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ZKTeco

ZKTeco at A Glance

ZKTeco is a world-leading supplier of enterprise biometric verification technology, specializing in Hybrid-Biometric Verification technology.

ZKTeco is a global provider of products and solutions based on the entrance and exit time and safety management system of "People, Vehicles and Things".

Big data operation, AI-powered software platforms such as ZKBioSecurity, BioTime, etc., which are widely used in:

They serve over

60 Countries

and with

15,000,000 Clients around the world

Business **Government** **Smart City** **Hospital** ...

Main Business

— ZKBioSecurity, Access Control, Security Inspection, Entrance Control, T&A ··· —

ZKTeco

Fast Facts

15 R&D Centers globally

85 Branch Offices globally

180 Countries use our products

8 Countries have our storage centers

140+ Service Outlets

ZKTeco in Africa

Tangier, Morocco
Branch Office

Cairo, Egypt
Branch Office

Lagos, Nigeria
-Branch Office
-R&D Biometrics Center

Nairobi, Kenya
Branch Office

Johannesburg, SA
Branch Office

Fingerprint Recognition

ZKTeco offers own intelligent property rights based algorithms, in the meantime our templates are privately owned, ZKTeco never releases algorithms and template formats to any 3rd party, the reliability of ZKTeco algorithms is based on our 20-year algorithm development experience .

- **PIV Certificates**
- **Live fingerprint detection**
- **Quick recognition of dry, wet and rough fingerprints**

Finger Vein Recognition

Finger vein patterns are almost impossible to counterfeit because they are located under the skin's surface.

Main features of combining fingerprint and finger vein technogy

- Since finger veins are covered by skins and invisible to human eyes, there are lower risks of spoof or duplicated vein features, and it is even lower of the combination of fingerprint and finger vein features, which provide **higher anti-spoof ability**;
- **Suitable for large-scale users** : the combination of fingerprint and finger vein verifications can reduce rejection and failure of verification and enables applications with a large number of users;
- **Small storage space required** : the template of fingerprint and finger vein is lower than 2Kbyte.

3-IN-1 Palm Recognition
Powered by Computer Vision Technology

In 2016, ZKTeco first introduced the touchless palm recognition technology which was a breakthrough of touchless biometrics recognition, it was **the first and the only** recognition available.

- **Anti-spoofing Technology**

  All attacks are guarded throughout 3 layers :

  Palm Recognition → Palm Print Recognition → Palm Vein Recognition

- **Wide Angle Tolerance**

  +/-60 degrees in roll axis
  Slight angle twist in both pitch and yaw axes

- **Ultra-long Recognition Distance**

  Range of **10 – 60 cm**
  Less than **0.35s**

Visible Light Facial Recognition

Enhanced Visible Light Facial Recognition is the latest technology of ZKTeco, aimed to overcome shortcomings of previous facial recognition and achieve an all-rounded upgrade on whatever performance and reliability by using Deep Learning.

One of the rising biometric technologies!

New Height of Anti-Spoofing
- Anti Fake Video Attack
- Anti-Fake Photo Attack
- Multiple Biometrics

Speedy Recognition
- Ultra-fast real time < 0.6s
- High speed processing time

Proactive Facial Recognition
- Opening doors without standing in front of the camera
- Auto-recognizes Everyone

Wide Pose Angle Acceptance
- Extra wide angle recognition (+/- 30 degrees)
- Make-up, glasses ,etc
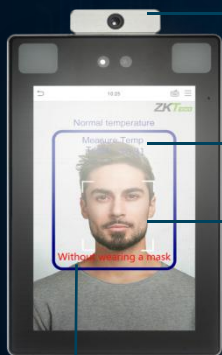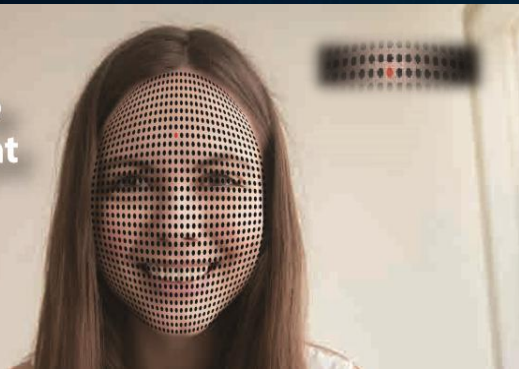
Touchless for Better Hygiene

Clinic, hospital, construction site, factory, etc

Support ZKBioSecurity
- Flexible Group Scheduling
- Multi-Location
- User-friendly mobile App
- Report

