



# International Journal of Innovative Research in Computer and Communication Engineering

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## A Survey of Iris Scanning for Authentication

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**ABSTRACT:** Authentication is a security process which requires high level of reliability. For this, biometrics is gaining increasing attention these days.

*Iris scanning* is one of the biometrics which is gaining importance nowadays.

Iris - An iris is an analyzing feature found in the colored ring of tissue that surrounds the pupil.

The main objective of Iris Scanning is to control access to an asset by requiring individuals to identify themselves through the unique biological characteristics of their iris. If the system recognizes the iris being scanned, the access is granted, else not. Iris Scanning uses no close contact between the user and the scanner.

In this paper Iris Scanning will be discussed in detail.

**KEYWORDS:** Authentication, Biometrics, Iris scanning.

### I. INTRODUCTION

Authentication is a method to improve the quality of security which is needed very much nowadays. Biometric is the most secured and convenient authentication tool. It is practically impossible to borrow, steal, forget or fake it. Biometrics deals with the trial of individual's unique physical characteristics (like finger prints, hand or palm geometry, retina, iris and facial characteristics) or behavioural characteristics (like signature and voice) to authenticate their identity.

As iris is an internal organ that is well protected, contains unique characteristics and is mostly flat and it has a fine texture (unique even for identical twins), it is considered to be amongst the most secured methods of authentication and identification.

Despite of whether the subject is wearing contact lenses or glasses, iris scans can be done easily. However, eye lids and eye lashes are important to be taken into account as both can vague the necessary parts of the eye and cause false information.

Iris recognition uses mathematical pattern-recognition techniques. IR illumination reduces 'specular reflection' from the cornea.

Iris scanning uses camera technology with slight infrared illumination, so it is different from the Retina Scanning. It takes the images of the detail-rich, elaborated structures of the iris. These images are encoded using mathematical and statistical algorithms. Finally, the previously stored images are searched from databases to match the encoded image. Thus, an individual can be identified explicitly.

### II. MARKET TRENDS

Iris recognition will achieve 16% market share i.e. the largest of any single biometric method and will be generating \$1.5 billion in annual revenues.

### III. CONCEPT

The iris scan technology is a combination of computer vision technology, pattern recognition, statistical inference, and optics. The iris can serve as a kind of living password that one need not remember but can always present.

In [1], it is described that the iris has many features that can be used to distinguish one iris from another. One of the primary visible features is the "trabecular meshwork", a radially divided tissue which is permanently formed by the eighth month of gestation. Another prominent feature is "chaotic morphogenesis" that occurs during the seventh month of gestation, which means that even identical twins have incongruous irises. One more feature is the "degrees of

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freedom”, i.e. 266 degrees of freedom, the number of variations in the iris. Next feature is “protection”, the iris is protected behind the eyelid, cornea and aqueous humor and is also not subject to the effects of aging.

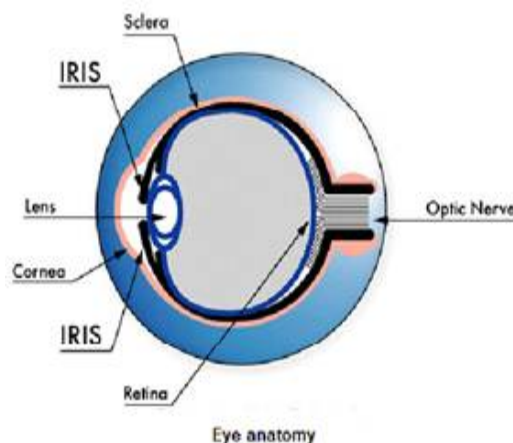


Fig.1 Concept

## IV. WORKING

As described in [2], there are two stages in the iris scanning process for authentication/access: First is the Enrollment process and the second stage is Verification/Recognition.

### Enrollment Process:

The enrollment process is fully automatic and just one-time task. Irises of eyes are digitally scanned two times. Firstly with ordinary light and secondly with infrared lights. Infrared lights get all the minute details of iris structure/pattern that are not fetched by ordinary lights. These two digital photographs are enrolled and then the system starts analyzing process for about 240 unique features for each individual. These unique iris features are then converted into 512 digits long Iris Code. These codes are stored in database by the iris scanning system.

Iris Recognition Enrollment Process is made up of 3 steps:

1. Capturing the image
2. Defining the location of the iris and optimizing the image
3. Recording and differentiating the image.

- *Capturing the Image*

In this step, the image of an iris is captured. A standard camera using both visible and infrared light can be used to capture the image of the iris. The position of the camera should be kept between three and a half inches and one meter to capture the image.

