Biometric Sensors No Dirtier Than Doorknobs, Study Finds

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While biometric equipment is gaining popularity in a variety of applications, such as ensuring secure access to buildings, industries are finding that many users believe the devices are unsanitary and a potential source of germs that could cause illness. But a new study has found that while the platen glass surfaces of devices that scan fingerprints or hand geometry may look more unsanitary due to visible dirt and prints, they in fact harbor about the same amount of bacteria as a typical doorknob.

Christine R. Blomeke, a researcher and doctoral student in Purdue's Biometric Standards, Performance and Assurance Laboratory, performed the study along with lab director Stephen J. Elliott, an associate professor of industrial technology, and Thomas M. Walter, a continuing lecturer in the Department of Biological Sciences.

Blomeke said the study was conducted because of participant comments made during fingerprint and hand-geometry studies at the lab. She said the subjects, who were required to touch their hands or fingers to the sensors, questioned the cleanliness of the surfaces.

"When you look at these devices, finger moisture, dirt and oils cause the surface to appear to be dirty," Blomeke said. "In a study we did on this last year, more than a quarter of the participants indicated that they thought the devices were somewhat unsanitary.

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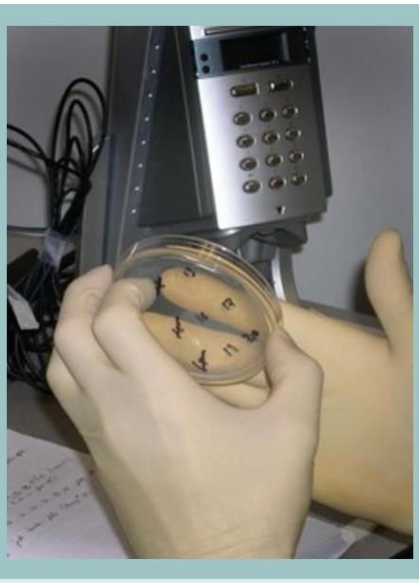
on all three devices.

"Since the use of biometric devices is rapidly expanding in public spaces, such as airports, stores and banks around the world, we felt it was important to examine whether touching these surfaces would subject users to more germs than they would be exposed to by touching objects such as pens, doorknobs and elevator buttons."

For the study, Blomeke's team examined the bacterial recovery and transfer from three types of biometric sensors: fingerprint, hand-geometry and vein-recognition devices. Each sensor was tested separately with two kinds of bacteria: Staphylococcus aureus, a common cause of blood and skin infections, and Escherichia

coli, commonly known as E. coli, which can cause diarrhea, urinary tract infections and meningitis.

To test how well the bacteria could survive on a biometric device, the surfaces were first sterilized to kill existing bacteria, then coated with a bacteria culture. Testers used sterilized gloves to touch the biometric device surface after five, 20, 40 and 60 minutes to measure how many of the bacteria were still alive and could be transferred. Testers first touched the device surface, then a sterile plate or Petri dish containing growth media to allow any bacteria present to be more easily examined. The solution on the plate was allowed to grow for 24 hours at 37 degrees Celsius (approximately 99 degrees Fahrenheit).



Researchers at Purdue's Biometric Standards, Performance and Assurance Laboratory test bacteria from a vein-recognition reader, a biometric device that can authenticate a person's identity. Researchers have found that although the surfaces of some biometric devices may look more unsanitary due to visible dirt and prints, they harbor about the same amount of bacteria as a typical doorknob.

Credit: Purdue University photo

The next step was to test for bacterial transfer from the biometric device. To do this, the devices were sterilized, then testers wearing sterilized gloves touched the device surface and a sterile plate to measure how many bacteria were present before it was contaminated. Next, the device surfaces were contaminated with one species of bacteria at a time, and testers wearing sterilized gloves touched the device surface, then touched a sterile plate containing growth media 50 times. Just as in the other test, the solution was allowed to grow overnight to quantify the number of live cells recovered from touching the contaminated device.

Researchers found that E. coli survived on the devices slightly longer than staph bacteria, but within 20 minutes, nearly all of the bacteria had died on all three devices.

Finally, a metal doorknob was tested with the same methods. Researchers found that the transfer of bacteria from the doorknob to another surface was nearly identical to that of the biometric devices. Blomeke said that on the doorknob, as well as on the three biometric devices, the majority of bacteria was transferred within the first 10 touches.

"What we can take away from this is that no matter what kind of a surface it is, if it is contaminated, the more it is touched, the cleaner the surface becomes," she said. "Of course, the bacteria are moved to the hand. But it's important to remember that there are naturally occurring bacteria on everyone's hands, and hundreds or even thousands of cells would have to enter the body - through a cut in the skin or from mucous tissues - to make a person sick."

Blomeke said that since naturally occurring organisms live on our skin at all times, as well as on frequently touched common surfaces, the fact that some bacteria live on biometric devices shouldn't deter people from using them.

"Biometric devices are the way of the future, and their use is growing rapidly," she said. "In years to come, nearly everyone may be required to use the devices to enter buildings, pay for services or even clock in and out at work. Since there is the perception that these devices may cause illness, our study is important in that it at least establishes that a person is not any more likely to become ill from a biometric device that from a plain, old-fashioned doorknob."

Blomeke said hygienic concerns - whether on high-tech or low-tech surfaces or devices - can easily be alleviated. "It's always a good idea to get in the practice of washing your hands with soap and water or keeping antibacterial solution handy," she said.

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The Biometric Standards, Performance and Assurance Laboratory is housed in the Department of Industrial Technology in Purdue's College of Technology. In the lab, researchers and students test and evaluate equipment for iris, vein, hand, fingerprint, signature, keystroke and face recognition. In addition, courses in automatic identification, data capture, and biometric technology and applications are taught in the lab.

The results of the study were presented recently at the Institute of Electrical and Electronics Engineers International Carnahan Conference on Security Technology in Ottawa, Ontario, Canada.

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