

Contactless 3-D fingerprint identification

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A new system improves the speed and accuracy of fingerprint scanning and matching by using 3-D technology. No pressing required.

A new system for contactless, three-dimensional (3-D) fingerprint identification has an advanced design that is not only an improvement over 2-D scanners, it is also more compact and less costly than other 3-D

systems.

"We are pushing contactless biometric [technology](#) into a new realm of speed and accuracy at an affordable cost," says Ajay Kumar of The Hong Kong Polytechnic University (PolyU). "This system could be used for many applications, including identification, crime investigation, immigration control, and security of access."

Automated, contact-based 2-D fingerprinting identification is commonly used by [law enforcement agencies](#) to identify people. However, rolling or pressing fingers against a hard surface can result in partial or degraded images due to skin deformations, slippages or smearing. By avoiding direct contact between the imaging sensor and skin, 3-D sensors can significantly improve image quality and accuracy. It is also far more hygienic.

Minutiae points are details from [fingerprints](#) such as ridge endings and bifurcations, and are universally considered the most reliable features that ensure each fingerprint is unique. About 40 to 45 minutiae points per fingerprint can be recovered on average. Kumar and his team developed an innovative system that identifies minutiae height and orientation in 3-D. These measurements are added to the basic details of location and orientation in 2-D, doubling the amount of information usually captured by commercial fingerprint systems.

Unlike other contactless 3-D fingerprint systems that require multiple cameras and bulky lighting setups, this system uses a single, low-cost digital camera coupled with a few LED light sources controlled by a computer. This is coupled with the team's proprietary algorithms that identify the 3-D minutiae features and match prints with an accuracy of about 97%. With less equipment needed, this system is more compact and much less expensive than existing technologies. It is also very efficient, with a fast processing time of approximately two seconds. The

team has received several US patents for its new technologies and aims to commercialize the product.

More information: Ajay Kumar et al. Towards Contactless, Low-Cost and Accurate 3D Fingerprint Identification, *2013 IEEE Conference on Computer Vision and Pattern Recognition* (2013). [DOI: 10.1109/CVPR.2013.441](https://doi.org/10.1109/CVPR.2013.441)

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