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Solution 1.

Biometrics: Biometrics are physical or behavioral human characteristics to that can be used to digitally identify a person to grant access to system, devices or data.

Examples: fingerprints, facial recognition, facial pattern, voice or typing cadence et.

Ping Identity survey, 92% of enterprises rank biometric authentication as an "effective" or "very effective" to secure Identity data stored on premises, and 86% say it is effective for protecting data stored in public cloud.

Finger vein: Finger vein is a biometric trait for individual recognisation from the security and sustability individual perspective It is a system that is most prominant among biometic methods.
The vein pattern in finger utilizes as a novel component for recognition and validation. The vein pattern for every human being is distinct

"A high degree of replication between recording the underlying pattern and consequent checking because the state of the finger surface (dampness or dryness) has insignificant impact"

There are following certain challenges that need to for the solution framework. The challenges are as follows:

1. changes in finger vein pattern also occur from shrink of vascular system.
2. If desease can affect the finger vein pattern. The diseases like tumors, diabetes, hypertension can affect finger vein
3. Vein recognition efficiency can be badly affected by the development in age

and the physical revolution in the body.

4. The _alteration_ of the _finger_ vein pattern shape occurs due to physiological growth.

5. _Image acquisition_ using _infrared imaging_ that can temporal change thickness and _contrast of finger_.

PROPOSED SOLUTION
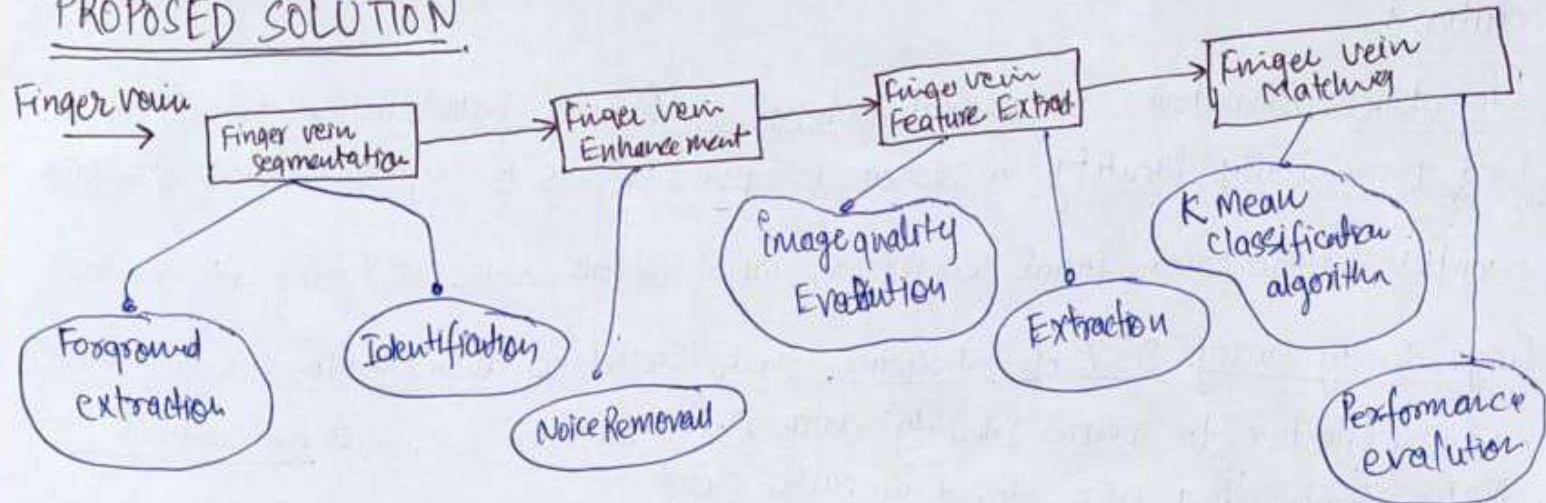
way forward

Different finger vein feature solution for solving challenges facing finger vein recognition system were proposed. This techique is simple and computationally fast.

Authentication

It refers to the process of _identifying_ an _individual_, usually based on a _username, password_, and some type of _additional verification_.