1024 Temperature Measurement Points

10,800 Temperature Measurement Points

Infrared Temperature Sensor

Infrared Temperature Sensor

Real Time Temperature Imaging

Temperature Value

Temperature Value

Mask Detection

Mask Detection
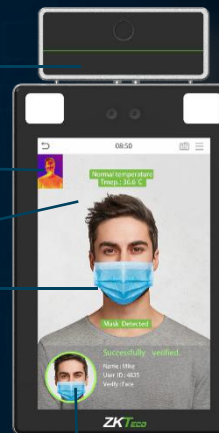
ProFace X [TD]

ProFace X [TI]

Face Detection
No need to touch the A&C terminal
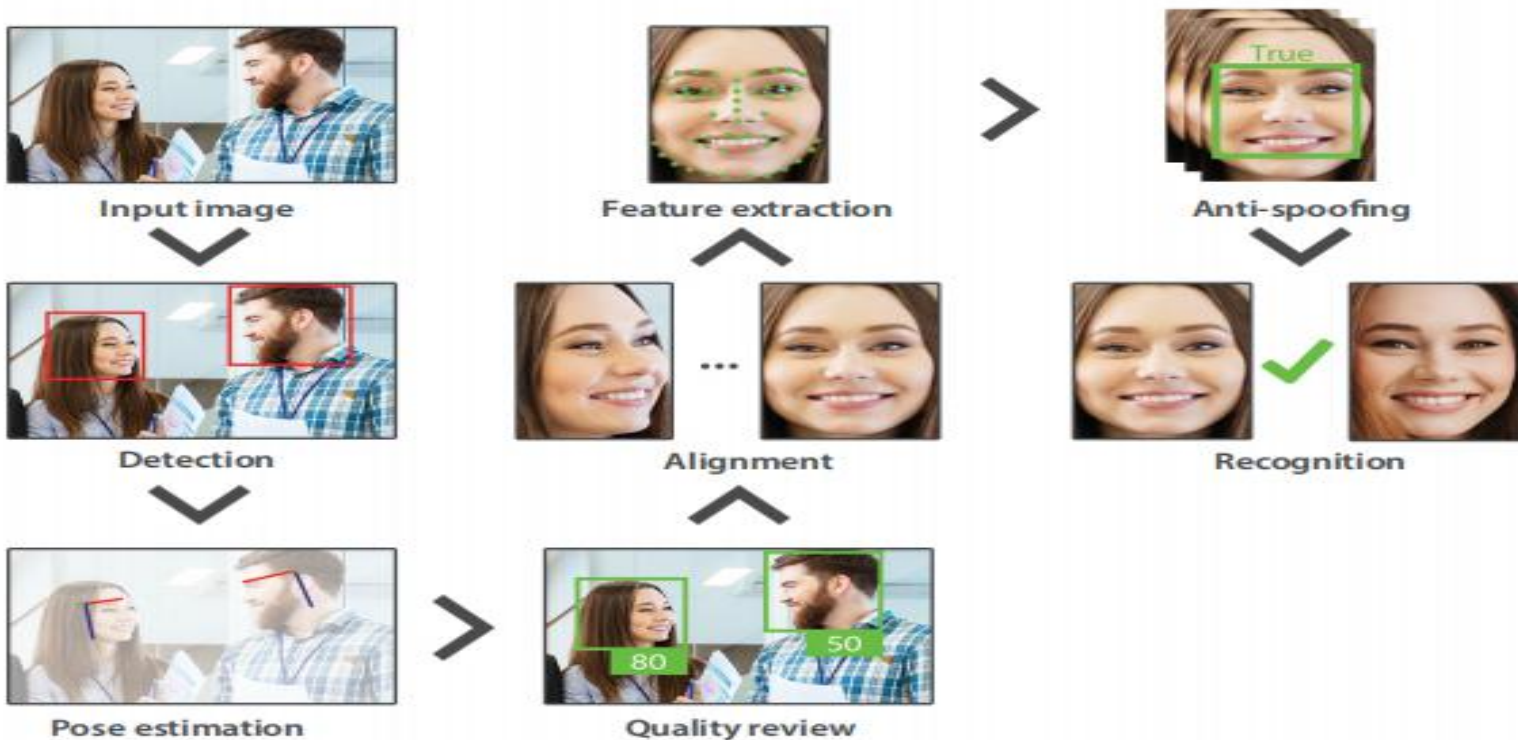Auto detection and identification of faces

