Thermal Imaging body temperature measurement solution + Track and Trace Solution

NCS HK Team
Challenge on New Corona Virus

- High infection rate that can spread quickly in anywhere
- Cannot differentiate any potential virus carrier in community such as inside commercial buildings, government offices, schools, mass transportation or other public areas.
- Time consuming in measuring the body temperature of people entering the area of interests
Thermal Imaging Body Temperature Measurement

With this technology, public places for various entrances and exits can measure body temperature in a fast and effective way. It can also prompt out alert from the system automatically in case the body temperature in an individual has exceeded the normal level.

- **Rapid** body temperature screening
- **Early warning** of abnormal body temperature
- **High accuracy** of body temperature detection
- **High adaptability** environmental
Application Scenarios

The system can be applied to various areas where early detection of individual with fever symptom is necessary to prevent wide spread of the infection of virus.
Advantages of Thermal Imaging Technology

- High security
- Fast response
- High temperature measurement accuracy

Reduce the risk of cross-contamination caused by contact temperature measurement

Real-time temperature measurement, 7x24 hours monitoring

Measuring range: 30 °C ~ 45 °C
Temperature measurement accuracy:
± 0.5 °C, no black body
± 0.3 °C with black body
Principles and Installation Requirement

The thermal imaging human body temperature measurement system uses a black body as a reference temperature source for temperature measurement. The black body is installed in the field of view of the camera. The latter measures the temperature of the black body and uses it as a reference to perform temperature measurement and correction in real time to meet the requirement of high accuracy of human body temperature $\pm 0.3 \, ^{\circ}C$.

**Installation requirements**

1. The camera's thermal imaging lens is facing the black body's radiating surface
2. The camera installation should be higher than the black body and the top view angle is best
3. The black body should be located at the corner of the thermal imaging video
Solution Diagram

Simple Installation
- Deploy the Camera and Black body at site
- Workstation next to Camera to prompt alert

Enterprise Integration
- The monitoring at site will send the signal to a Monitoring Center for centralized monitoring
- Video footage can be stored

Small Scene at Site
- TPC-BF3221 (sound and light alert)
- Monitoring Workstation with DSS Express (alarm alert)

Monitoring Center
- DSS Express (alarm alert/video storage)
- Large screen display - instant screen

Human Body Temperature Measurement Black-Body
<table>
<thead>
<tr>
<th>Model</th>
<th>Main Specifications</th>
<th>Function Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH-TPC-BF3221</td>
<td>Thermal Imaging:</td>
<td>1. Automatic face detection and face temperature measurement;</td>
</tr>
<tr>
<td></td>
<td>- Detector resolution: 256 * 192</td>
<td>2. Double light fusion</td>
</tr>
<tr>
<td></td>
<td>- Lens focal length: 3.5mm / 7mm optional</td>
<td>3. Automatic sound and light warning when a suspected fever is found</td>
</tr>
<tr>
<td></td>
<td>- Temperature measurement range: 30 ℃ ~ 45 ℃</td>
<td>Come with Tripod</td>
</tr>
<tr>
<td></td>
<td>- Temperature measurement accuracy: ± 0.3 ℃</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Visible light:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Resolution: 1920 * 1080</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Lens focal length: 4mm / 8mm optional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Protection level: IP67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Power supply: DC12V / PoE</td>
<td></td>
</tr>
<tr>
<td>DH-TPC-HBB1</td>
<td>Temperature resolution: 0.1 ℃</td>
<td>High-precision blackbody</td>
</tr>
<tr>
<td></td>
<td>Temperature stability: ± (0.1 ~ 0.2) ℃ / 30min</td>
<td>Come with Tripod</td>
</tr>
<tr>
<td>DSS Express</td>
<td>Workstation with Monitor (i7 processor with Win10 O/S) Express Application software</td>
<td>1. Human body over-temperature alarm access;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Alarm event popup prompt</td>
</tr>
</tbody>
</table>
Main Products

