

Enhanced Security System Using an Embedded Real-Time Finger-Vein Detection

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Abstract

In this paper, a real-time embedded finger-vein recognition system for authentication is proposed. The security system is executed on an embedded process and outfitted with an original finger-vein detection algorithm. In this system consists of three hardware modules: human machine communication module, image acquisition module and embedded main board module. To collect finger-vein images in image acquisition module, the structure diagram of the system is used. To execute the finger-vein recognition algorithm and communicate with the peripheral device, an embedded main board including the Microcontroller chip, flash memory and communication port is used. To display recognition results and receive inputs from users, the human machine communication module (LED or keyboard) is used. An intelligent security system is proposed using real-time finger vein recognition.

Keyword— Finger vein recognition, Image Acquisition, 3D Finger Print.

I. Introduction

In biometric authentication, finger vein recognition is a one of the method and that uses pattern-recognition systems based on pictures vein patterns of human finger under the skin's exterior. To recognize individuals and confirm their uniqueness, finger vein recognition is one of the methods of biometrics used.

Finger Vein ID is a biometric validation scheme that equals the vascular model in a person's finger to earlier attained data. The knowledge is presently in improvement or exploit for a broad range of functions, with automobile security, credit card authentication, computer and network authentication, employee time and attendance tracking, automated teller machines and end point security.

A creature introduces a touch into an attester incurable including a near-infrared light- emitting diode glow and a colorless charge-coupled device camera to achieve the pattern for the record database. In the blood, hemoglobin attracts near-infrared LED glow, which creates the vein scheme emerge as a gloomy model of strokes. The image is recorded by camera and digitized the raw data, specialized and sent to a record of chronicle images. The finger is scrutinized as earlier than and the data is send to the record of chronicle images for evaluation for the purpose of authentication. It will take less than few seconds.

To every entity blood vessel prototypes are single, when are some other biometric data for example fingerprints or the prototypes of the iris. Distinct blood vessel patterns are approximately not possible to forge in some biometric schemes since they are placed under the surface of skin. With a mannequin finger fixed with a copied fingerprint, biometric schemes depends on fingerprints may be tricked; by footages and high resolution pictures, facial and tone trait based schemes can be tricked. The scheme is greatly stiffer to trick as it can merely validate the finger of a person living.

Individual data's are typically issued by with Personal Identification Numbers or passwords, which are easy to carry out except is vulnerable to the danger of disclosure and mortal beyond. Biometrics uses behavioral characteristics or person physiological for individual recognition, has magnetized high and high notice and is fetching one of the mainly admired and talented substitutes to the PIN based validation methods or conventional password [1][2]. Furthermore, little multimedia substance in customer electronic machines can be sheltered by biometrics [3]. It have a very big list of accessible biometric samples, and such several schemes have been enlarged and executed, counting folks for the iris, face, palm print, fingerprint, voice, hand shape, gait and signature. Such as palm prints and fingerprints are typically disputed; signatures, voice, iris images and hand shapes are simply created; by face lifts or occlusions face recognition may be completed tricky [4]; for example, iris and face recognition and fingerprints are vulnerable to skit molests, explicitly the biometric identifiers may be imitative and worn to produce relics that may trick a lot of presently obtainable biometric tools. The enormous confront to biometrics is consequently to get better identification routine in stipulations of both efficiency and accuracy and be highly defiant to illusory performs.

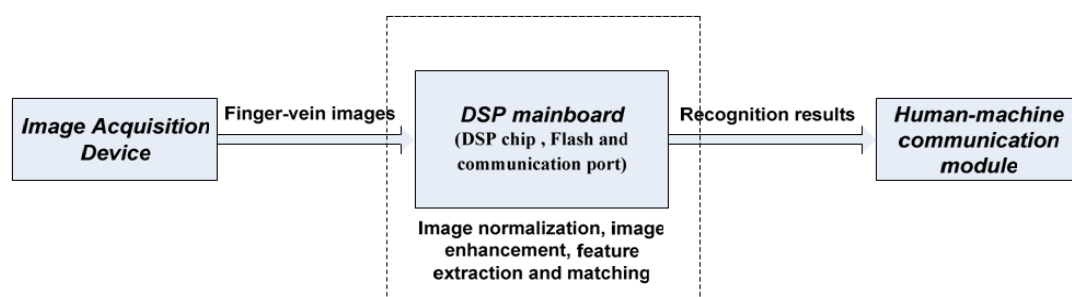


Fig.1. Structure of hardware system [1].

