10-Print Capture
Scanner & Software Requirements

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1.0 Introduction

The Department of Homeland Security (DHS), the Federal Bureau of Investigation (FBI), Department of State (DOS), National Institute of Justice (NIJ), Department of Defense Biometric Fusion Center (DOD/BFC), and National Institute of Standards and Technology (NIST), have jointly defined an urgent, near-term demand for faster, smaller, more mobile, 10 fingerprint slap capture devices to meet critical national security needs. These departments have organized a unified User Group in order to develop standardized requirements and to co-sponsor a "Challenge to Industry" as a first step towards meeting these common needs. These requirements represent the consensus position of the participants of the User Group.

The User Group identified the need for a 10 print capture scanner device (the "Scanner"), along with client- and server-based utility software (the "Software"), including slap quality, segmentation, sequence verification, fingerprint image quality, compression, and other utilities. The Scanner and Software shall be interoperable, that is, any approved Scanner shall work with any approved Software and vice versa.

The essential operational requirements of the Scanner and Software, some of which are not met currently by the Industry, include the following general objectives:

1. Meet the current space requirements (6"x6"x6") constraints of the deployment facilities.

2. Be mobile so as to support multiple operational scenarios.

3. Perform all the ten print capture processing steps including individual finger segmentation and image quality checks within 5 seconds per slap, from the time the subject places his/her fingers on the Scanner, to the moment the capture Software has segmented, analyzed image quality, and delivered status to the operator.

4. Be powered without an additional 120v power plug in order to meet power capacity and power cabling constraints of the current facilities.

5. Comply with the current biometric industry standards

6. Meet or exceed fingerprint quality requirements contained in the latest version (7.1) of the Federal Bureau of Investigation's (FBI's) Electronic Fingerprint Transmission Specification, Appendix F.

The size of the Scanner, power requirements, and speed of both the Software and Scanner will have critical impacts on current facilities and operations. Although we are not aware of any technology existing today that is able to meet these parameters, we intend to minimize the negative impacts of 10-print capture deployment to environments and populations where delays in processing are intolerable.

2.0 Requirements

Below are the Scanner and Software Requirements. The term “shall” indicates a mandatory requirement. The term “should” indicates a strongly desired requirement, but not mandatory.

2.1 General Scanner and Software Requirements:

1. The Scanner and Software shall capture the ten fingers using 2 four finger slaps and one 2 thumbs slap.

2. The Scanner and Software shall support slap capture of both identification slaps and individual finger flats.

3. The Scanner and Software shall output fingerprint images in accordance with format standards identified in section 2.6, below.

4. The Scanner and Software should support rolled fingerprint capture.

5. The Scanner and Software shall be able to auto sense or auto capture finger when a finger is placed on it.

6. The Scanner and Software should have an anti-spoofing capability (e.g. live finger detection).

7. The Scanner shall be factory calibrated and shall provide automatic recalibration.

8. The Scanner should be mobile enough to be used by subjects who cannot reach the countertop.

9. The Scanner shall have the capability to be firmly mounted on the counter-top.

10. The Scanner shall operate in the following environment

    - Temperature Range 35°F to 120°F (2°C to 49°C)

    - Humidity Range 10-90% non-condensing; splash resistant

    - Direct sunlight and/or in variable outdoor conditions.

2.2 Scanner Form Factors

1. The Scanner shall be no larger than the following dimensions: Length 6", Width 6", and Height 6".

2. The Scanner shall capture a slap size image of no less than 3.2 inches wide by 3 inches tall.

3. The weight of the Scanner shall not exceed 5 pounds.

4. The Scanner shall have a mean time between failure of at least 5 years of 7x24 operational use.

5. The Scanner shall have sealed, rugged container with high tolerance for shock and vibration

6. Other proper human factor design should be considered, for example, but not limited to

    - tilting capture area angle to increase pressure on the platen to achieve better print quality,

    - be designed to support both handheld and counter mounted use.

7. The Scanner should provide visible indication of power and status (e.g. off-line; ready, processing).

2.3 Scanner Interface and Drivers

1. The Scanner shall interface with Microsoft Windows 2000 and Windows XP environments.

2. The power for the Scanner shall be drawn from the desktop computer to which it is connected and not require an additional 120v plug.

3. The Scanner interface to desktop computers shall be supported through a single, 6' cable to provide both data transmission and power supply.