The following are methods for authenticate a person,

1. Multi-factor Authentication (MFA)
   - Require two or more independent ways to verifying identity.
   - Example :- ATM (first card is required, then PIN required)

2. Transaction Authentication
   - Seeks out reasonable mistakes when comparing known data about a user with the details of a current transaction.
   - Example : IP address overseas

3. Token Authentication

- A material device that is used to access secure systems.
- Example: Card, dongle or RFID chip.

4. Out-of-Band Authentication (OOB)

- utilizes totally separate channels, like mobile devices, to authenticate transactions that originated on a computer.
- Example: OTP verification, login logout etc.

Solution ②:

Control Objectives for Information & related Technology.
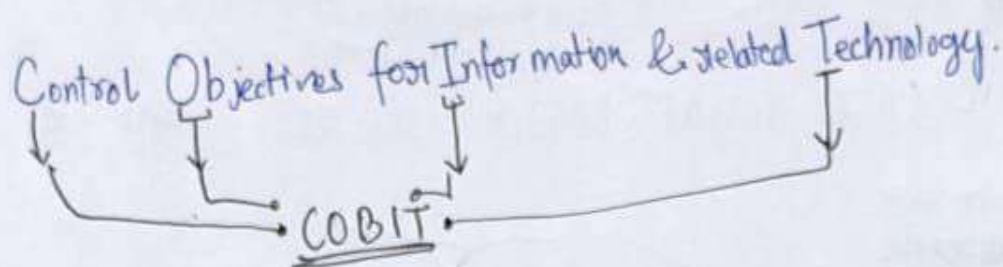
COBIT

COBIT

- A framework for developing, implementing, monitoring and improving information technology (IT) governance and management best practices.
- Published by the IT Governance Institute (ITGI) and ISACA.
- Provide a common language for business executives to communicate with each other about goals, objectives and results.

Information Security Management System (ISMS)

- describes and demonstrates your organisation's approach to Information Security.
- Includes how people, policies, controls and system identification.
- Address the opportunities and threats revolving around valuable information and related threats and assets.
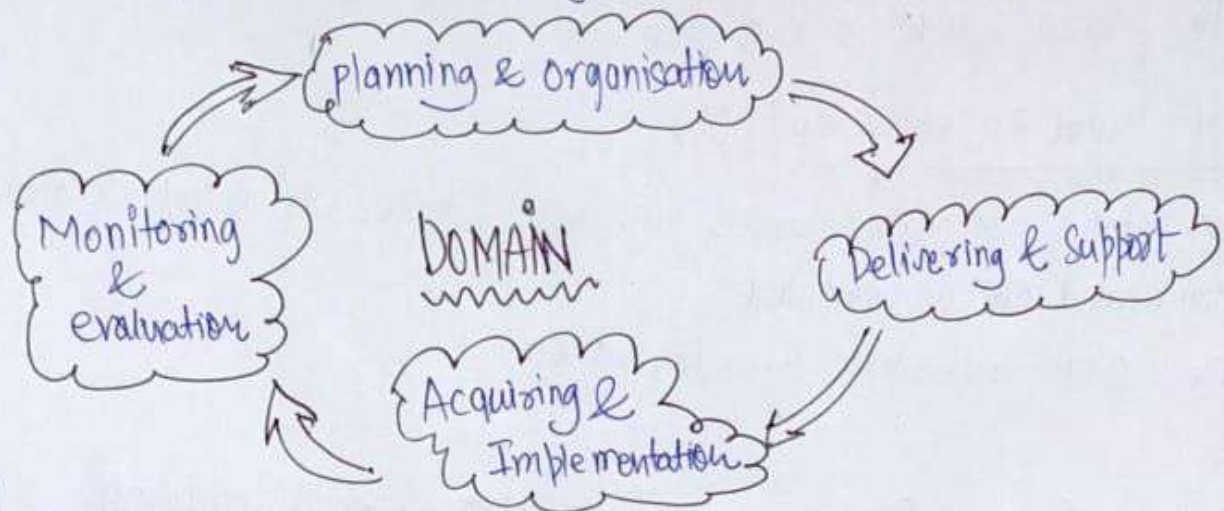
Example: ISO/IEC 27001 : 2013 (ISO27001) is the international standard that sets out the specification for an information security management system.