By extending biometrics that are extremely creature, at the end, a lot of researchers include required to develop aggravate skit and reliability. Also simultaneously, present a extremely intricate, expectantly insurmountable confront to folks who desire to crush them [5]. Particularly for customer electronics relevance, biometrics substantiation schemes require to be cost proficient and simple to develop [1][6].

We intended a extraordinary tool for obtaining lofty eminence finger-vein images and suggest a embedded platform based on DSP to develop the finger-vein recognition system in the current cram to attain good detection recital and decrease working out cost [1].

Currently, security is most important in every activity. Illicit behaviors are occurring in the entire place currently. So corporate sectors and government are focusing mostly on the security levels with their all creation. It will fetch solitude around the earth. So in a consideration of fetching solitude during security level, it can be developed [7].

II. FINGER VEIN DETECTION

There are three hardware modules are considering in the finger-vein recognition system. That is, DSP main board, human- machine communication module and image acquisition module. The constitution figure of the system is shown in Fig. 1. To gather finger-vein images the image acquisition module is used. To carry out the finger-vein recognition algorithm and also to communicate with the tangential device, the DSP main board is used including the flash memory, communication port and DSP chip. To show gratitude results and obtain inputs from users, the keyboard or LED is used.

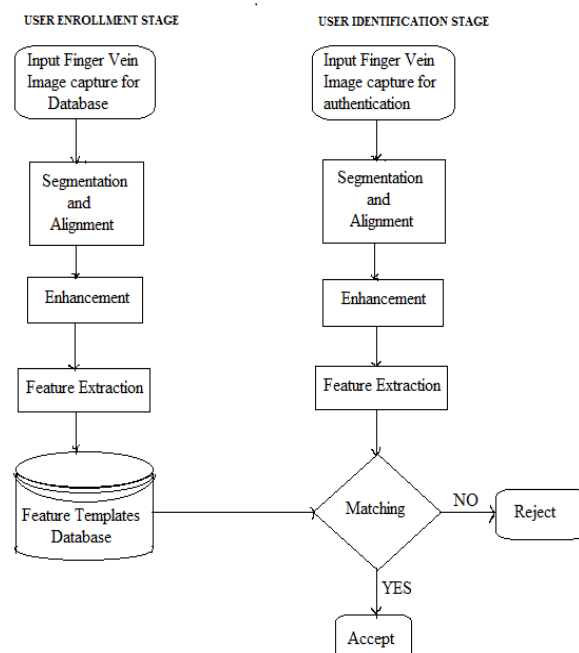


Fig.2. Flow chart of Finger-vein Algorithm [1].

This algorithm contains two stages. That is the verification stage and the enrollment stage. It is beginning with finger-vein image preprocessing and it includes recognition of the image segmentation, region of interest, enhancement and alignment. After the characteristic mining step and the pre-processing for the enrollment stage, the finger-vein pattern database is build. For the confirmation phase, the finger-vein input image is harmonized with the matching pattern behind its characteristics are extorted. Flow chart of the of Finger-vein Algorithm was shown in fig. 2. For finger-vein equaling few special techniques may have been suggested.

Based on the benefits for finger-vein identification method, a tale user recognition scheme using finger-vein methodology for customer electronics machines are proposed as shown in Fig.3. The proposed system initial efforts to utilize Radon convert to obtain enviable directional attributes of finger-vein image [8].



Fig.3. Consumer electronics devices for secure user identification [8].

