

[0012] It is a further aspect of the disclosed embodiments to provide for three-dimensional fingerprint scanning and identification. The above and other aspects can be achieved as is now described. A contactless, three-dimensional fingerprint scanner target apparatus, method, and system are described. The contactless fingerprint scanner provides improved fidelity of both topographical features of three-dimensional fingerprint features and optical contrast of the three-dimensional fingerprint surface by use of calibration targets illustrated in the disclosed embodiments. Calibration targets are intended to be scanned by fingerprint scanning devices. Calibration target images generated from the data captured by scanning the target can then be analyzed against known calibration target feature specifications to evaluate or validate device capture fidelity repeatability as well as interoperability. The calibration targets can also enable scanner vendors and designers to validate their devices, as well as to perform type certification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The accompanying figures, in which like reference numerals refer to identical or functionally-similar elements throughout the separate views and which are incorporated in and form a part of the specification, further illustrate the embodiments and, together with the detailed description, serve to explain the embodiments disclosed herein.

[0014] FIG. 1 illustrates an exemplary block diagram of an exemplary data-processing apparatus, which can be utilized for processing data, in accordance with the disclosed embodiments;

[0015] FIG. 2 illustrates an exemplary schematic view of an exemplary software system including an operating system, application software, and a user interface, in accordance with the disclosed embodiments;

[0016] FIG. 3 illustrates an exemplary contactless fingerprint scanner operating system, in accordance with the disclosed embodiments;

[0017] FIG. 4 illustrates an exemplary pictorial illustration of exemplary test patterns, in accordance with the disclosed embodiments;

[0018] FIG. 5 illustrates an exemplary pictorial illustration of a blank (i.e., absent test patterns) calibration target cylinder with threading, in accordance with the disclosed embodiments; and

[0019] FIG. 6 illustrates an exemplary pictorial illustration of a simulated ridge test pattern, in accordance with the disclosed embodiments.

DETAILED DESCRIPTION

[0020] The particular values and configurations discussed in these non-limiting examples can be varied and are cited merely to illustrate at least one embodiment and are not intended to limit the scope thereof.

[0021] The embodiments will now be described more fully hereinafter with reference to the accompanying illustrations, in which illustrative embodiments of the invention are shown. The embodiments disclosed herein can be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements through-

out. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

[0022] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises” and/or “comprising,” when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0023] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein. To maintain consistency, further reference of the terms “sensing”, “sense”, “sensed”, “sensor” and/or “scanning”, “scan”, “scanned”, scanner will be referenced solely as “scanning”, “scan”, “scanned” or “scanner” respectively (except in some of the comments).

[0024] As will be appreciated by one skilled in the art, one or more of the disclosed embodiments can be embodied as a method, system, or computer program usable medium or computer program product. Accordingly, the disclosed embodiments can in some instances take the form of an entire hardware embodiment, an entire software embodiment or an embodiment combining software and hardware aspects all generally referred to herein as a “module”. Furthermore, the disclosed embodiments may take the form of a computer usable medium, computer program product, a computer-readable tangible storage device storing computer program code, or said computer program code comprising program instructions executable by said processor on a computer-usable storage medium having computer-usable program code embodied in the medium. Any suitable computer readable medium may be utilized including hard disks, USB Flash Drives, DVDs, CD-ROMs, optical storage devices, magnetic storage devices, etc.

[0025] The disclosed embodiments are described in part below with reference to flowchart illustrations and/or block diagrams of methods, systems, computer program products, and data structures according to embodiments of the invention. It will be understood that each block of the illustrations, and combinations of blocks, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the block or blocks.

[0026] These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner such that the instructions stored in the computer-readable memory produce an article of