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HTD - High Temperature Detection

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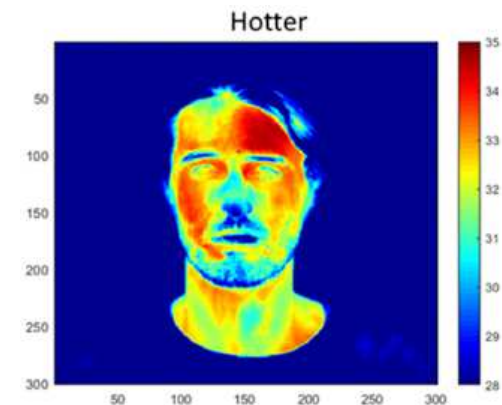
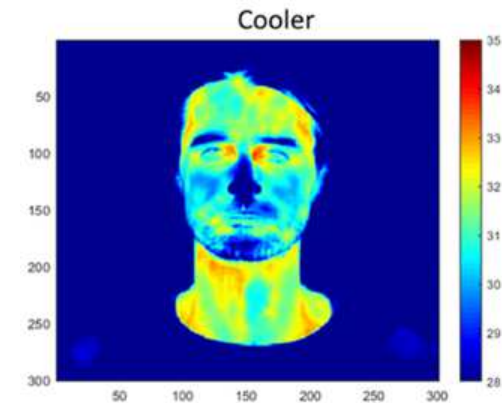


Use case

Accurately and remotely find people with high temperature

In crowded places, or entry/exit to areas of critical importance such as borders, airports, ports, ships, power-stations ...

- To provide reassurance and confidence to staff and customers
- To protect frontline staff / employees
- Allow appropriate decisions to be made as to how that person might be handled or screened.
- Identity those who were in close proximity of that person – to aid contact tracking and tracing while preserving their anonymity and privacy



What solutions are available today ? And limitations

Infra red sensors

- ± 0.5 °C to ± 1 °C - cheap
- Have very narrow field of view
- More suitable for handhelds at short range
 - ➔ Close range (0.5m to 1m)
 - ➔ Not accurate enough. Too many false negatives/positives

Thermal camera + RGB camera

- Accuracy of ± 0.5 °C or worse – without blackbody device(*) – expensive
- Accuracy of ± 0.3 °C – best case – with a blackbody device – more expensive
- A blackbody device is large, has to be installed within view of the camera, has a wait time before starting, needs annual calibration, and may need recalibration after cleaning.
 - ➔ Accuracy can be an issue if high volume of persons / passengers
 - ➔ Such solutions are not designed for people but are re-purposed from other industries

(*) *Blackbody device : a calibration device, that provides a known temperature reference in the scene*

HTD : Combines two world class Thales technologies and expertises

High Grade Thermal Imaging

- Detection and Identification of people and things in conditions of full daylight to complete darkness
- Highly accurate measurement of temperature
- Real time HD resolution output
- In use in:
 - Search and Rescue (Land, Air and Sea)
 - Security for Critical National Infrastructure
 - Surveillance and targeting systems
 - Pilot's night vision for cars and aircraft



High accuracy face recognition

- Tracking of human faces in a view
- Isolation of individual faces
- Biometric face matching
- In use in:
 - Border Control gates and kiosks
 - Airline and cruise line self boarding
 - Access control for secure sites
 - Identification in public spaces

HTD solution from THALES – what is it ?

High accuracy temperature detection

- Fusion of facial recognition and thermal imaging for greater accuracy and easier recognition of persons
- Uses spacial temperature signature across face for better accuracy
- No black body – hence easier to use
- Face recognition algorithm can also verify face mask use
- A sw solution that can be used with different cameras
- Developed and tested with data collected in hospitals and with expert inputs from medical clinicians

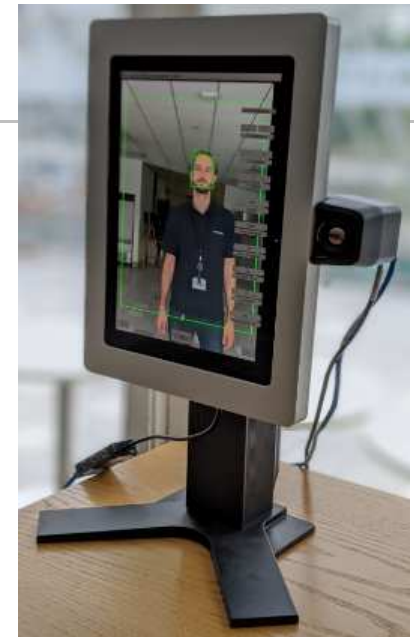
Standalone or integrated with Security Digital Platform

- For aggregation of data across multiple check points
- For detecting, processing and displaying big data, to help implement COVID-19 measures.
- Cloud based for fast response

