



## Distinguished Lecture Series

# New Advances in Forensic Identification



Monday, March 23<sup>th</sup>, 2015 10:00am  
Auditorium 106 at New IIS Building

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### Abstract

Biometrics or biometric authentication is the technology devoted to identification of individuals using biological traits or characteristics. Biometric characteristics can be either physiological or behavioral. Physiological characteristics include fingerprints, DNA, blood types, iris patterns, retina patterns, hand geometry, palm prints, vein geometry, face recognition, ear shape, and body odor/scent, among others. Behavioral characteristics include signature dynamics, hair, footprint, typing rhythm, gait, and voice.

Fingernails as forensic evidence have not been adopted as a biometric trait in any current biometric system. A system of fingernail biometrics for human identification is proposed. Fingernails have excellent properties suitable as factors for biometrics. They are usually classified based on ridge patterns. Vertical nail ridges are seen rather commonly and usually are not signs of serious illness.

These ridges generally extend from the base of fingernail to the tip in an orderly, regular fashion and tend to become more prominent with age. Horizontal nail ridges run from one side of the nail lengthwise across to the other side. Horizontal nail ridges may indicate the presence of an underlying illness or medical condition, although this is not always the case. One special type of horizontal nail ridge that may indicate underlying illness is called Beau's lines.

Fingernails are found in crime scenes and on victims, suspects, witnesses and evidence. Unlike tissue or blood, a fingernail do not easily decompose, but are easy to store and transport without contamination.

Collection of fingernails is painless, harmless and convenient. Fingernails can also be found on badly decomposed bodies and body parts, especially in catastrophic incidents. Not only mitochondrial DNA, but also nuclear DNA has been successful analyzed from fingernail fragments. Fingernail patterns and physical features were extracted by image processing. Features of size, length, and width of fingernails; DNA profiles; vertical nail ridges; horizontal nail ridges; special features, inclusions and color of fingernails were measured and combined as a template representative of the fingernail pattern, which can be used for matching to the template database. The use of fingernails may present a human identification system that can consider multiple modalities integrated into a biometrics system.

For more information: <http://www.iis.sinica.edu.tw/>