4. The Scanner shall be provided with device drivers.

5. The Scanner drivers shall run in Microsoft Windows 2000 and Windows XP environments, in both 32 and 64 bit operating modes.

6. The Scanner shall support upgrading and managing of the software/firmware in the unit from the connected PC.

7. The Scanner shall be UL certified.

2.4 Scanner Fingerprint Image Quality

1. The Scanner image quality shall be certified to be in compliance with or exceed the FBI's EFTS Appendix F Image Quality Specifications (IQS) for Identification Flats.

2. A means should be provided to verify that the Scanner continues to meet EFTS Appendix F image quality requirements at operator selected intervals throughout the useful life of the Scanner.

3. The Scanner shall eliminate the Halo Effect: the effect of condensation from placing warm, moist fingers on the platen.

4. The Scanner should have the ability to capture print images when the fingers are dry or wet.

5. The Scanner shall be able to captures high quality fingerprint images regardless of skin color or age of the subject.

6. The Scanner and Software shall provide means to distinguish and eliminate ghost (residual latent fingerprint) images.

2.5 Scanner Support Utility Software ("Software")

1. The Software shall be in the form of a Software Development Kit (SDK) for easy integration with both client (PC with Scanner attached) and server (an application server without the Scanner attached) applications.

2. The Software, operating with the Scanner, shall deliver segmented, quality assessed and sequenced images to the client component in no greater than 5 seconds per step, from the moment the subject first touches the scanner platen, through capture of one of the three slap images.

3. The Software shall be provided with sample source code and documentation necessary to support development of client and server applications.

4. The Software shall run in Microsoft Windows 2000, Windows 2003 Server and Windows XP environments, in both 32 and 64 bit operating modes, as well as all major Unix and Linux variants.

5. The Software shall support any approved Scanner.

6. The Software shall assess overall slap quality, including correct number of fingers captured, size and grayscale intensity of the fingers, fingers not truncated at edges, etc., in support of auto-capture.

7. The Software shall segment any single four-finger slap image into discrete, single-finger images.

8. The Software shall segment any single two-thumb slap image into discrete, single-thumb images.

9. The Software shall assess the fingerprint quality of all individual fingerprint images

10. The Software shall construct single two-thumb images from discrete single thumb images.

11. The Software shall distinguish between left and right hands for any four-finger slaps.

12. The Software shall be able to distinguish image sequence (finger number) of the captured fingers.

13. The Software shall provide handling for hands that are not easily segmented such as amputations and deformities.

14. The Software shall conduct quality checks that assess image quality and provide the user with instant feedback.

15. The Software should provide the capability to interrupt auto sense or auto capture.

16. The Software shall track source and version of image quality modules in segmentation and sequence determination.

17. The Software shall support java and C++ applications on the client, and J2EE, C++, and .Net applications on the server.

18. The Software shall provide a NIST and FBI-certified WSQ compression at selectable compression ratios (e.g. 10:1, 15:1)

2.6 Compliance with standards

The Scanner and Software shall comply with the following standards

1. ANSI INCITS 358-2002, BioAPI Specification, http://www.bioapi.org/ - (note: it is anticipated that the interface between Scanner and Software may use a subset of the BioAPI specification. Both the Scanner and Software therefore should support BioAPI.)

2. CJIS-RS-0010 (V7.1), Electronic Fingerprint Transmission Standard (EFTS) (address EFTS support with compression) , http://www.fbi.gov/hq/cjisd/iafis/efts_70.pdf

3. ANSI/NIST ITL 1-2000, Data Format for the Interchange of Fingerprint, Facial, & Scar Mark & Tattoo (SMT) Information, http://www.itl.nist.gov/

4. IAFIS-IC-0010(V3), IAFIS Wavelet Scalar Quantization (WSQ) Grayscale Fingerprint Image Compression Specification, dated December 19, 1997.

5. ISO/IEC 15444 – Information technology – JPEG 2000 Image Coding System, http://www.incits.org/

6. Fingerprint Image Quality, NISTIR 7151, August 2004 http://www.itl.nist.gov/iaui/894.03/pact/pact.html

NOTE: The Software shall return image with ANSI/NIST ITL1-2000/EFTS format. It shall further allow selection of the compression to be applied (i.e., WSQ, JPEG2000, or none).