New lab working on security shoe sole to ID people

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High-tech security? Forget those irksome digital eye scans. Meet the biometric shoe.

A new lab is working to perfect special shoe insoles that can help monitor access to high-security areas, like nuclear power plants or special military bases.

The concept is based on research that shows each person has unique feet, and ways of walking. Sensors in the bio-soles check the pressure of feet, monitor gait, and use a microcomputer to compare the patterns to a master file for that person. If the patterns match the bio-soles go to sleep. If they don't, a wireless alarm message can go out.

"It's part of a shoe that you don't have to think about," said Marios Savvides, head of Carnegie Mellon University's new Pedo-Biometrics Lab, in Pittsburgh.

The lab, which has $1.5 million in startup funding, is a partnership with Autonomous ID, a Canadian company that is relocating to several U.S. cities. Todd Gray, the company president, said he saw the potential when his daughter was in a maternity ward decorated with representations of different baby feet all along a wall.

Autonomous ID has been working on prototypes since 2009, with the goal of making a relatively low cost ID system. Gray said they've already run tests on sample bio-soles, which are no thicker than a common foot

pad sold in pharmacies, and achieved an accuracy rate of more than 99 percent. He said Carnegie Mellon will broaden the tests to include "a full spectrum of society: big, tall, thin, heavy, athletic, multicultural, on a diet, twins and so on."

Gray wouldn't speculate on what the system will cost or when it might reach the marketplace, but each worker at a site would have his or her own pair of bio-soles.

"Within the third step, it knows it's you, and it goes back to sleep," he said. "If I put on yours, it would know almost instantly that I'm not you."

The idea may seem far-fetched, but scientists have known for centuries that individuals have unique ways of walking, and in recent years the U.S. Department of Defense has been funding millions of dollars of gait research, as has the Chinese government.

The Institute of Intelligent Machines is doing extensive research into gait biometrics, including reports of systems where a floor monitors footsteps without people's knowledge.

One expert who is not connected with the CMU lab said the biometric sole seems promising.

"I must admit I find this news very exciting," said John DiMaggio, an Oregon podiatrist who has worked with law enforcement to use foot information in forensic investigations. While it is too early to fully judge the CMU research plan, DiMaggio said using feet as a biometric identification source makes sense.

While researchers have noted that gait can vary with injuries, fatigue and other factors, Savvides said the bio-soles can detect signs of those things, too.

The bio-soles might also have medical uses. Several papers presented this month at the Alzheimer's Association International Conference in Vancouver suggest changes in how elderly people walk - such as a slowing pace or variable stride - can provide early warnings of dementia.

Gray said the technology is less invasive of privacy than eye scans and other biometrics, in part because the individual data stays inside the bio-soles.

But one group that has followed biometrics and privacy issues said there could still be problems.

"Any biometric capture device is a potential tracking device, just like every iPhone is a potential tracking device. That's just the way these things are," said Lee Tien, an attorney with the Electronic Frontier Foundation, a San Francisco nonprofit that monitors free speech and privacy issues.

Tien said that the bio-soles themselves "might make a person feel a little bit better" than other security systems and that Gray's claim that the system can ID a person within three steps is "pretty impressive."

But he added that if the project is successful, bio-soles could also be implanted in shoes secretly.

"I wouldn't expect Nike to build these in. But it's potentially covert," he said, meaning it could be used to help spy on people.