Thermal Network Value Hybrid Bullet Camera
DH-TPC-BF3221

- 256x192 VOx uncooled thermal sensor technology
- Athermalized Lens (thermal camera), Focus-free
- 1/2.8” 2Megapixel progressive scan Sony cmos
- Support ROI, Motion Detection, Color Palettes
- Support measure body temperature,
- Measurement Accuracy: Max (±0.3°C, with black-body)
- Active deterrence with white light & siren
- Built-in 2/2 alarm in/out
- Micro SD memory, IP67, PoE

Human Temperature Measurement Blackbody
DH-TPC-HBB

- Working temperature: 40.0°C
  (Environment temperature +5.0°C ~ 50.0°C adjustable)
- Effective radiant surface: 70mm×70mm
- Temperature resolution: 0.1°C
- Temperature accuracy: ±0.2°C (single point)
- Temperature stability: ±( 0.1 ~ 0.2 )°C/30min
- Effective emissivity: 0.97
- Power supply 220VAC 50Hz 35W
- Net weight 1.8 kg
- Dimensions W110 mm× H120 mm ×D180 mm
- Ambient temperature/humidity: 0°C~40°C/ ≤80%RH
Human Temperature Measurement Blackbody

- The imported intelligent temperature control meter is used to control the temperature with high precision and good stability.
- The target surface is coated with high emissivity aviation coatings.
- Compared with the same type of products, cost-effective.
Advanced Integration – Tracking of Potential Carrier

1) Entrance
Camera detects fever case

2) Alert Send to Control Center

3) Activate Facial Recognition to match the staff database

4) Dispatch Security

5) To track and locate the individual by Facial Recognition from various cameras when he/she walks across different areas

Centralized Control Room
IVS-F7500-P
Face Recognition Server
IVS-F7500-P

- Technology
- Products
- Software Functions
- Face recognition Solutions
- Successful Case
IVS-F7500-P

Technology
AI application based on Human

Face Recognition
- Featured with the face modeling and the face recognition algorithm
- Application scene Entrance, identity check, public security
Typical Applications

- Identity check
- Access control
- Escaped prisoner arrest
- Visitor recognition
- Target retrieval
Face Detection

- The face is detected from the picture and the face is captured.
- According to the different face detection modes, it is divided into image stream and video stream.

Facial Attributes
- Age, Glasses, Expression, Gender

Video stream
- Use the normal camera, transfer the video to the server, then it encodes, detects faces and output the human face image.

Image stream
- The network camera completes the face detection and sends the intercepted face images to the server.

IPC capture two images to IVS:
One is the full view image, one is the human face image.
Feature Modeling

All feature vectors are integrated into one feature face, it calls feature modeling.

Feature Vector
- Feature points extracted from a picture
- The number of feature points is from 128 to 1024
- In general, the more features, the higher the recognition rate

Face recognition IPC : 128
IVSS : 256
IVS : 512

Modeling capabilities
- Modeling capabilities : 100 pcs/s
  (It means the sever access 100 face detection camera)
- CPU : 50pcs/s, GPU : 100-300 pcs/s
Feature Matching

A server has a feature modeling capability of 100 pieces per second and a dynamic base of 300,000 pieces, so the device needs to have a matching capability of 1 million x 300,000 = 30 million pieces per second.
Face recognition Topology

- Supports Ordinary IPC
- Supports Face Detection IPC
- Supports Image Search
- Supports Feature Search
- Supports Video Analysis
- Supports Dynamic Matching
- Supports Real-time Deployment

- Ordinary IPC
- Face Detection IPC
- Face Image
- Face Video

- Image Detection
- Face Recognition
- Feature Modeling

- Data Storage
- Face Recognition Server
- Face Database

- Snapshot large & mini image

- Upload facial feature

- Facial feature of the snapshot
- Standard facial feature

- Feature Matching

- Platform
**IVS-F7500-P Highlights**

**Architecture**
- GPU Tesla P4, using GPU P4 for intelligent deep learning and computing, offers amazing energy efficiency 60 times higher than CPU.