COBIT with respect to ISMS

- Ensure quality, control and reliability of information system in an organization
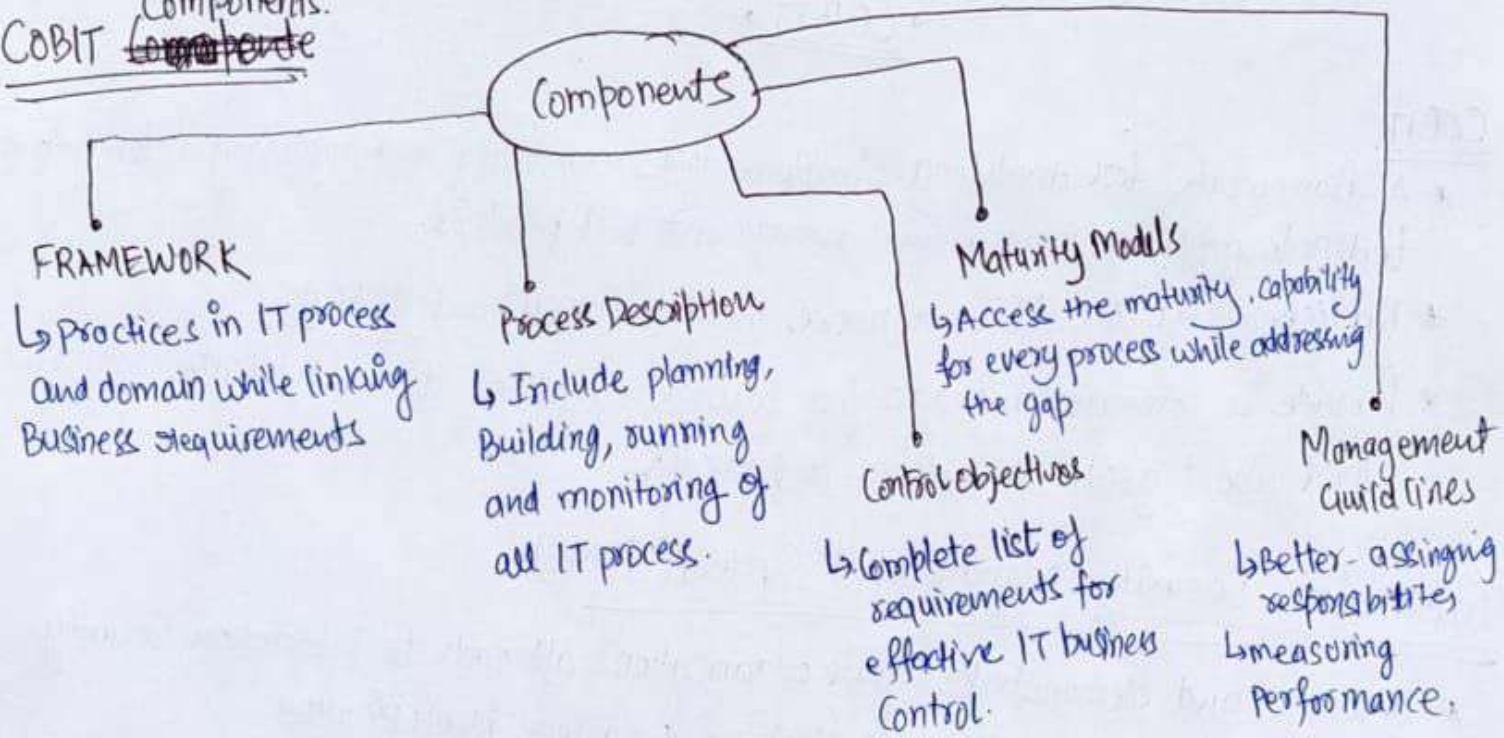
* model to deliver the value to an organisation.
* Control model gurantees the integrity of the information system.

