



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## NEW ERA PHONE LOCK

Rohit Raj<sup>1</sup>, Akriti Kumari<sup>2</sup>, Shashank Gupta<sup>3</sup>, Jayant Kumar<sup>4</sup>

B.Tech Student<sup>1,3,4</sup>, BCA Student<sup>2</sup>

Department of Computer Science Engineering<sup>1,3,4</sup>, Department of Computer Application<sup>2</sup>  
Galgotias University, Gautam BuddhNagar, India<sup>1,3,4</sup>, Cimage Group of Colleges, Patna, India<sup>2</sup>

**Abstract:** Finger Vein has several advantages over other types of biometrics, the most notable of which are its high degree of accuracy and ability to withstand fraud attempts. There is no doubt that the Finger Vein Biometric is head and shoulders above any other kind of biometric. Biometric authentication refers to verifying a person's identity by using aspects of their physical traits. The use of face and fingerprint recognition technologies is becoming more common. In recent years, the authentication method that utilizes finger veins has garnered much attention as an innovative approach to biometric identification. This is primarily due to this method's high degree of accuracy. A select number of financial institutions have implemented it as the most up-to-date security technology for ATMs. In this study, we have checked various new eras system and their comparison with advantages and disadvantages.

### Introduction

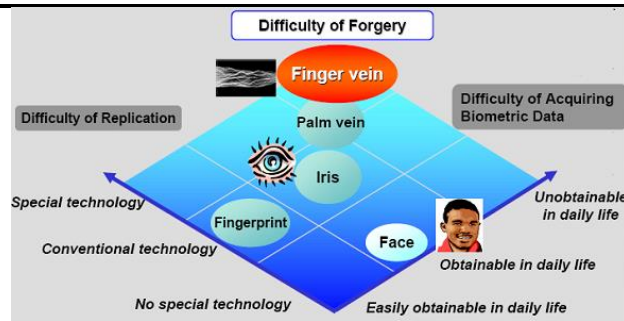
Identification and authentication systems, such as those used for access control, online payments, bank accounts, and unlocking mobile gadgets, have grown rapidly in popularity in the security business in recent years. Both security and ease are important considerations in making this choice(1). The reliability, resilience, convenience, and cleanliness of contactless biometric identification systems make them ideal for use in access control and payment. Many biometric techniques don't need physical contact with the subject. Some examples include iris scanning, contactless fingerprinting, gait analysis, vascular analysis, and more (2). The topic of vein recognition as a biometric identification tool is attracting the attention of researchers. The advantage of using a vein recognition system is that it can only be used on a living person. It uses infrared light to illuminate veins and collect blood samples(3).

Vesalius' idea was first proposed in 1543, and since then, scientists have hypothesised that the veins in our bodies change in structure and direction throughout time. A forensic medicine expert says the vein pattern on the back of a hand is unique to each individual, even if they are identical twins (4). Theoretical and practical studies of palm vein identification systems have been conducted by scientists. There are two kinds of people in the world: handcrafted(5)(6), and deep learning(7)(8). The palm vein identification system has been commercialised in practical applications.

As a consequence, the design and architecture of practical applications are kept private thanks to trade secrets. The employment of specialized devices with near-infrared (NIR) sensors has resulted in higher costs for both research and application(9). In this article, we refer to our system as VeinDeep. A smartphone's owner may be identified by their vein patterns, making it impossible for anybody else to use the device. It doesn't leave an imprint on the skin like fingerprints, although venous patterns do exist below it(10). As a consequence, they can't be recognised as easily as a face in a crowd. Our device uses an IR depth sensor to take pictures of vein patterns. Both an infrared light source and an infra-red light source may be used to visualise veins under infrared illumination. (11)

Finger-vein biometric systems may collect and utilise a person's individual vein patterns to identify them. Vein patterns, in contrast to more traditional biometrics such as fingerprints and features, cannot be duplicated outside the body. Additional advantages of finger-vein technology include A person's unique finger-vein pattern, particularly that of identical twins, might be used to tell them apart. 2) Vein patterns do not change with ageing and remain static. Because of its small size and superior recognition accuracy when compared to other biometric identification systems, this biometric identification technique is becoming more popular. When it comes to finger-vein patterns, it is impossible to falsify them. Non-invasive and contactless sensors make it easy to use, and with 10 fingers available, the remaining fingers may be used for identification in the event of an accident or other unexpected circumstance. (12)(13)(14)

Biometrics systems, which employ a part of the body and are very precise, are currently being adopted over the globe as an acceptable answer to the current high degree of security requirements. Researchers have shown that an individual's vascular patterns are difficult to imitate, contactless, racial and skin discolouration independent, and age-independent. This information is used by biometric systems(15)(12). Comparing it to other biometrics, it offers several benefits, as seen in figure 1.