**Access Capability**
- Supports 100 channels of face capture camera access.

**Dispatching Ability**
- Dynamic comparison, support for real-time 100 channels picture stream, 300,000 face deployment and comparison.
- Static comparison, support 30 million static libraries.

**Comparison Method**
- Support 1:1; 1:N; n:N for comparison
Model: IVS-F7500-P
BOM : 1.0.01.18.10153
Update model: IVS-F7500

- All-in-one, including servers, software, and authorizations.
- Do not sell software separately.
- Supports up to 100 streams of pictures
- 20 million static libraries
- 300,000 face black list (99 libraries) real-time alarm
Tesla P4 can provide very high energy efficiency for very large-scale data centers.

- A single Tesla P4 server can replace 13 CPU servers.
- The total cost can save over 800%.
Facial Attributes

- Age
- Glasses
- Expression
- Gender

High Index Multiple Features

- Dynamic comparison: 99%
- Effective identification: regardless of black and white, color photo, interpupillary distance greater than 20 pixels
- Static Chart: 95% in the first place
- Face structuring: Accuracy 99%

Performance

- Standard photo
- Black and white photo
- Different races
- Face capture
**IVS VS IVSS**

### System-level server
**IVS**
- Intel Xeon Gold 5120 × 2
- NVIDIA Tesla P4, 24x faster than TX1
- 128G, up to 512G upgradeable
- 100 channels
- Take 512 feature points, high recognition rate
- 100 faces per second
- 99 libraries, 300,000
- 20 million
- 20T

### Embedded platform
**IVSS**
- Embedded CPU
- TX1
- 16G, Upgradable to 54G
- 32 channels
- Take 256 feature points
- 32 faces per second
- 20 libraries, 100,000
- no
- Need to buy another hard drive
Face server client function highlights:

- Server Add, Camera Add
- Face search
- Face matching, matching pattern 1:1; 1:N; n:N
- Support for custom face database, support for adding, modifying and deleting
- Supports camera control to ensure that a channel can be compared in real time
- Supports uploading videos and compares faces with video analysis
Step 1: Open client

Step 2: Click "Add"

Step 3: Click "Add"

Step 4:
Port: 11180
Default username: admin
Default password: abc123
Add IPC

Step 1

Step 2: Click “add”

Click

Tick

Protocol: “Dahua3”

Analysis: “Snap”
Real-time interface

Click the stretch arrow

Real-time preview

Compare the result

Snap the picture
Real Time Detection with No Mask & High Temperature
Click the icon

Select IPC

Filter condition

click “search”

Show the result
Comparison result search

Click this icon

Choose IPC

Choose the date

Click "search"

Show the result
Database query

- Click icon
- Select database
- Filter condition
- Click "search"
- Show the result
1:1 Comparison

Click this icon
1: N Comparison

Click this icon

Click "add"

Select Face library

result
Add the face library

Click this icon

click "add"

Add library
New product: IVS-F7200-P

Architecture
- GPU Tesla P4, using GPU P4 for intelligent deep learning and computing, offers amazing energy efficiency 60 times higher than CPU.

Access Capability
- Supports 30 channels of face capture camera access.

Dispatching Ability
- Dynamic comparison, support for real-time 30 channels picture stream, 300,000 face deployment and comparison.
- Static comparison, support 10 million static libraries.

Comparison Method
- Support 1:1; 1:N; n:N for comparison
New product: IVS-F7500-2P

Architecture
- GPU Tesla P4 x 2, using GPU P4 for intelligent deep learning and computing, offers amazing energy efficiency 60 times higher than CPU.

Access Capability
- Supports 200 channels of face capture camera access.

Dispatching Ability
- Dynamic comparison, support for real-time 200 channels picture stream, 300,000 face deployment and comparison.
- Static comparison, support 80 million static libraries.

Comparison Method
- Support 1:1; 1:N; n:N for comparison
AI Products-Camera

Deep Learning Algorithm
- With the GPU chip, the effect of capturing faces is greatly enhanced.
- At the same time capture 16 faces.

Solution
- face capture, picture streaming to the back-end server for face comparison.

