



## Biometric Comparison Guide

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TOLERANCE

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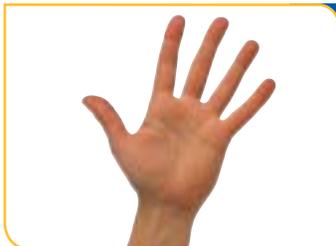
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### Iris Recognition vs. Facial Recognition

#### Overview

Facial recognition technology has gained publicity post 9-11 for its ability to “scan” large crowds and populations (random travelers in airports, those attending public events such as the Super Bowl, etc.) As such, it can be useful as a non-invasive attempt to “pick out” those who might fit a similar description within a database, making it a good “surveillance” technology.

However, facial recognition is relatively easy to fool. Age, facial hair, surgery, head coverings, and masks all affect results. For this reason, it will most likely remain a surveillance tool instead of a baseline identifier, and will not be used for critical 1: all match applications such as border control, Simplified Passenger Travel (SPT) or restricted access.



#### **Strengths of Facial Recognition**

- Effective for surveillance applications:
  - Provides a first level “scan” within an extremely large, low-security situation.
  - Easy to deploy, can use standard CCTV hardware integrated with face recognition software.
  - Passive technology, does not require user cooperation and works from a distance.
  - May be able to use high quality images in an existing database.

#### **Weaknesses of Facial Recognition**

- Lighting, age, glasses, and head/face coverings all impact false reject rates.
- Even in surveillance applications, lower accuracy results in multiple candidate returns in large populations. As a result, secondary processing is required for surveillance operations.
- Privacy concerns: people do not always know when their picture/image is being taken and being searched in a database — or worse, being enrolled in a database. Can be used without explicit opt-in permission.

#### **Strengths of Iris Recognition**

- Opt-in: subjects agree to enroll and participate, reducing privacy concerns.
- Proven highest accuracy: iris recognition had no false matches in over two million cross-comparisons, according to Biometric Product Testing Final Report (19 March 2001, Center for Mathematics and Scientific Computing, National Physics Laboratory, U.K.)
- Ability to handle very large populations at high speed: IrisCode® databases can handle very large 1: all searches within extremely large databases.
- Convenient: all a person needs to do is look into a camera for a few seconds. A video image is taken which is non-invasive and inherently safe.
- The iris itself is stable throughout a person’s life (approximately from the age of one); the physical characteristics of the iris don't change with age.





### Iris Recognition vs. Fingerprint

#### Overview

Fingerprint technology has been widely accepted — primarily due to its historical use within the law enforcement community, and the existence of the AFIS database.

Fingerprint readers are not ideally suited to handle the large variation of populations that need to be enrolled. “Outliers,” or those in the population that deviate from the mean, can be an inherent barrier to enrollment or recognition.

In large-scale deployments it takes many minutes, not seconds, to conduct a single search and a search may require ancillary data (such as age, sex, etc.) to partition the database for more speed. Further, multiple candidate matches may be returned. A back up identification method is often needed to handle the resolution of these multiple matches.

In a high volume, high speed environment, fingerprints do not have the accuracy, reliability or ability to handle large, diverse populations as is needed for critical transportation applications such as border control, Simplified Passenger Travel (SPT) or restricted access. For these reasons, the best use of fingerprint technology within the transportation industry may be background checks.



#### Strengths of Fingerprints

- Widely accepted by civil law enforcement and forensic government applications (the AFIS database); as such, fingerprints are excellent for background checks.
- Can provide a relatively low false rejection rate and false acceptance rate when used in populations with a low incidence of “outliers” (however, large groups or groups of varied by race and gender are an issue).
- Wide range of vendors and solutions.
- Ability to enroll multiple fingers.

#### Weaknesses of Fingerprints

- Fingerprint is not as accurate as iris recognition —
  - Fingerprint false accept rate varies by vendor, and is approximately 1 in 100,000. Iris recognition false accept rate is 1 in 1.2 million statistically.
  - Most high-end fingerprint systems measure approximately 40-60 characteristics; iris recognition looks at about 240 characteristics to create the unique IrisCode®.
- Iris recognition can perform 1: all matches in a high speed environment, whereas fingerprint searches take much longer, may require filtering, and may return multiple candidate matches.
- The long association of fingerprints with criminals makes this biometric an uncomfortable method of authentication for some people.
- Most systems require physical contact with a scanner device that needs to be kept clean (hygiene issue).
- The large number of players (different algorithms) means no fingerprint standards exist. Iris recognition has one core standard, which is flexible and open to all partners, and has been the foundation for Oki, Panasonic and LG hardware solutions.
- Based on occupation, trauma or disease, individual fingerprints may be obscured, damaged or changed — meaning some people may need to enroll multiple times over the course of their lives.



- Fingerprint readability also may be affected by the work an individual does. For example, transportation workers such as mechanics, food workers, or maintenance workers may present fingerprints that are difficult to read due to dryness or the presence of foreign substances, such as oil or dirt, on fingers.

#### **Strengths of Iris Recognition**

- Proven highest accuracy: iris recognition had no false matches in over two million cross-comparisons, according to Biometric Product Testing Final Report (19 March 2001, Center for Mathematics and Scientific Computing, National Physics Laboratory, U.K.).
- Ability to handle very large populations at high speed: IrisCode® databases can handle very large 1: all searches within extremely large databases.
- Convenient: all a person needs to do is look into a camera for a few seconds. A video image is taken which is non-invasive and inherently safe.
- The iris itself is stable throughout a person's life (approximately from the age of one); the physical characteristics of the iris don't change with age.
- Total Cost of Ownership: iris recognition carries extremely low maintenance costs and offers seamless interoperability between different hardware vendors; the technology also has the ability to work well with other applications.





### Iris Recognition vs. Hand Geometry

#### Overview

Hand Geometry gained some acceptance in the mid-1990's as one of the first biometrics — performing a variety of functions including access control, employee time and attendance and point of sale applications. While it is fairly easy to use, it is also rather expensive, and requires large, bulky equipment which can limit the application.

Hand geometry carries other challenges as well. Factors such as weather, temperature and medical conditions affect hand size. Hand size and geometry varies greatly over time, which is especially obvious in the very young and very old. Template updates are required to stay current. Readers cannot accommodate extreme sizes. These challenges make hand geometry unsuitable for the high volume, large population applications of the transportation industry.



#### **Strengths of Hand Geometry**

- Currently being used for functions such as access control, employee time recording and point of sale applications.
- Fairly easy to use.
- Reasonably high acceptance among users, and it is opt-in.
- Works in challenging environments.

#### **Weaknesses of Hand Geometry**

- Does not support 1: all matching with large databases.
- Weather, temperature and medical conditions such as pregnancy or certain medications can affect hand size.
- Hand size and geometry changes over time, especially in the very young and the very old.
- People are reluctant to place hand where many others have touched (hygiene issue).
- Extreme sizes are not accommodated in all hand readers.
- Fairly expensive and large equipment is required.

#### **Strengths of Iris Recognition**

- Hands-free operation.
- Proven highest accuracy: iris recognition had no false matches in over two million cross-comparisons, according to Biometric Product Testing Final Report (19 March 2001, Center for Mathematics and Scientific Computing, National Physics Laboratory, U.K.)
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- Convenient: all a person needs to do is look into a camera for a few seconds. A video image is taken which is non-invasive and inherently safe.
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