## PROBLEM STATEMENT

### Face Recognition

1. Under various lighting circumstances, the colour of the skin may change.
2. Eyeglasses, make-up, and acne are all present.
3. Faces are positioned in different ways by the camera.
4. Clearness and distance of facial picture from camera
5. Different expressions on the face
6. Partial-face-covering headgear, such as hats and caps

### Biometric Recognition

1. Hackers may get their hands on your fingerprints.
2. Your fingerprints cannot be changed, only your password.
3. To unlock a phone using biometrics, the police do not need your consent.

## EXISTING SYSTEM

### Face ID

Since its debut on the iPhone X in 2017, Face ID has served as a facial recognition system. In lieu of Touch ID, Face ID is now the default biometric security option for iPhones that lack a Home button. For the first time, Face ID was offered on iPads in 2018. Encrypted Face ID data prevents Apple and other firms from accessing your phone. Face ID removes the need for on-screen passwords and passphrases, making it easier for people to use their smartphones and other devices. Using a smartphone or tablet as a form of identity verification is another option you have.

### How does Face ID work?

TrueDepth cameras, neural networks, and Bionic chips all play a role in Face ID's success. Any changes you make to your look, such as applying make-up or shaving your beard, might compromise Face ID's ability to correctly identify you. Before updating your face data, Face ID will validate your identity to ensure that you are who you say you are. Because they're not designed to pair with hats, scarves, or most sunglasses, face masks won't work with them. As of the newest iOS 14.5 software update, Face ID may now be used while wearing a face mask while the Apple Watch is unlocked.

### 1. The true Depth camera system

For the TrueDepth camera to recognise your face, it relies on a flood illuminator (or newer). A camera with an infrared sensor will capture more than 30,000 tiny spots of infrared light. As the infrared picture and the infrared dots are processed using neural networks, the result is a mathematical representation of your face.

### 2. Neural networks

The face scans on your iPhone X (or newer) may be used to authenticate an Apple Pay transaction by comparing them to the one you've saved on your iPhone. Currently, unnoticed occurrences are taking place. Apple states that more than one billion images were taken by individuals throughout the globe to build the neural networks used in Face ID.

### 3. Bionic neural engine

Apple's A11 Bionic neural engine was inspired by Face ID and is capable of handling all of the data supplied by it. As a result, the A12 Bionic neural engine was used in the next iPhones, giving even higher Face ID improvements. The iPhone 11s has A13, the 12-s (and 13-s) had A14, and the 15 had both. The processors have machine learning algorithms built into them. The processing power of hundreds of billions of operations per second is needed for a real-time Face ID detection system.

### Biometric Recognition

Using a person's unique combination of physiological and behavioural features, biometric recognition is used in the area of information technology to identify them. This new technology relies on gathering data that may be analysed and utilised to rebuild a person's identity and recognition.

Optical, capacitive, or ultrasonically, smartphones can read your fingerprint. Optical, magnetic, and capacitive scanners are the three main types of fingerprint readers. A small camera, commonly lighted by LEDs or the phone's screen, is used to capture an image of your finger when you take a selfie. Second, capacitive sensors may be utilised with these sensors to verify that the finger is there. This is because even a well-taken shot can mislead these sensors. Fingerprint sensors include a grid of small capacitors that store and release energy only when your fingerprint ridges come into direct contact with them. A capacitance array may then be used to map the specific pattern of your fingerprint. Swipes and force detection may also be accomplished with these sensors.

## DISADVANTAGE OF EXISTING SYSTEM

### Biometric Recognition

It is the most used biometric recognition method. Some limitations include the fact that precise finger placement is required to operate the scanning apparatus, making it difficult to use. The smaller surface area of the finger makes it more difficult to correctly detect veins since there are fewer points of reference. For identification purposes, more feature points are collected from the dorsal or palm veins since they cover a bigger area. Both accuracy and security are enhanced as a result. Our ability to record palm vein patterns and palm prints will allow us to identify persons based on their different patterns.

Businesses may reap some of the system's advantages, but there are also some drawbacks:

- Disabilities of the Body
- No one's physical characteristics can be changed.
- Problems with the Scanner
- Malfunctions in the software
- There isn't any remote access available.
- Breaches in the security system
- False Positives

### Face ID

Facial recognition technology can change our future. However, like with any new technology, the deployment of this new system in society has its own set of challenges and risks.

- Privacy is at risk.
- Implies on the individual's right to privacy.
- Personal liberties are violated.
- Deficiencies in data security
- Fraud and other wrongdoing as a result of abuse
- Even though technology has advanced, it is still a relatively new concept.
- Errors may put innocent individuals in danger.
- It is possible to control technology.

