Hitachi Finger Vein Authentication: FAQ

Notes: July 2006

Blank: Q&A that can be disclosed to public

TS: Technical Specifications that can be disclosed to public

#	Question	Answer	Details
□ . General: Finger Vein Authentication			
□-1	What is biometrics?	Biometrics refers to the measurement of biological characteristics unique to each individual for the purposes of verifying identity. These biological characteristics can include the veins in the palm or fingers of the hand, fingerprints, iris patterns or any other parts of the body whose specific patterns are unique to an individual. Biometrics has been employed in a variety of security applications, including door access control to office buildings or research laboratories, immigration control or banks' ATMs, PC or mobile phone login security.	
□-2	How does finger vein authentication work?	Finger vein authentication works by utilizing the vein patterns in one's fingers to verify the identity of individuals. When one's finger is placed on the vein authentication device, the vein pattern of the finger is scanned and matched with a pre-registered vein pattern profile to confirm the identity of an individual. Unlike fingerprinting and other forms of biometrics where the biological information being scanned is on the exterior of the body, finger vein authentication scans information in the interior of the body and therefore makes falsification extremely difficult. Finger vein authentication thus serves as a highly secure form of personal authentication.	
□-3	Was finger vein authentication technology developed by Hitachi?	In 1997, 200 researchers at the Hitachi Research Institute began independent development of next-generation biometrics technology. Since then, Hitachi has acquired 23 important patents surrounding this advanced finger vein authentication technology, including "Patent #: 2004-265269 ; Authentication System for Individuals."	
□-4	How did the idea first originate to use vein patterns as a form of biometrics?	The idea was first suggested in a 1992 thesis written at Hokkaido University.	
□-5	What are the merits of vein authentication as compared with other biometric technologies?	Compared with other biometrics, such as fingerprinting vein authentication is much more difficult to falsify. Vein authentication is also less expensive and thus more realistically applicable than iris scanning or face/voice recognition. Moreover , the false rejection rate (FRR) is significantly lower than fingerprinting, making finger vein authentication more applicable.	

□-6	Does there exist other biometric technologies that are superior to vein authentication?	Biometrics technologies each have their merits and shortcomings, so it is difficult to make direct comparisons, but because vein authentication relies on biological information on the interior of the body, it is more effective than the others at reducing the possibility of falsification. Also, vein pattern recognition requires just a touch of the finger or hand, thus making it the easiest and most natural to use among the various biometric technologies. Moreover, to confirm the accuracy of personal authentication to an even greater degree, vein recognition can be combined with face recognition systems to enable "multi-model authentication" that guarantees accuracy through multiple layers of security. In addition to enhanced security, vein authentication used in conjunction with face recognition systems would also keep a log of facial information should it be necessary to be used as evidence.	
□-7	Do finger vein patterns change with time or age?	In the case of adults, no significant changes were observed. In the case of small children, any changes in finger vein patterns as they grow is currently under observation.	
□-8	Is there proof that individual vein patterns are unique?	There is no formal proof, but such evidence is included in current medical and statistical studies.	
□-9	Are vein patterns different among identical twins?	Yes. From small-scale experiments, it has been shown that identical twins have different vein patterns.	
II . Device Operation			
II-1	What is the method for operating finger vein authentication devices?	Place the finger on the scanner, first to enroll, then to authenticate the finger vein pattern. (For details please refer to each product's user manual.)	Product user manuals
II-2	Is authentication possible using any of the ten fingers?	It is recommended to use fingers other than the thumb. (For details please refer to each product's user manual.)	Product user manuals
III . Image Processing			
III-1	What are the strong points and weak points of light transmission versus light reflection methods?	· Light transmission method: High-contrast photography methods enable the imaging of detailed vein patterns. However, light has more difficulty penetrating parts of the body with thicker skin, thus the finger has been chosen as ideal for light transmission methods. · Light reflection method: Despite thicker skin in certain areas, images of blood vessels can be captured. However, the reflection of light off the surface of the skin causes low-contrast images, making it more difficult to capture images of detailed vein patterns with clarity.	·