Face Detection
No need to touch the A&C terminal
Auto detection and identification of faces

ZKTeco

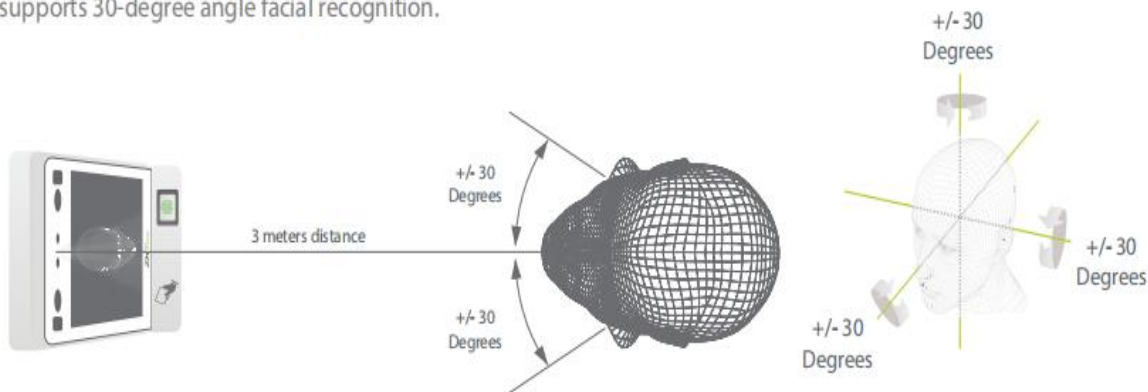# Step through the Enhanced Visible Light Facial Recognition

Traditional facial recognition will go through 4 main stages including detection, alignment, feature extraction and recognition. The Enhanced Visible Light Facial Recognition has newly incorporated multiple stages in order to complement the technology.

Input image

Detection

Pose estimation

Feature extraction

Alignment

Quality review

Anti-spoofing

Recognition

ZKTeco

Proactive Facial Recognition

Recognition distance up to 3m long and extra wide angle recognition

The recognition distance has been greatly extended up to 3 meters long, which significantly improves maximum traffic rate. While most of algorithms only support 15-degree angle facial recognition, ZKTeco supports 30-degree angle facial recognition.