## PROPOSED IDEA

### Finger vein Biometrics

It is possible to identify a certain person using just his or her finger vein biometrics. There is no one-size-fits-all solution. Because the biometric data is acquired from the blood arteries under your skin, the term "vascular biometrics" is also used to describe it. Haemoglobin, the iron-containing protein in the blood, changes colour when exposed to near-infrared or visible light. This is how it all comes together. Scanning the user's hands reveals their blood vessels. Encryption and storage of vein pattern data are done using computers.

How does finger vein biometric technology work?

Using images of a person's subdermal veins, biometrics can identify them. A monochrome CCD camera and near-infrared LED terminals are used to record the patterns. When the light absorbed by haemoglobin in the blood is reflected, the veins appear as lines. When a camera takes a picture, it sends the digital data to a database of photos that are similar to it.

For each finger, the data is compared to an image database that has been built up over time. This method is the same as the one used before. In milliseconds, the whole procedure is accomplished. These mobile device-integrated near-infrared camera systems may make it feasible to identify people safely and reliably from a distance.

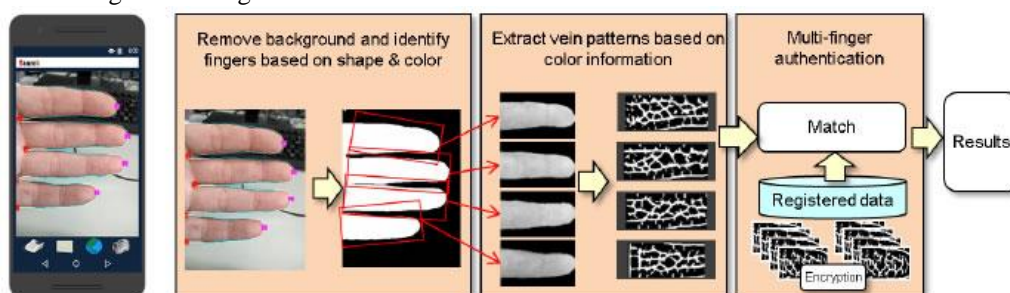
Unlike fingerprints, this method depends on the vein patterns that may be seen under the skin's surface. It is possible to verify that the person being recognised is a human being via this authentication procedure.

How finger vein recognition will eliminate biometric bias?

As a result, law enforcement is increasingly interested in facial recognition and AI-based biometrics. Bias in biometrics has long-term consequences that go well beyond daily usage. In an ATM or online banking transaction, a false positive or negative verification escalates the risk of fraud

Finger vein biometrics are completely impartial. An algorithmic misunderstanding leads to accusations of prejudice against a person's behavioural and biological characteristics, which is a kind of biometric bias, One way around this issue is to rely on your internal procedures. Vein biometrics uses a database of venous patterns to minimise the danger of systemic bias.

Block Diagram for finger vein Biometric



**DESIGN AND THINKING STEPS**

Design for finger vein biometric



Veins, like irises and fingerprints, are an individual's most distinctive physical characteristic. Leg veins in identical twins are not identical in size, shape, or colour. This makes it incredibly difficult to fake or manipulate with visible veins. There is little change in the form of people's bodies as they age.

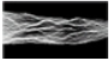




When you're ready to use the vein recognition technology, just press the button on the scanner with your finger, wrist, palm, or back of your hand. Infrared light is used by a camera to take a digital image, which is subsequently processed. Haemoglobin in your blood absorbs light, making veins seem black in photographs. The vein structure is utilised in the same manner as the other biometric kinds to build a reference template.

In hospitals, a machine measures veins' length and diameter. Radioactive particles are often used in medical vein imaging. Instead, to detect a person's fingerprints, biometric security scanners employ a light that resembles a remote control. For more information about infrared photography, you may check out NASA's extensive library.

**ADVANTAGES OF PROPOSED IDEA**

Advantages of finger vein biometrics

As opposed to other biometrics, Finger Vein offers several advantages, such as greater accuracy, more resistance to fraud, faster authentication times, and a more compact form factor. When Finger Vein Biometrics is compared to other kinds of biometrics, its advantages are clear:

Biometric Information	Authentication Method	Security	User Resistance	Cost	Privacy	Size of Device
	Uses finger vein patterns	High	Low	Medium	Very Private	Small to Medium
	Uses palm vein patterns	High	Low	Medium	Very Private	Medium
	Uses distinguishing points of a fingerprint	Medium	High	Low	No Privacy	Small
	Uses facial contours, location and shape of eyes and nose	Low	Low	Medium	No Privacy	Medium to Large
	Uses the pattern of radial features of the iris	High	High	Medium to High	Medium Privacy	Large

**CONCLUSION**

We may conclude that Hand ID and Vein Biometric identification are less effective than our present screen locks if we use them instead. Hand ID and vein biometrics are superior to existing technologies. Hand ID and Vein Biometrics expertise are a must.



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