III-2	Does the light transmission method cause any harmful effects to the human body?	Light transmission has satisfied JISC6802 safety standard and has thus been confirmed to have no harmful effects on the human body.	
III-4	What is the wavelength of the light used in finger vein authentication devices?	Near infrared light = 0.75–1.4 μm	
Ⅳ．Device Specifications			
□-1	What is the device size?	The smallest device is 39mm × 34mm × 15mm with a volume of 19ml. For other products, please see specifications.	TS
□-2	How long does it take to authenticate a finger?	Approximately 1 second. Please see specifications for further details.	TS
□-3	What is the data format and API (interface) of the software?	Each product is different. Future product will be compliant with BioAPI and CBEFF.	TS
□-4	How many templates can be installed in a device?	Multiple templates can be installed in a device. Each product is different, so please see specifications.	TS
□-5	What is the size of a template ?	It is about 400 bytes. For further details, please see specifications.	TS
□-6	Is one-to-many authentication (1:N) possible?	For physical access, it is possible. For USB-type PC login, it is not possible; however, since the SDK is provided, it is possible to customize authentication according to preference.	TS
□-7	What is the maximum number of fingers that can be processed by a single device?	Please see specifications.	TS
□-8	How long does 1:N authentication take?	Please see specifications.	TS
□-9	What is the status of international standardization & certification?	Current products have not met international standards, but API and data format will meet ISO standards.	
□-10	Do current products meet ICAO standards?	No.	
□-12	What is the level of power consumption?	It depends on each product.	TS
Ⅴ．Accuracy Evaluation			
V-1	What is a false acceptance rate (FAR)?	It is the rate of occurrence whereby another individual is mistakenly identified and authenticated as the true user.	
V-2	What is a false rejection rate (FRR)?	It is the rate of occurrence whereby the true user is mistakenly identified as another individual and thus fails to achieve authentication.	

□-3	What is the accuracy rate?	Technically FAR is 0.01% and FRR is 0.0001%. For further information, please see specifications.	TS
□-6	Does the accuracy rate change depending on the finger's position?	If the finger is at the same position during authentication as enrollment, then the rate is not affected.	
□-7	Does the accuracy rate change depending on which finger is used for authentication ?	When there is difficulty positioning the finger on the device, such as in the case of the pinky or thumb, FRR may be higher.	
□-8	Does the accuracy rate change depending on the gender?	There is almost no difference, but those whose fingers are very short and thin might generate a slightly higher FRR	
□-9	Does the accuracy rate change depending on the race?	Will be updated once the results of the IBG test are confirmed in August.	
□-10	Does the accuracy rate change depending on the temperature ?	When it is so cold that finger movement becomes difficult, FRR may be higher.	
□-11	Does the accuracy rate change depending on the humidity ?	The device is not operable under conditions of condensation on surfaces, but otherwise humidity does not have influence.	
□ Q&A for use regulation			
VI-5	Is authentication possible while wearing gloves?	Generally speaking, it is not possible. However, authentication could be possible while wearing thin gloves used in medical operations.	
VI-6	Is it possible to use out of doors?	Hitachi does not assume to be used out of doors. Some countermeasures should be necessary for outside use.	
□-7	Can other biometric technologies work under outdoor lighting?	Optical biometrics typically cannot be used under outdoor lighting.	
VII. Security Countermeasures			
VII-1	If one's finger was cut off by another and placed on an authentication device, would authentication still be possible?	As blood would flow out of a disconnected finger, authentication would no longer be possible.	
VII-2	Can finger vein patterns be falsified? Are there any countermeasures?	Unlike fingerprints and other biometrics, vein patterns exist internally within the human body and thus make forgery or other falsification extremely difficult. Even in the extremely minute chance that falsification occurs, live detection techniques or other such measures may be effective at preventing such occurrences.	

VII-3	It has been said that a piece of white radish was successfully authenticated using finger vein authentication devices. Is this information true? Forged or falsified objects are not supposed to be authenticated, correct?	This rumor is false, and falsification in such ways is impossible. Although the patterns on a radish can be enrolled, it does not constitute forgery of a human finger vein pattern. Moreover, enrollment is strictly managed, thus making the enrollment of a radish as biological information quite impossible. In areas requiring enhanced security (such as the financial sector), live detection techniques can further be employed to limit registration to living, human biological information.	
VII-5	What live detection functions are used?	Finger vein devices use live detection functions, but details cannot be disclosed for security reasons.	
VII-6	What about enrollment /deletion of biometric data ?	Need to check	
VIII. Applications			
VIII-1	Are multi-modal applications involving finger vein patterns possible?	No standard product currently exists for multi-modal applications. However, Hitachi can provide the SDK of logical access products to make multi-modal functions possible.	
VIII-2	Is use with smart cards possible?	Some access control products have this function (for domestic use only). Although no logical access product currently exists that can be used with smart cards, Hitachi can provide the SDKs to make this function possible.	
VIII-3	How are we addressing issues of product miniaturization and/or price reduction?	Miniaturization is dependent on “flat sensor” technology and price reduction is dependent on LSI, both currently under development. It has not yet been determined how small the technology can become.	
VIII-4	Is large-scale access control possible?	Hitachi sells some products for a lot of templates and/or doors by managing templates in servers. Please look at detail specifications of each product.	
IX. Others			
□-2	Patents	To be presented at Global Meeting.	TS
□-4	What about availability in languages other than Japanese, English and Chinese?	Depends on specifications of each product.	TS