- *Defining the Location of the Iris and Optimizing the Image*

In this step, the location of the iris is defined. The iris recognition system identifies the image of the iris. This involves removing areas that are covered by the eyelids, any deep shadows and reflective areas. The following diagram shows the optimization of the image:

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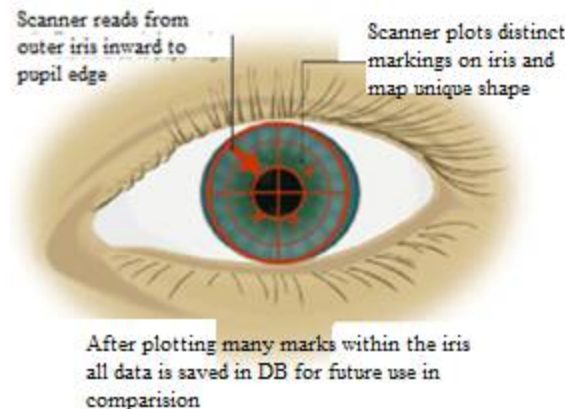


Fig.2 Working

- *Storing and Comparing the Image*

This step stores the images in database. In order to describe the information of an image a 2-D Gabor wavelet is used to filter the image. Then this image is segmented into hundreds of phases. This algorithm takes away only 93 degrees of freedom which means 173 degrees of freedom are still there to identify the iris. Then this record is stored in a database. In order to compare an image with the saved image, this same process is followed.

### Verification/Recognition Process:

The Verification/Recognition process as described in [3], in which you just need to stand in front of a iris scanner and get an image of your eyes (iris). The system extracts your Iris Code and matches it with the stored images in its database. When it matches, you are identified positively. Here, a pattern matching algorithm is used.

## V. RELATED ISSUES

Originally in late 1980s, iris scan was first used to identify prisoners in a Pennsylvania prison. They accepted to use iris scanning technology to move more quickly through security checkpoints. The same reason led the different airports to use this technology like Charlotte/Douglas International Airport in North Carolina; the Flughafen Frankfurt Airport in Germany; and London's Heathrow airport.

In 2005, Rep. Robert Andrews (D-NJ) introduced the Iris Security Scan Security Act of 2005. It aimed to give States grants to where they could use iris scan records of convicted criminals for various purposes. On February 6, 2006, the bill was referred to the House Judiciary Subcommittee on Crime, Terrorism and Homeland Security, to convince that the bill may achieve homeland security or anti-terrorism objectives.

## VI. MERITS AND DEMERITS

### Merits:

1. Predictable- The iris is mostly flat, and is controlled by two complementary muscles (the sphincter pupil and dilator pupil). Thus, the shape of iris is more predictable than that of the face.
2. Protected- It is an internal and well protected organ which can never be damaged or changed. This can never be achieved in case of fingerprints.
3. Low false match rate- The fine texture of iris makes very low chances of false matches. Even identical twins have different iris textures.
4. Stability- The fine texture of iris remains extremely stable till lifetime.

### Some more advantages:

- a. Very high accuracy.



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- b. Verification time is generally less than 5 seconds.
- c. The iris of a dead person depreciates very fast, so verification for a person to be alive is not needed.

## Demerits:

- 1. Compatibility- Iris scanning is comparatively a new technology and is incompatible with many systems.
- 2. Distance issues- Iris recognition is very difficult to carry out from more than the prescribed distance.
- 3. Bothersome application- The scanners are often tough to adjust and can become bothersome for multiple people.

## Some more disadvantages:

- a. Intrusive.
- b. Need of large memory.
- c. Very expensive.

## VII. APPLICATIONS

- 1. National border controls: There, the iris is used as a living passport
- 2. Computer login, Cell phone and other wireless-device-based authentication
- 3. Secure access to bank accounts at cash machines
- 4. Ticketless travel and Premises access control
- 5. Driving licenses and Credit-card authentication
- 6. Forensics; birth certificates; tracing missing or wanted persons
- 7. Automobile ignition and unlocking
- 8. Anti-terrorism
- 9. Secure financial transactions
- 10. Internet security

## VIII. FUTURE SCOPE & CONCLUSION

### Future Scope:

In the increasing demand of fast scanning, the iris scanning system leads. It is future of all the biometric systems as it takes least time and gives accuracy in result.

### Conclusion:

An iris can be effectively used in scanning systems. It is an internal well protected part of an individual's eye. So, it can identify an individual efficiently. Unlike the retina, which lies at the back of the eye and requires a detailed scan, the iris is easily scanned with simple camera technology. There is no need of physical contact needed with the scanner in this technology. An individual simply stands within range and an image is collected and analyzed.

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