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        ┌─────────────────────────┐
   ┌───→│ Planning & organisation │───┐
   │     └─────────────────────────┘    │
   │                                     ↓
┌──────────┐        DOMAIN        ┌────────────────────┐
│Monitoring│       ~~~~~~~        │Delivering & Support│
│    &     │                      └────────────────────┘
│evaluation│     ┌──────────────┐          │
└──────────┘     │  Acquiring & │          │
   ↑             │Implementation│←─────────┘
   └─────────────└──────────────┘
```

Standard
Acts :- ITIL, COSO, TOGAF, PMBOK, ISO27000, CMMI etc.

COBIT ~~Components~~ Components.

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                    ┌──────────┐
        ┌───────────│Components│──────────────┐
        │           └──────────┘              │
   ┌────┴───┐         │        │         ┌────┴────┐
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FRAMEWORK
↳ Practices in IT process and domain while linking Business requirements

Process Description
↳ Include planning, Building, running and monitoring of all IT process.

Maturity Models
↳ Access the maturity, capability for every process while addressing the gap

Control objectives
↳ Complete list of requirements for effective IT business Control.

Management Guild lines
↳ Better- assingning responsibilites
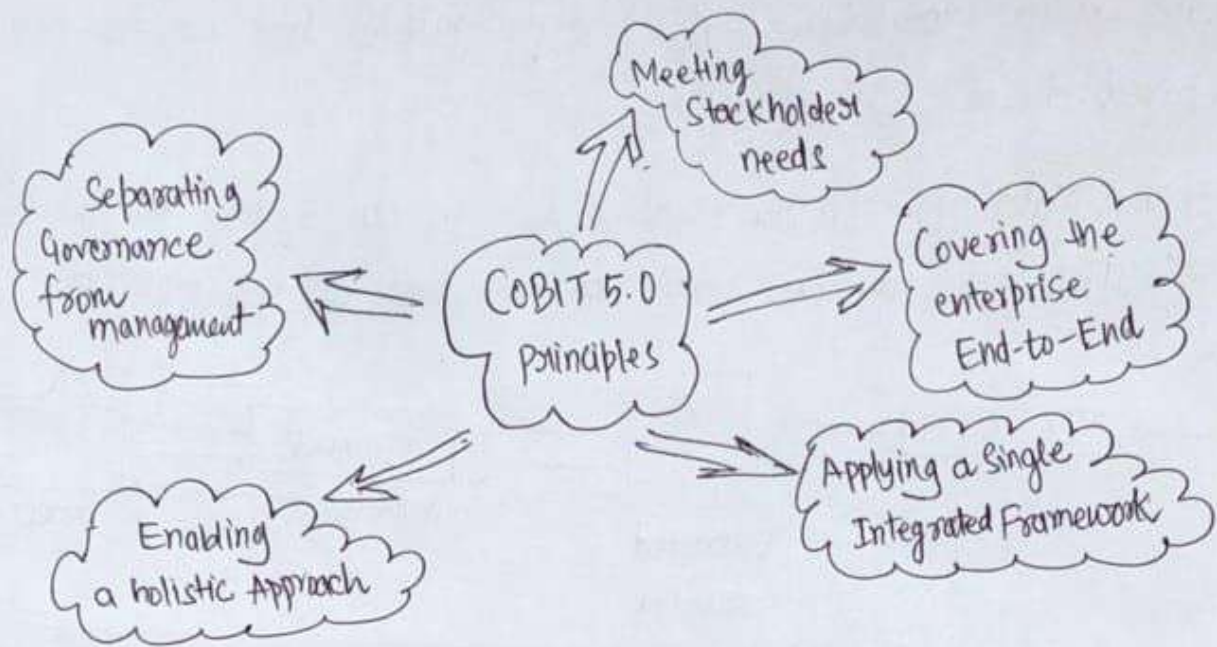↳ measuring performance.

Why is COBIT 5.0 the most renowned version ?

* COBIT 5.0 addressed all criticisms in a sustainable manner.
