false results that either implicate innocent travelers or let bad guys slip through. Mr. Shoval's company has conducted about 10 trials in Israel, including tests in which control groups were given terrorist missions and tried to beat the system. In the latest Israeli trial, the system caught 85 percent of the role-acting terrorists, meaning that 15 percent got through, and incorrectly identified 8 percent of innocent travelers as potential threats, according to corporate marketing materials.

The company's goal is to prove it can catch at least 90 percent of potential saboteurs -- a 10 percent false-negative rate -- while inconveniencing just 4 percent of innocent travelers.

Mr. Shoval won a contract for the Knoxville trial in a competitive process. Next year, Israeli authorities plan to test Cogito at the country's main international airport and at checkpoints between Israel and the West Bank, where the goal will be to catch genuine security threats while testing the logistics of using the system more broadly. The latest prototype costs about $200,000 a machine.

Even though his expertise is in human observation, U.S. behavior-recognition expert Dr. Ekman says projects like Cogito deserve a shot. He expects technology to advance even further, to devices like lasers that measure people's vital signs from a distance. Within a year, he predicts, such technology will be able to tell whether someone's "blood pressure or heart rate is significantly higher than the last 10 people" who entered an airport.