+/- 30 Degrees

3 meters distance

+/- 30 Degrees

+/- 30 Degrees

+/- 30 Degrees

+/- 30 Degrees

+/- 30 Degrees

Selfie

Recognition Approved
Get access to door

Upload images while registration

How ZKTeco's Near-Infrared Facial Recognition Works

Step 1

Face Detection

Detecting whether the image contains any human faces through CNNs
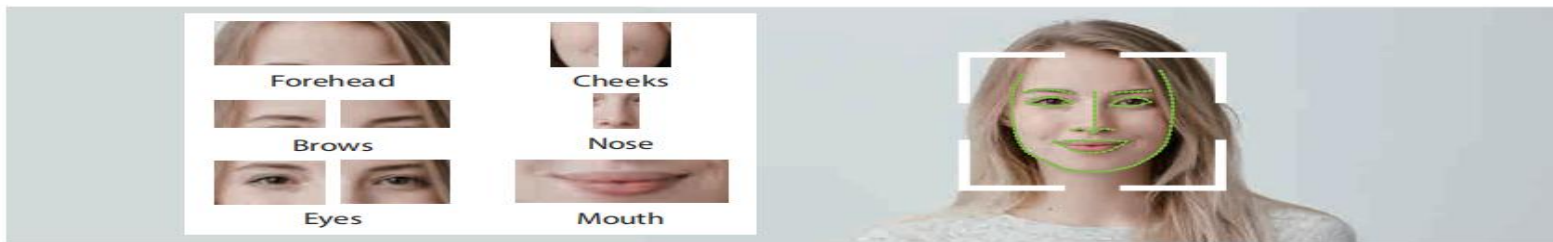(Convolutional Neural Network, details described below).
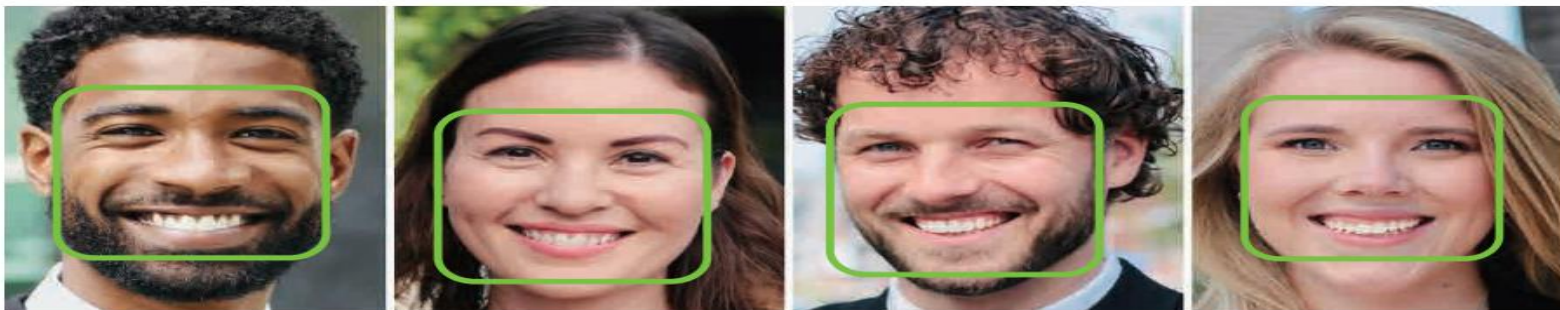
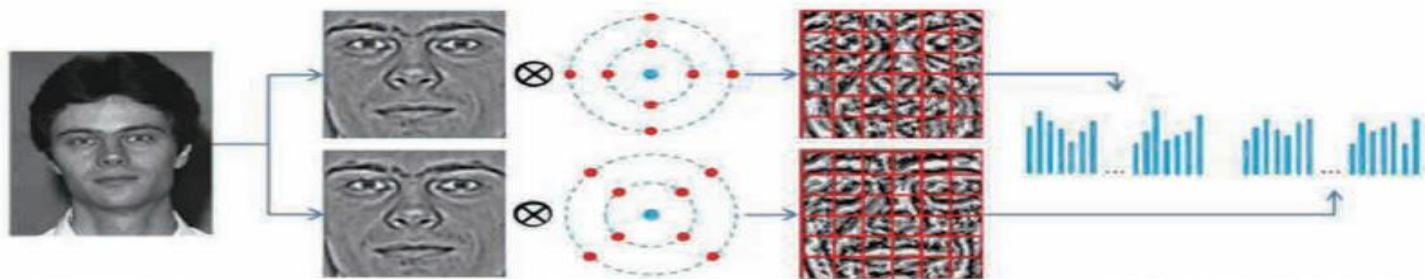## How ZKTeco's Near-Infrared Facial Recognition Works

Step 2

Face Landmarks

Finding the landmarks of the detected face. Landmarks can be 178 in amount, depending on the device.

Face Alignment

Aligning the detected facial image with the pre-saved facial templates to standardize images.

Original Image   Normalized Image   Dual Cross Encoders   DCP Code Maps   DCP Based Face Representation
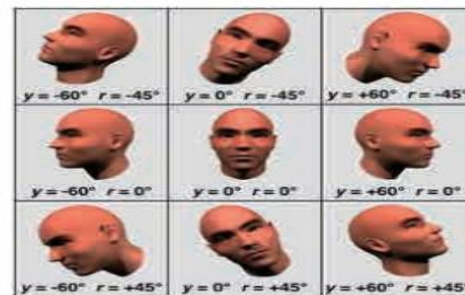
Features Extraction

Extracting feature points from the facial image by CNNs. The amount of feature points ranges from 178 to more than 2,000.
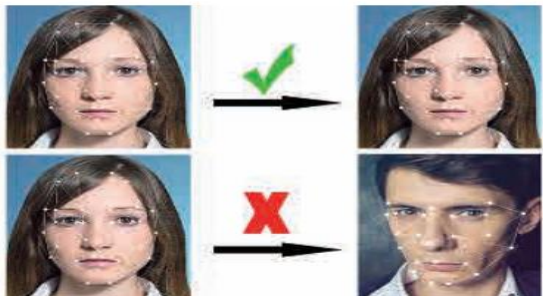

Face Tracking

Tracking the dynamic target whose face is detected. Modeling or motion modeling method are usually used. Moreover, tracking through skin color is also an easy and effective way.

How ZKTeco's Near-Infrared Facial Recognition Works

Step 3

Face Comparing process

To confirm the identity of detected facial image or search and compare the detected facial image with facial images in the database. This process will finally find out if there is a pre-saved image can match with the detected image and thus confirm the identity of the target.

