



## PALM VEIN AUTHENTICATION TECHNOLOGY

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### Abstract:

*Palm vein authentication has high level of accuracy because it is located inside the body and does not change over the life and cannot be stolen. These papers present an analysis of palm vein pattern recognition algorithms, techniques, methodologies and system. It discusses the technical aspects of recent approaches for the following processes; detection of region of interest (ROI), segment of palm vein pattern, features extraction, and matching. The results show that, there is no benchmark database exists for palm vein recognition. For all processes, there are many machine learning techniques with very high accuracy.*

**Keywords:** Biometrics Palm Vein Pattern; ROI Extraction; Features Extraction; Matching.

**Cite This Article:** Miss. Jagruti Jain, Miss. Chitra Desai, and Miss. Mrunali Chavan. (2019). "PALM VEIN AUTHENTICATION TECHNOLOGY." *International Journal of Engineering Technologies and Management Research*, 6(12), 6-10. DOI: 10.29121/ijetmr.v6.i12.2019.468.

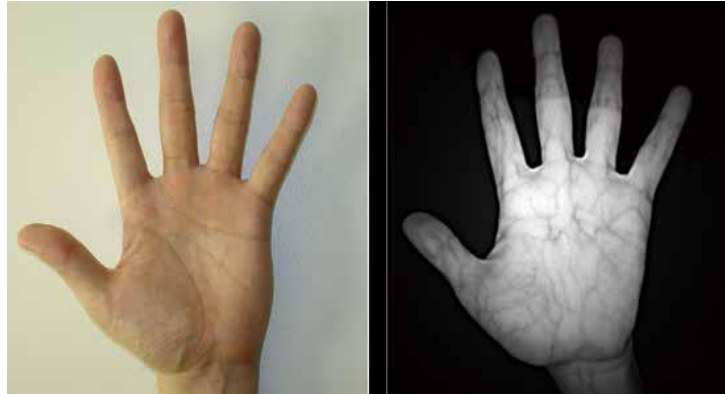
## 1. Introduction

In the ubiquitous network society, where individual can easily access their information anytime and anywhere, people are also faced with the risk that others can easily access the same information anytime and anywhere. Because of the risk, personal identification technology is used which includes password, personal identification numbers and identification cards. However, cards can be stolen, and password and numbers can be guessed or forgotten. To solve these problems, Fujitsu developed four method fingerprints, faces, voice prints and palm vein. Among these, because of its high accuracy, contact less palm vein authentication technology is being incorporated into various, financial products for use in public places. This palm vein authentication technology and some example of its application to financial solution. These papers will provide a broad overview of palm vein authentication, a biometric technology whose time has come and is being more widely adopted every year.

## 2. Palm Vein Authentication Technology

It works by comparing the vascular pattern under the skin, which are unique to each individual. Since vascular patterns exist inside the body, vein authentication has a number of advantages over other biometric techniques. Firstly, vein pattern is unaffected by environmental changes or by corneous or dirt on the users hand, and thus is perfectly reliable under these conditions. Secondly, vascular patterns the authentication feature are invisible under normal visible light conditions, which makes it virtually impossible to steal someone's confidential data without that

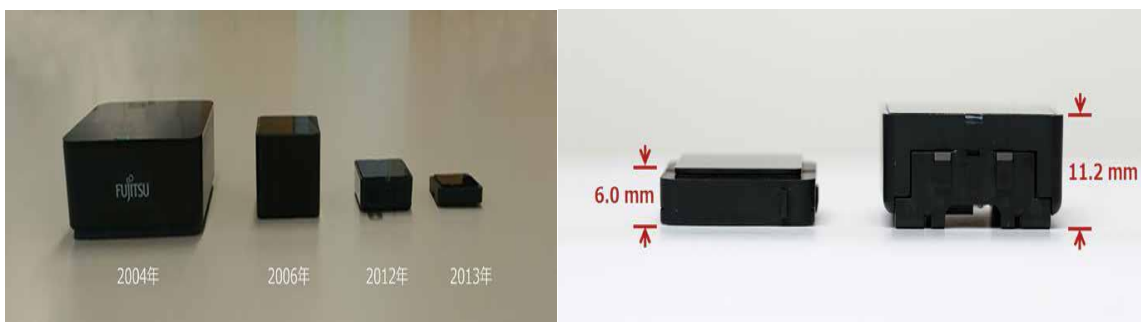
person being aware. This second advantage is particularly important in areas requiring high degree of authentication security. Between these two light sources is the near-infrared band ranging system on the right. One can see that the vascular pattern is practically invisible under visible light, but clearly revealed under near-infrared light. There are two types of palm vein sensors used to photograph veins, the reflection type and the transmission type. With the transmission type, the palm is positioned between the camera and light sources are in approximately the same location, and the camera captures light that is reflected off the hand. The palm vein authentication technology employs reflection type sensor. Authentication works as follows