III. IMAGE ACQUISITION

A fingerprint in its tapered wisdom is a notion gone by the friction ridges for a person finger. In a broad exploit of the expression, fingerprints are the outlines of an intuition from the friction ridges of several parts of a person or extra primate hand. A stamp from the foot may also depart an intuition of friction ridges. It is a hoisted piece of the epidermis on the fingers, the sole of the foot or the palm of the offer, containing of few or several attached ridge elements of skin friction ridge and it is called as epidermal ridges. It is sourced by the fundamental line among the papillae of inter papillary pegs and the dermis of the epidermis.

Notions of fingerprints can be lost after on a facade by the usual emissions of fret from the glands appear in skin friction ridge or it can be created by dye or some other essences conveyed from the climax of friction ridges in the skin surface to a comparatively soft facade for example a fingerprint card. Normally fingerprint proofs hold notions from the fortification on the final combined of thumbs and fingers, even though fingerprint cards as well as normally record pieces of inferior joint regions of the fingers.

An individual machine was extended for attaining the finger vein images devoid of creature involved by temperature, to accomplish lofty eminence close to-infrared images.

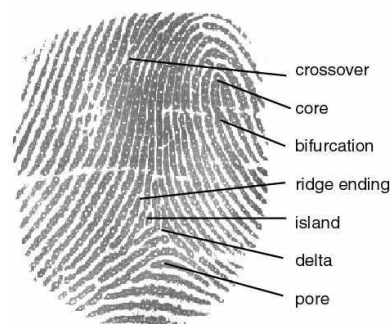


Fig.4. Fingerprint Recognition

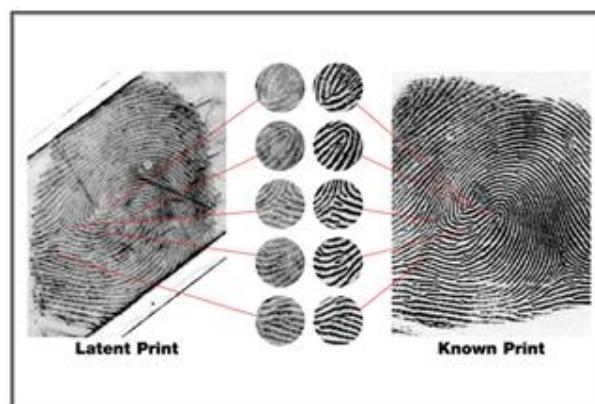


Fig.5. Fingerprint Comparison Chart

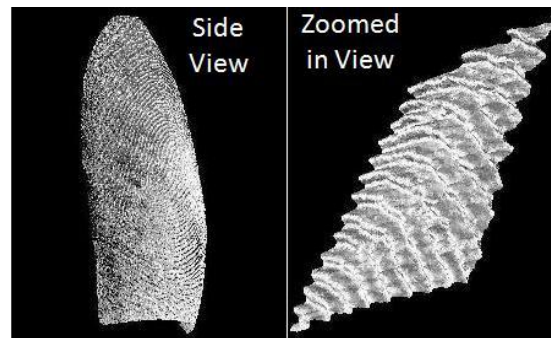


Fig.6. 3D Fingerprint

Usually this patterns may be imaged depends on the standards of light transmission or light reflection [9]. A finger-vein imaging machine depends on light reflection for further different imaging is developed. Fig. 4, 5 & 6 shows Fingerprint recognition, comparison and its 3D view.

To conquer few difficulties, since 2010, 3D touch less fingerprint scanners have been enlarged [9][10]. Attaining featured 3D fingerprint scanners, 3D information obtain a digital loom to the analog method of revolving or pushing the finger. Through sculpting the distance among bordering tips, the fingerprint may be pictured at a decree most sufficient to evidence the entire required feature [11].

IV. CONCLUSION

Finger-vein based identification equipment has maximum safety and consistency evaluated to the conventional authentication method. It can be applied in private or public apparatus, for example office or home door entry control structures, entrance control systems and ATM structures [8].

Security is most important necessary in all type of function. This project is executed in a mode to get better the safety altitude. As the finger-vein is a talented biometric prototype for individual recognition in provisos of its expediency and safety [7].

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