Multiple extraction
- 7 attributes: age, gender, wear glasses, expressions, charm, beard, masks.
- face attributes 5 expressions: calm, happy, sad, surprised, angry.

DH-IPC-HF8242FP (FN) -FD
DH-PLZ21C0-D (Lens)
AI Camera-Face Detection

- Real-time face detection and snapshot, several snap modes optional;
- Support to capture 16 face images at one time (in 1 frame);
- Support head down/side face detection and snapshot (vertical deflection angle up to 45° / horizontal deflection angle up to 90 °)
### Installation Requirements

<table>
<thead>
<tr>
<th>Snapshot position L</th>
<th>Height H</th>
<th>Lens F</th>
<th>Look down α</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>2m</td>
<td>9mm</td>
<td>10°</td>
</tr>
<tr>
<td>5.5m</td>
<td>2.5m</td>
<td>16mm</td>
<td>10°</td>
</tr>
<tr>
<td>7m</td>
<td>2.8m</td>
<td>20mm</td>
<td>10°</td>
</tr>
<tr>
<td>8.5m</td>
<td>3m</td>
<td>25mm</td>
<td>10°</td>
</tr>
<tr>
<td>11m</td>
<td>3.5m</td>
<td>32mm</td>
<td>10°</td>
</tr>
</tbody>
</table>
AI Products-Platform

- Record all persons records that pass through a specified zone
- Support search target via uploading an face image
- Create an individual walking path for designed person according to their face & time info

DSS PRO

Face Recognition

Person Info.

Gender: Male
Age: 55
Glasses: Yes
Expression: Calmness

Similarity 90%

Who are you?

Where are you?
Analyze For Human

Software Functions
DSS-PRO Platform Features - Real-time Capture

- Real-time capture
- Face search
- Search by image
- Tracking
- Statistics

Live video

Face comparison

Real-time capture
DSS-PRO Platform Features - FaceSearch

- Real-time capture
- Face search
- Search by image
- Tracking
- Statistics
Search By Image

Choose face library

Import pictures

Click search

Search by image: Select a face picture and compare it with the face library

Total 20 records
Tracking

Real-time capture

Face search

Search by image

Tracking

Statistics
Statistics

Real-time capture

Face search

Search by image

Tracking

Statistics

DSS PRO

Month Report

Gender

Age

Daily
Weekly
Monthly

Report type

Day

2017/03/01 - 2017/05/17

Gender

Age
Face recognition Solutions
How to select AI products for project

Project Scale

Small Scale
- Channel < 4
  - FR+NVR
    - IPC-HFW8242F-FR
- 4 ≤ Channel ≤ 16
  - FD+IVSS
    - IPC-HFW8242F-FD
    - IVS7008-1T
    - IVS7008-8T
    - IVS7016-1T
    - IVS7016-8T

Middle Scale
- 16 < Channel < 32
  - FD+IVSS
    - IPC-HFW8242F-FD
    - IVS7008-1T
    - IVS7012-2T
    - IVS7016-4T

Large Scale
- Channel ≥ 32
  - FD
    - IPC-HFW8242F-FD
    - IVS-F7000-P
    - IVS-F7200-P

This solution is the simplest and is mainly used for the application of road lock linkage, access control release, police control, etc. The scene is usually buildings, campus, community, temporary police control points.

Application:

![Security Check](image-url)
Face Recognition Solution – Medium scale Topology

Application:

Opportunity: upgrade the old CCTV system and video stream
New project, image stream

DSS PRO → Switch → IVSS
4 <Channel<32

Picture

Storage
Client
Display

All In One

Face Detection camera
HF8242F-FD
Face Detection camera
HF8242F-FD
Face Recognition Solution - Large Scale Topology

Safe City solution, Bank Solution, Airplane Solution server cluster application can be adopted to uniformly manage data and call data, so as to avoid data being stored separately in different NVR, resulting in disastrous user retrieval experience.

Channel ≥ 32

Application:
Uzbekistan university Project
Qatar Metro Project
Myanmar financial project