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## Ears Could Make Better Unique IDs Than Fingerprints

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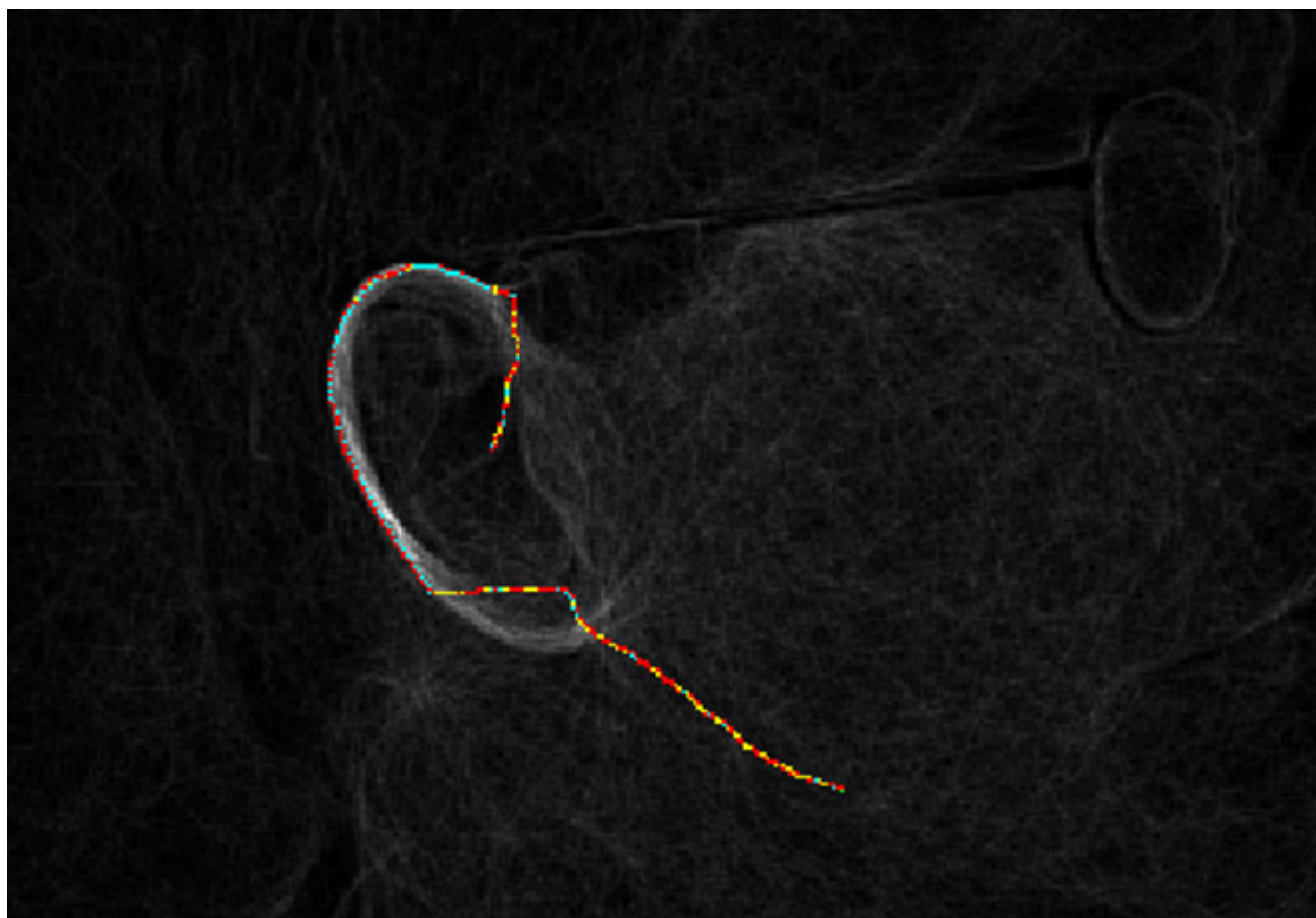
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On a planet hosting 6.7 billion human beings, having proof you're unique is of tantamount importance. The ear, it turns out, may be the best identification yet.

Through a new shape-finding algorithm called "image ray transform," which boasts 99.6 percent accuracy, according to a study presented at the IEEE Fourth International Conference on Biometrics Sept. 29, the outer ear may prove to be one of the most accurate and least intrusive ways to identify people.

Fingerprint databases of U.S. government agencies alone store the records of more than 100 million people, but prints can rub off or callous over during hard or repetitive labor. With the advent of computer vision, researchers and identification industries are seeking easier and more robust biometrics to get their hands on.

“When you’re born your ear is fully formed. The lobe descends a little, but overall it stays the same. It’s a great way to identify people,” said Mark Nixon, a computer scientist at the University of Southampton, and leader of [the research](#).

“There’s real power in using the appearance of an ear for computer recognition, compared to facial recognition. It’s roughly equivalent if not better,” said computer scientist Kevin Bowyer of Notre Dame, who is pursuing his own ear-recognition technology and not involved with Nixon’s work. “If you’ve got a profile image for someone, this is a great way to use it.”



Recent technologies use [computer vision](#) to convert human features, such as faces and irises, even the gait of a person’s walk, into reliable alternatives to fingerprints. Nixon and his team have pursued using ears as one biometric for years, and through what he called a “blue-sky research effort,” his colleagues created the highly capable image-ray-transform algorithm. The technology can [identify an ear](#) time after time with 99.6 percent accuracy. It works by unleashing a ray-producing algorithm on an image to seek out curved features. When a ray finds one, the software draws over the part and repeats the analysis. In a few hundred or thousand cycles, it cleanly paints the ear more than any other face structure.