Templates with Multi-dimensional Features

The algorithm uses multi-dimensional features as a registration template. Face elements acquired from up to 6 images will be recorded. The system will then generate and store the face template with multiple angles to increase the accuracy and speed of face detection and identification. Wearing hats, scarves and sunglasses is no longer an issue.
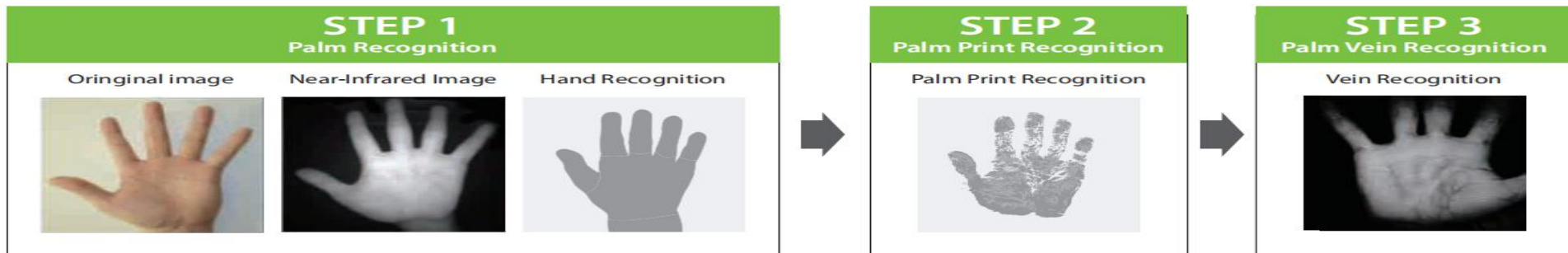
1   2   3   4   5   6
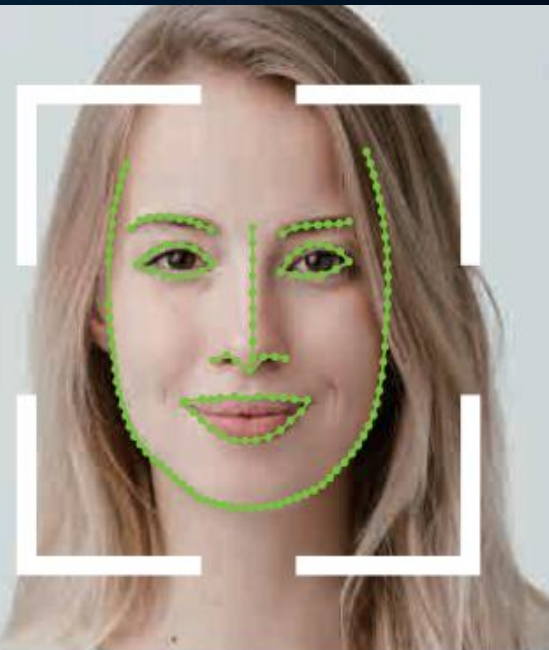
Face Recognition Speed

0.1s

Background

In 2016, ZKTeco first introduced the touchless palm recognition technology which was a breakthrough of touchless biometrics recognition, it was the first and the only recognition available. However, the previous technology was constrained by the angle tolerance and short recognition distance resulted in an imperfect user experience solution. After 5 years of R&D and the technological bloom of computer vision, in 2019 ZKTeco is going to launch the next generation 3-in-1 Palm Recognition Technology.

How Near Infrared Palm Recognition Works

STEP 1 Palm Recognition			STEP 2 Palm Print Recognition	STEP 3 Palm Vein Recognition
Oringinal image	Near-Infrared Image	Hand Recognition	Palm Print Recognition	Vein Recognition

Anti-spoofing Technology

With the help of near-infrared palm recognition technology, the anti-spoof ability has been greatly enhanced. The 3-in-1 combination of palm, palm print, and palm vein set an extremely high bar for spoofing attacks to pass through. All breaches are guarded throughout three layers as specified.

1st Layer - Palm Recognition

The latest algorithm contains the palm recognition function, it can identify whether the object is in proper **"palm" shape**, all the objects that are not in a proper "palm" shape will be identified as non-palm object and will be refused to process to the further recognition process.

2nd Layer - Palm Print Recognition

After the 1st layer recognition, the palm shape object will go for the second recognition process, the infrared camera will recognize the palm print, as palm print is one of the unique features points of human being, and is formed by hundreds of thousands of lines, accurate replication of palm print is extremely hard to be done, and **90% of the fake palm will be identified and rejected** in this stage.


