# 低成本非接觸式精確3D指紋識別系統
Low-Cost, Contactless and Accurate 3D Fingerprint Identification System

更安全、更衛生的低成本非接觸式3D指紋識別系統
Development of low-cost and touchless 3D fingerprint identification for higher security and hygiene

傳統的指紋識別技術，手指需在物體表面按壓或滑動以獲取圖像，如手指按壓或滑動的位置不佳、皮膚變形或出現污點等，便只能獲取部分或較低質素圖像。我們成功開發一套嶄新的非接觸式精確3D指紋識別系統，透過先進技術，以獲取含有精確的3D指紋圖像作個人身份識別。這套低成本、快捷、衛生、高精準度的指紋識別系統，能廣泛應用於醫療、司法鑑定等領域。
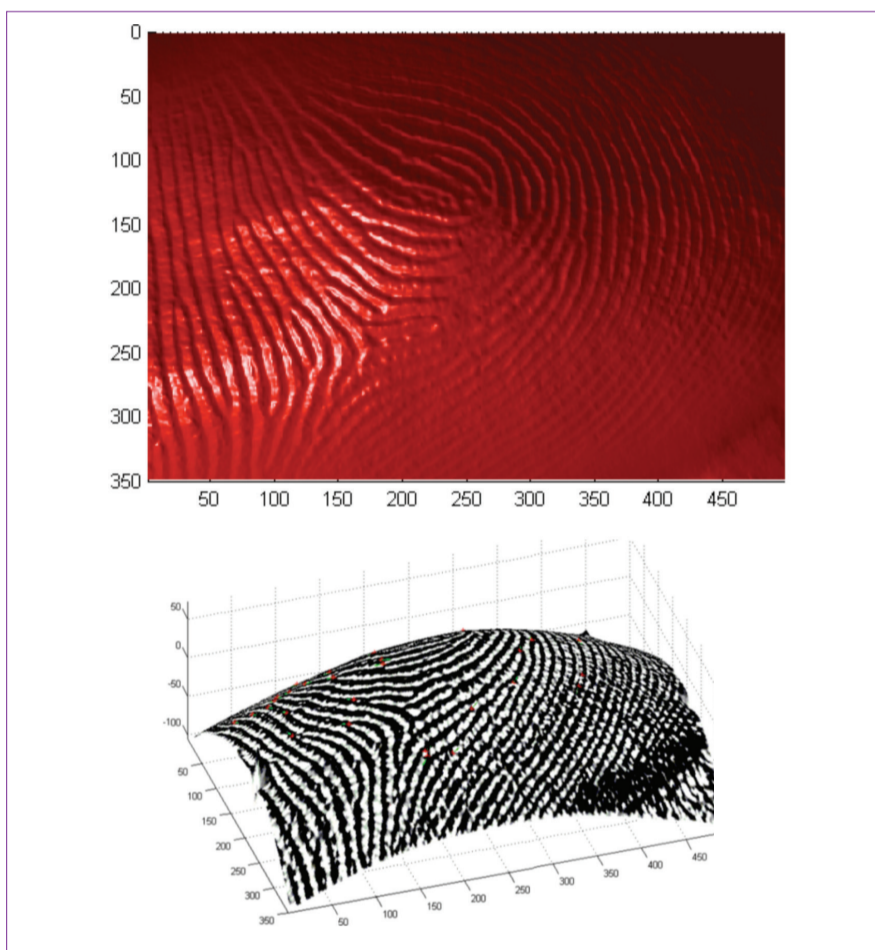
(a) 使用單攝像鏡頭重構3D 指紋圖像；(b) 細節特徵擴展可於 3D 空間中恢復，以獲取更準確的指紋識別資料
(a) Reconstructed 3D fingerprint image using single camera; (b) extended minutiae feature information recovered in 3D space for more reliable fingerprint identification

Traditional fingerprint identification by pressing or rolling of finger against the hard surface often results in partial or degraded images due to improper finger placement, skin deformation, slippages, or smearing. Therefore touchless 3D finger imaging can provide more accurate personal identification as rich information is available from 3D fingerprint images. This project designs and develops a low-cost, faster, more accurate and touchless 3D fingerprint identification system for high security applications. The advanced biometric identification using proposed system will enable the low-cost, faster, hygienic and more accurate identification of humans for wide range of civilian/forensic applications.
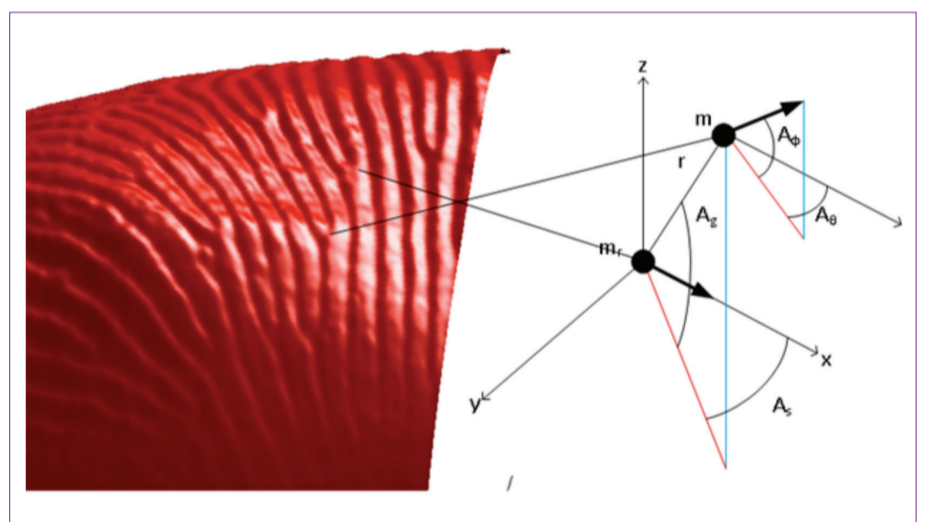
專利編號及國家: 8953854 (美國)，9483681 (美國)

特色與優點

- 運用單固定式攝像鏡頭，支援非接觸式3D指紋恢復及配對
- 在3D空間中，支援細節特徵擴展及配對
- 更精確安全的2D及3D同步指紋配對
- 高效能及低成本的3D指紋識別系統
- 使用的專屬3D拍紋演算法已在美國獲得專利

應　用

- 高度安全自動化邊境口岸過境檢查
- 非接觸式設計，改善指紋識別系統使用時的衛生問題
- 自動檢測經外科手術改變的指紋

從3D 指紋範本中，以參考細節特徵(m_r)計算3D細節特徵的相對定位
Computing relative localization of a 3D minutiae with a reference minutiae (m_r) in a given 3D fingerprint template

Patent No & Country: 8953854 (US) and 9483681 (US)

Special Features and Advantages

- Contactless 3D fingerprint recovery and matching using single fixed camera
- Extended minutiae representation and matching in 3D space
- Simultaneous 2D and 3D Fingerprint matching for higher accuracy/security
- Lower cost and superior performance than state-of-the-art 3D fingerprint systems
- Proprietary 3D fingerprint algorithms protected by awarded US Patent

Applications

- High security automated immigration crossing
- Touchless fingerprint identification for improved hygiene
- Automated detection of surgically altered fingerprints

Principal Investigator

Dr Ajay Kumar
Department of Computing
Contact Details
Institute for Entrepreneurship
Tel: (852) 3400 2929   Fax: (852) 2333 2410   Email: pdadmin@polyu.edu.hk

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