“The rays fly around the image and get caught in tubular things. The helix, or outer edge, of an ear is a wonderful tube that rays keep hitting,” said Alastair Cummings, the Southampton University computer scientist who developed the algorithm. “There are dozens of ways of doing ear biometrics, but this is a very good one.”

From there, another program turns the curves into a unique set of numbers, something that could be used as an ear-based ID.

Nixon and Cummings acknowledged some limitations of the system, including hair covering the ears, less-than-ideal lighting conditions, and different IDs generated from different angles. And using the ear as a biometric isn’t without critics.

“I have seen no scientific proof that the ear doesn’t change significantly over time. People tend to believe notions like these, and they are repeated over time,” said Anil Jain, a computer scientist at Michigan State University who was not involved in the study. “[Fingerprinting has a history of 100 years](#) showing that it works, unless you destroy your fingerprints or work in an industry that gives you calluses.”

Using the ear is not about replacing existing biometrics such as fingerprints, Bowyer said. Rather, it’s about supplementing them, especially when it comes to catching crooks.

“It’s easy to say, ‘Hey there’s fingerprints, faces and irises, why do we need more?’ For some applications that’s a valid question,” he said. “But when you’re doing surveillance, where a person isn’t being cooperative for obvious reasons, you want anything you can get. If you have images of

ears, it's dumb to throw that away.”

What's more, he says, there really aren't studies proving the agelessness of any human biometric — including fingerprints.

“Who over the age of 40 could think these things don't age?” Bowyer joked. “Some have said ‘irises are for life,’ but in some of our lab's work we've noticed degraded biometric performance even in those.”

To address limitations of the approach, the team is looking to demonstrate that ears do hold up over time. In addition, the researchers hope to pair their new biometric with other computer-vision technologies, such as face recognition, to bolster its reliability. And if the algorithm can be made to work quickly in three dimensions, a fuzzy clip of a criminal walking by a security camera could be turned into grade-A courtroom evidence.

“We've shown we can use ears, but can we process data that comes from a sort of normal scenario? That's the real challenge,” Nixon said.

*Images: Alastair Cummings/Southampton University (demo) 1) A man's profile processed by the image-ray-transform algorithm, with a multicolored ray detecting part of his ear. 2) Original photograph fed into the algorithm.*

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**Oriares**

Thanks for the info. Please visit my site. Maybe you can find useful information. Click: [health](#)



**mfritzo**

Law enforcement has used Ear prints for years. Many times that was the only print left by a safe cracker. These prints did hold up in court also.



**oryoki**

What about cauliflower ears developed from years of pounding. That's not a change? And for the love lorn, do they often think of Van Gogh?



**eddlemsg**

You touch my junk I'm calling a cop...



**Caseyphill**

This article sounds ridiculous to me. I work as a fingerprint technician inside a high profile facility, and I have taken classes on fingerprints. Throughout my professional career as well as the information I've studied, fingerprints are and always will be the best way to identify a person. This article argues that they can't be reliable because of scaring or callousing, but what they don't understand is the scaring, callousing, etc makes the print more identifiable. We dont' just look for a basic pattern. There's certain charateristics in each and every print and those characteristics will show up even if there's been damage to the print. I can understand using ears as a last resort, but I don't see it making any kind of dent with the kinds of resources and technology we have at our fingertips. No pun

intended.



**mikemosh511**

As a comparison, how accurate are fingerprint/optical tests?



**Barbara3**

About four decades ago, the Dick Tracy comic strip recommended looking at ears to identify the "bad guys." The strip claimed that each ear was unique. (Each Sunday the strip presented a little crime-stopping tip for kids.) Interesting to see this approach taken using modern science.



**PhilipM**

I doubt it will work well... on paper all ideas can look great.



**Techimo**

How do you get the ink out of your ear when they are done "ear printing" you?



**specialEd**

Wait until they earprint Mr. Spock:  
"Must be time to recalibrate."



**Yacko**

What about noses? Then we could throw a healthy dose of racial profiling in with the identification process.



**ov3rki11**

Chalk another one up on the list of "Things we should NOT be teaching computers to do"



**anne**

How accurate are fingerprints, for comparison? Because 99.6% accuracy over 100 million people would mean potentially misidentifying 400,000 people. (1) That's not good and (2) if fingerprints are \*worse\* that's scary.



**danjezk**

i was wondering why my earlobes keep glue-ing themselves to my jaws, for a quick id - makes a lot of sense.

Why don't they just ask us?



**franklin101**

it didn't seem to follow the earline right...



**Qflux**

My favorite line of the article: "I have seen no scientific proof that the ear doesn't change significantly over time. People tend to believe notions like these, and they are repeated over time,"



**thatguynamedgreg**

To avoid getting prints on my guns I would just pull the trigger with my lobes. Now I guess I have to find another way.



**Bruckley**

How about genitalia?



**Sebben**

This is very old news.

Ears were used for identification before fingerprints. The whole obsession with fingerprints came to be due to the fact that criminals don't typically leave earprints at the crime scene. However, early identification of criminals were done using ears.



**robogobo**

"least intrusive" meaning "easiest to accomplish without a person's knowledge." time to start wearing your hair long and over your ears in the airport.



**MajorVariola**

Ok, but ears can be replaced with prosthetics a lot easier than distal phalanges.



**yerfdog**

My ears change all the time, thanks to grappling, sometimes significantly. I don't want to be locked out because I rolled hard one night. Granted, this only effects a small number of people, but it happens.

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