* It now encourages all organizations to govern and manage information in the most holistic and integrated manner.
* COBIT 5.0 has been appreciated for its ability to reduce the risk of IT implementations.

Diagram: COBIT 5.0 Principles connected to:
- Separating Governance from management
- Meeting Stockholder needs
- Covering the enterprise End-to-End
- Applying a Single Integrated Framework
- Enabling a holistic Approach

Way ahead

COBIT 5.0 is the exact solution the modern businesses are asking for. New business demand that risk scenarios are better met with the power of information.

Solution ③

"Biometric Recognition" refer to the process of establishing a person's identity based on their biometric data.

There exist four stages in a Biometric System.

1. **Capture:** A physical or behavioral sample is captured during enrollment, identification or verification process.

Diagram: Database → Preprosser → Preprossed/Preprocessed
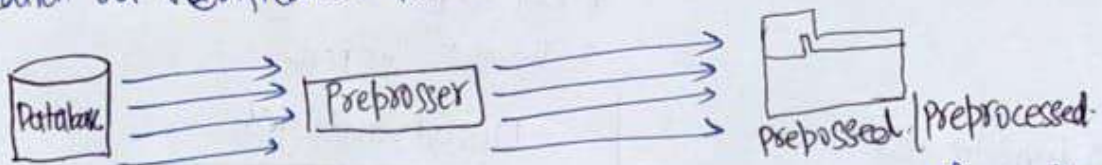
2. **Extraction:** In this stage, unique data is extracted from the sample and a template is created.

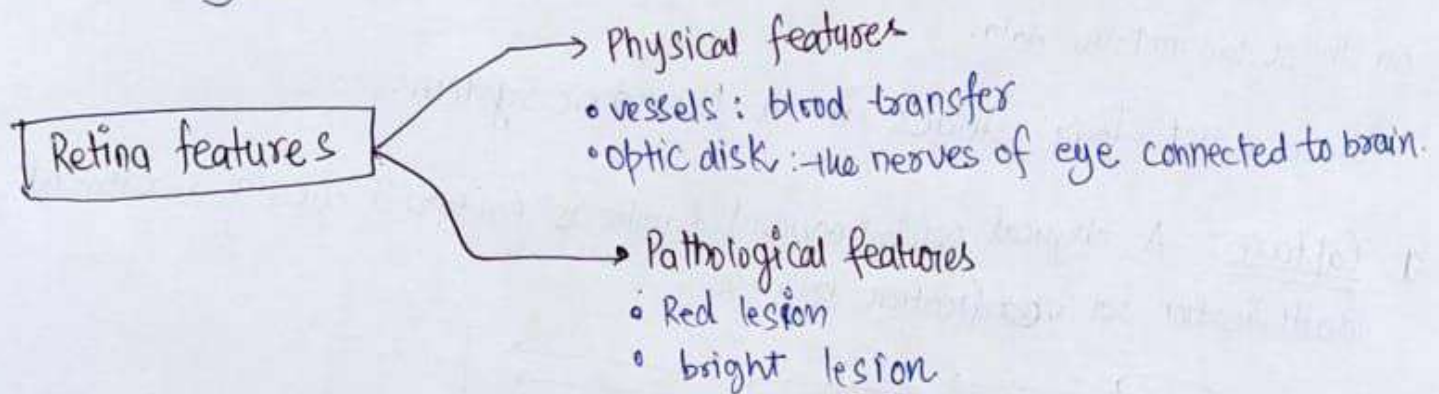Diagram: Preprocessed → Extractor → Extracted.
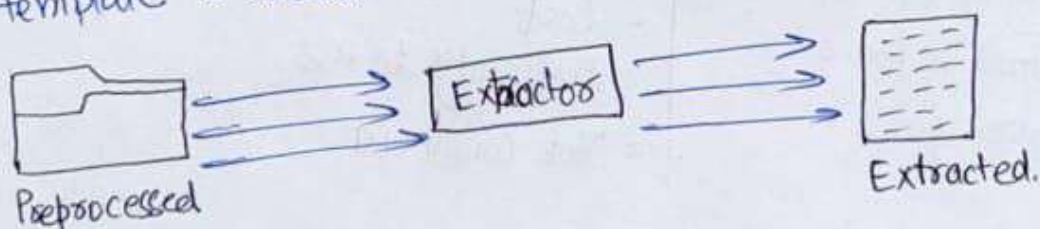
3. Comparison: In this particular stage, every iteration there are the templates is compared to new sample

4. Matching/Non-Matching: In the Final stage, In the system decides if the features extracted from the new sample are matched or non-matched.
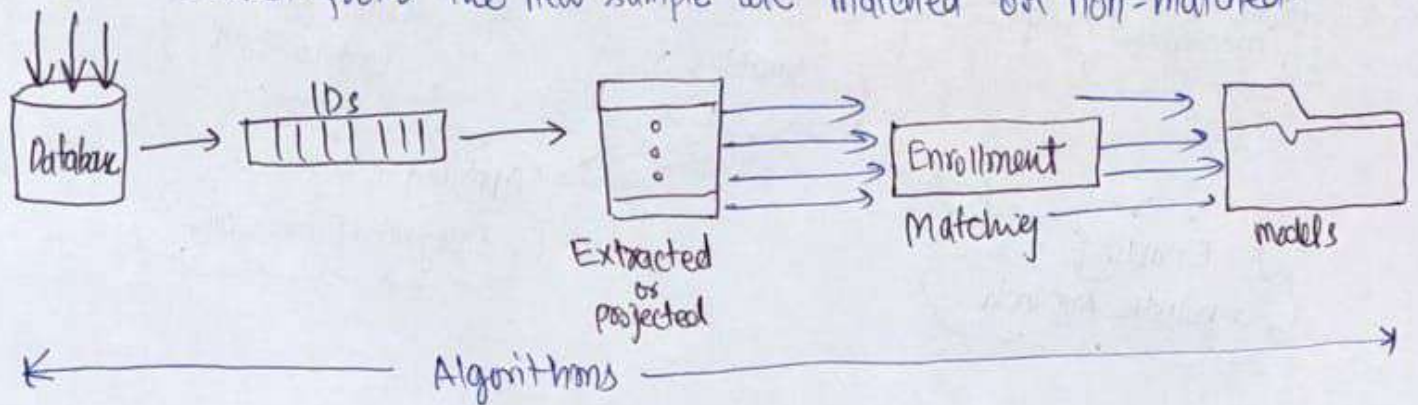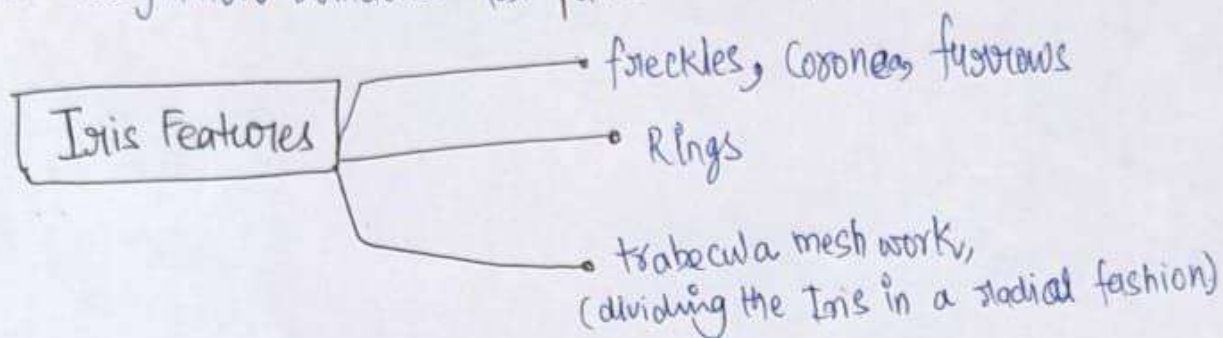