3rd Layer - Palm Vein Recognition

In this stage, the infrared camera will be activated. Under normal sunlight, palm vein cannot be imaged, but under infrared light (wavelength 700 – 900mm), the palm vein will become visible as the deoxygenated hemoglobin in the blood exhibits stronger absorption characteristics than moisture in other tissues and tissues under infrared light. Using a near-infrared light source to illuminate the palm, the venous blood in the shallow layer of the palm absorbs most of the light, while the body tissue such as the skin absorbs light less and reflects the light back. Through the imaging of the image sensor, the venous blood vessels and other tissues are imaged with a strong difference in brightness, so that the structural distribution of the vein can be clearly distinguished. Hence the complication process to get a clear image of the palm vein, and the **vein image is extremely complex** which is involved with millions of vessels and some of the vessels are as tiny as a hair, it is almost **impossible to replicate** a qualified fake palm vein model to pass the recognition process.

Unique Palm Detection Algorithm

ZKTeco's palm detection algorithm can detect the user's palm from the left/ right, and front/ back. At the same time, the algorithm allows ZKTeco's palm recognition to have a high detection accuracy for the palm tension and slack. Its high tolerance for palm gesture will bring an excellent user experience.

+/-60° Yaw
+/-60° Pitch
+/-25° Bend
+/-60° Roll
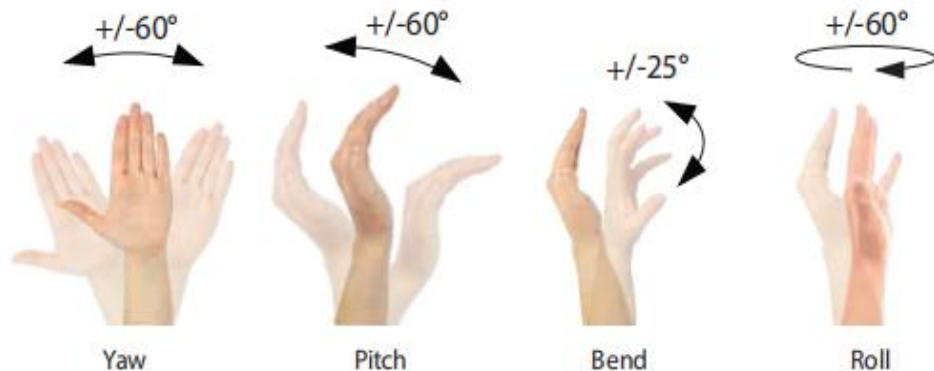
The palm recognition algorithm understands how palm looks like in different angles. Therefore, in this generation terminal, the angle tolerance of palm image can be extended to as wide as +/-25 degrees which is almost reaches the critical point of the widest-angle acceptance of palm posture.

50cm
+/-60°
+/-60°

50cm of recognition distance and extra wide angle palm recognition
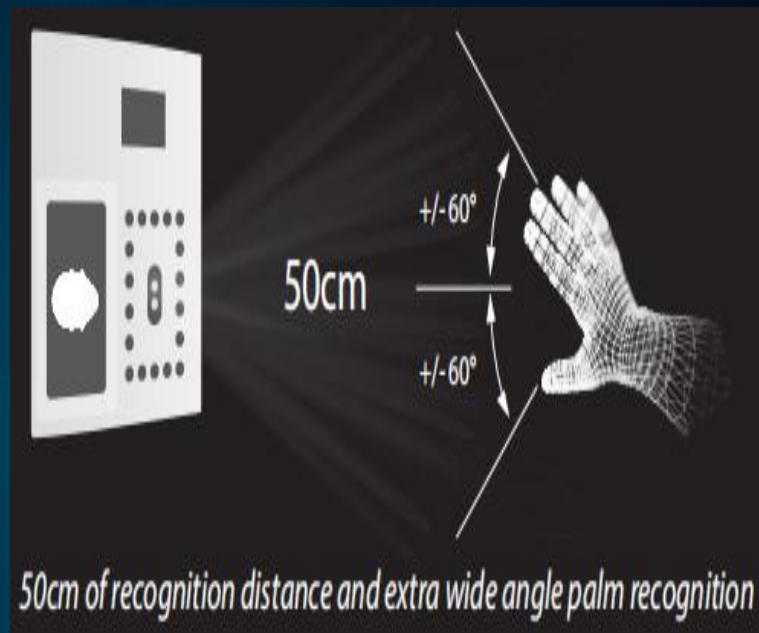
BIOMETRICS & COMPUTER VISION

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