STANDARD CALIBRATION TARGET FOR CONTACTLESS FINGERPRINT SCANNERS

CROSS-REFERENCE TO PROVISIONAL APPLICATION

[0001] This patent application claims priority to U.S. Provisional Patent Application Ser. No. 61/537,163, entitled "STANDARD CALIBRATION TARGET FOR CONTACTLESS FINGERPRINT SCANNERS" which was filed on Sep. 21, 2011, the disclosure of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] Embodiments relate to data-processing systems and methods. Embodiments further relate to both contactless or contact-based biometric sensing and/or scanning of fingerprints. Embodiments also relate to enhanced three-dimensional fingerprint sensing and/or scanning and identification.

BACKGROUND OF THE INVENTION

[0003] Fingerprint scanning and matching is a reliable method for personal identification (one-to-many) or verification (one-to-one). Fingerprints can be scanned, analyzed, and stored in a database for future reference and identification purposes.

[0004] Most fingerprint scanners require that a person physically contact the scanning device. Typically, a person places a finger or multiple fingers or entire hand on a platen of a fingerprint scanner while the finger/fingers/hand is scanned and fingerprint data is collected. Physical contact with a fingerprint scanning device is highly problematic. These contact-based scanning devices predominantly have a single monolithic planar platen. Because of the anthropometrics of the human hand and the relative placement of the fingerprints on the fingers, capturing the fingerprints of all five fingers at the same time is not possible with most such devices. Physical contact with a fingerprint scanning device enables contaminant and pathogen transfer between multiple people using the same device. Additionally, residue left on the platen after physical contact can degrade fingerprint scanning performance and subsequently, fingerprint analysis and fingerprint matching capability. As a result, the operation of contact-based scanning devices periodically needs to be stopped for platen cleaning to ensure optimal device performance. To mitigate some of the shortfalls of contact-based scanners, a new generation of contactless scanners has emerged. Typically, a person positions and holds one or both hands, or one or more fingers in the acquisition aperture of a contactless scanner for the scanner to capture those fingerprints. The typical contactless scanner requires either no physical contact between the person and the fingerprint scanner, or minimal contact via some sort of arm or wrist pedestal to aid in the positioning and steadying of the hand or finger.

[0005] Current contactless fingerprint scanners are also problematic. Most contactless fingerprint scanners generate a two-dimensional image by first capturing one or more fingers or hands in three dimensions and then flattening the three dimensional image using some sort of data convolution process. This convolution process can make certain assumptions for the geometry of the three dimensional scan that may introduce error in the flattening process. Additionally, due to the difficulty in locking on to and acquiring an image in three dimensional volumetric spaces, a contactless scanner may introduce distortion to the various parts of a fingerprint when capturing its image. The two dimensional capture processes can also be prone to distortion and fidelity problems. In order to ensure fidelity of the captured image to the original fingerprint sample, a series of calibration targets and tests have been developed for use with two-dimensional scanners. These calibration targets and tests are designed to allow for the detection, and where possible, the calibration and correction of these anomalies. No such calibration targets exist for three dimensional contactless scanners.

[0006] The Department of Homeland Security ("DHS") and the United States Visitor and Immigrant Status Indicator Technology ("US-VISIT") programs are undergoing the migration from a two-print capture process (i.e., left and right index fingers). Many other stakeholders involved in the capture of fingerprints are also moving from capturing individual fingers to build a set of ten fingers. These stakeholders are switching from capturing individual fingers to a slap fingerprint capture process (i.e., capturing all the fingers on each hand at once). The slap capture process decreases complexity in the fingerprint capture task by reducing the number of discrete capture steps from ten or more to just two or three (i.e., left hand and right hand, or left four-fingers, right four fingers and both thumbs), can reduce errors by reducing the chance of errors in the sequence of capturing individual prints, and can reduce fingerprint acquisition times by capturing more than one finger at a time. Furthermore, by eliminating the need for physical contact through utilizing a contactless scanner, the process can be further optimized by allowing capture of all fingers from both hands which would not otherwise be possible due to anthropometric challenges of flat-platen devices, as well as mitigate concerns of pathogen transfer.

[0007] There are calibration targets and test tools developed for two dimensional scanners but no such targets exist to measure the operational fidelity of these new three dimensional scanners to the original fingerprint.

[0008] Therefore, a need exists for a contactless three-dimensional fingerprint scanner that provides for improved, validated, and repeatable image capture. This image capture can include acquiring either the topographical measurements and/or contrast of three-dimensional fingerprint features and/or optical contrast of the three-dimensional fingerprint surface in three-dimensional space, or capturing a two-dimensional representation of a three dimensional finger by measuring either the three-dimensional fingerprint features and/or optical contrast in part and not limited to, for use in identification and identification matching, three dimensional fingerprint scanner calibration testing and three dimensional fingerprint scanner calibration correction.

BRIEF SUMMARY

[0009] The following summary is provided to facilitate an understanding of some of the innovative features unique to the embodiments disclosed and is not intended to be a full description. A full appreciation of the various aspects of the embodiments can be gained by taking the entire specification, claims, drawings, and abstract as a whole.

[0010] It is, therefore, one aspect of the disclosed embodiments to provide for improved data-processing systems and methods.

[0011] It is another aspect of the disclosed embodiments to provide for biometric scanning of fingerprints.