Solution ④.

Retina.

* The Human retina is a thin tissue composed of neural cells situated in the posterior portion of the eye.

* Retinal scanning is used to map the unique patterns of a person's retina.

Retina features →
→ Physical features
  • vessels : blood transfer
  • optic disk :- the nerves of eye connected to brain.
→ Pathological features
  o Red lesion
  o bright lesion

Advantages	Disadvantages.
• Small template	• Static design
• Stability of biometrics Sample	• Consumer perceptions
• Resistant to fraud.	• Cost
• Accuracy	• difficulty to use
	• Not convinent.

Iris:

* The human is a thin, circular structure in the eye, responsible for controlling the size and the diameter of the pupils.

* "Eye color" is the color of the Iris, which can vary for person to person.

* Iris recognition biometrics for patient Identification in healthcare

Iris Features
- freckles, Coronea furrows
- Rings
- trabecula mesh work, (dividing the Iris in a radial fashion)

Advantages	DisAdvantages
* High level of accuracy	* High Cost Capture devices or Inconvient device
* Capable of reliable Identification as well as verification.	* not easy to use since light sensitivity of humans
* Unique Structures for each iris	* potentially low contrast pattern in dark Irises
	* Accuracy decreases when users wear Eyeglass.

An image is formed on the retina with light rays converging most at the Cornea and upon entering and exiting the lens.

Rays from the top and bottom of object are traced and produced an inverted real image on the retina.