Palm Vein image (L: Visible light, R: near-infrared light)

### 3. Miniaturization of Palm Vein Sensors

In July 2004, to ensure customers security, suruga bank launched its” Bio Security Deposit” the world’s first financial service to use palm secure. This service features high security for customers using vein authentication, does require a bank card or pass book and prevents withdrawal from branches other than the registered branch.



Miniaturization of palm vein sensors

#### 3.1. Personal Computers

In personal computers palm vein technology can apply by inserting the vein sensor inside mouse. When power is supplied to system the mouse also gets. Power and the sensor in the sensor in the mouse will be ready to sense palm vein. When one place his/her palm vein the sensor sense the

veins and if they are matched with the registered once the system allows the person to use it. One can use this technology even to lock folders that should be maintained as private information

### 3.2. In Hospitals and Library

A public library in Japan is set to become the first in the world to use palm-vein biometrics as a substitute for conventional library cards. The University of Tokyo hospitals has shaken delivery of a contactless palm vein authentication system to secure physical access to its department of planning information and management.

### 3.3. Authentication

In front of our homes we can apply this palm vein technology so that by registering the veins of our family members and relatives we can maintain high range security which is not possible through other technologies. Japanese recently used these technologies before front doors and getting high range security. A public library in Japan is set to become the first in the world to use palm vein biometrics as a substitute for conventional library cards. The University of Tokyo hospitals has taken delivery of contactless palm vein authentication system to secure physical access to its department of planning information and management. Since the first palm vein authentication systems were put into service, palm vein sensors have steadily shrunk to accommodate a growing number of mobile applications. Let us take a closer look at some of the mobile application that will likely adopt biometrics authentication in the near future. Notebook PCs, tablet, computers, and other mobile devices are now available that are as powerful both in terms of processing power and functionality as the desktop computers of just a few years ago.



Thin notebook PC with built-in palm vein sensor

## 4. International Standardization Initiatives

International standards covering vein authentication are making headway even research and development on this biometric technology is in progress. SC37 is organized into six working groups dealing with “Harmonized Biometric vocabulary.

## 5. Registering Through Palm Vein Technology

Palm vein authentication technology consists of a small palm vein scanner that's easy and natural to use, fast and highly accurate.

## 6. Working of Palm Vein Security System

One should place his/her palm near to scanner. The scanner makes use of special characteristics of the reduced hemoglobin coursing through the palm veins-it absorbs near-infrared light. This makes it possible to take a snapshot of what's beneath the outer skin, something very hard to read steal. The integrated optical system in the palm vein sensor uses this phenomenon to generate an palm image uses this phenomenon to generate an palm image of the palm vein pattern and the generated image is digitized, encrypted and finally stored as a registered template in the database.

## 7. What Happens if the Registered Palm Gets Damaged?

There may be a chance that the palm we had registered may get damaged that we cannot use this technology, so during the time of registration we take the veins of both the hands so that if one gets damaged we can access through the second hand. When hand get damaged up to large extent we can get veins because deeper into hand veins are obtained.

## 8. Future Developments

Presented a broad overview of palm vein authentication technology, and covered the most recent development trends and standardization activity relating to palm vein authentication. Palm vein authentication is a relatively recent biometric technology compared with fingerprint-based authentication, so there is still plenty of room for further technological progress. Fujitsu will continue to pursue multiple objectives in conducting work in this area: we will collaborate in building a large-scale social infrastructure system by continuing to improve the accuracy of sensors and systems, while at the same time continuing to reduce the size and cost of sensors.

## 9. Conclusion

Palm vein pattern authentication technology was being used in wide range. If this technology is introduced in India we can solve many problems such as password protection in ATM, security in various fields and if we implement this technology in government offices we can make the employees to work according the government timings, surely this technology will bring a revolution in the field of science and technology in the near future.

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