Available for POCs/trials



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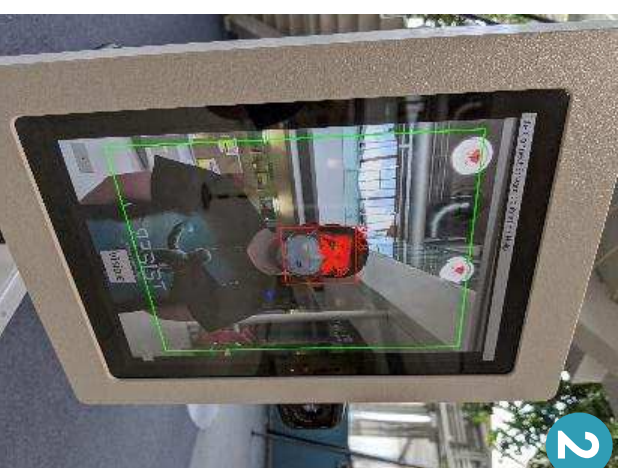
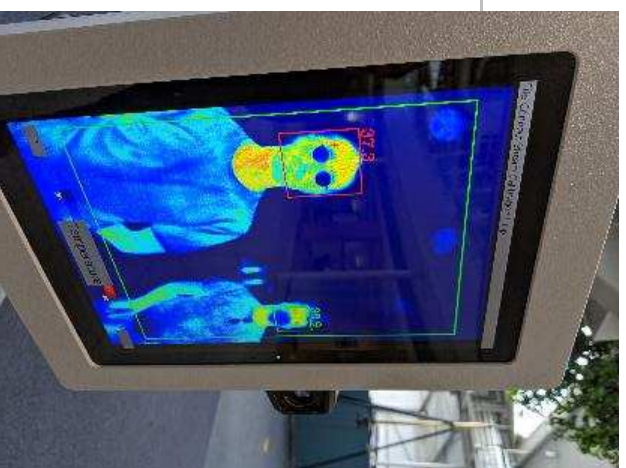


HTD views

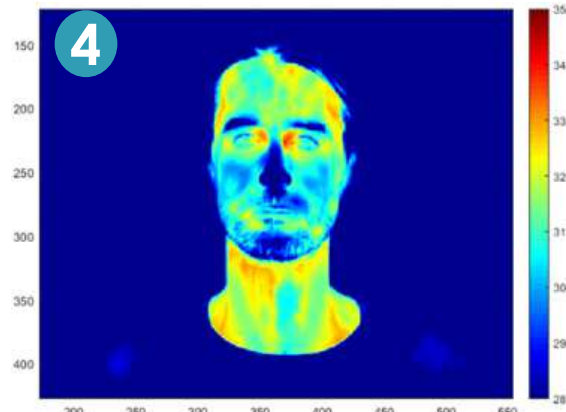
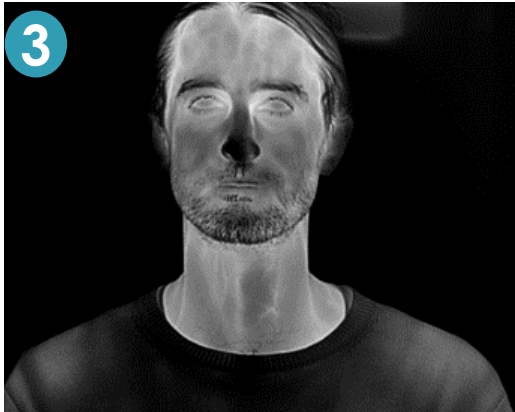
- Single person
- Multiple persons
- Thermal or RGB image
- With mask (1)
- Fusion thermal+RGB (2)



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How it works



- 1 Regular facial image captured
- 2 Facial recognition tracks and saves faces
- 3 Thermal Image captured
- 4 Temperature reading of key facial areas
- 5 Combined to provide an easy-to-see composite image showing relative facial feature temperatures NOT just a simple threshold.



Key differentiators

Thermal / Visible image fusion so that operator can easily recognize the person

- Show on the visible image the 'hot parts' of the face in red – for better / immediate recognition

(*RMS Accuracy of ± 0.3 °C without a blackbody device – smaller footprint, no maintenance

- Blackbody devices are big, not portable, costly – are remote from camera so setup is more spread out
- Blackbody devices need yearly maintenance, need recalibration if touched/cleaned, takes some time to heat up
- Often implemented as open loop, therefore there is no feedback of the blackbody temperature (which can drift) to the wider system which reduces accuracy

(* RMS : root mean square

Superior RMS accuracy ± 0.1 °C without a blackbody device

- **With enhanced algorithm and advanced self calibration** – not just a simple threshold
- HTD measures temperature of multiple points on the face, not just a maximum, and use correlation techniques to closely predict human body temperature. Works also with glasses and face masks
- Less affected by changes in ambient conditions (cold or hot weather)

Detection on the move, at a distance, and in unmanned areas

- Remote detection of high temperature avoids the need for control points where potentially infected people gather together

Can be connected to our face recognition platform for subsequent recognition

- Those who were in close proximity to that person could also be stored to aid with "contact tracing" if so required.
- Faces of high temperature individuals can be stored for processing as a later step by health officials.

Developed and tested with data collected in hospitals and with expert inputs from medical clinicians

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Why accuracy matters : Definition of Terms

Threshold

- Manual or automatic temperature cut-off
- 37.2 °C is often defined as a low threshold for fever

True Detections

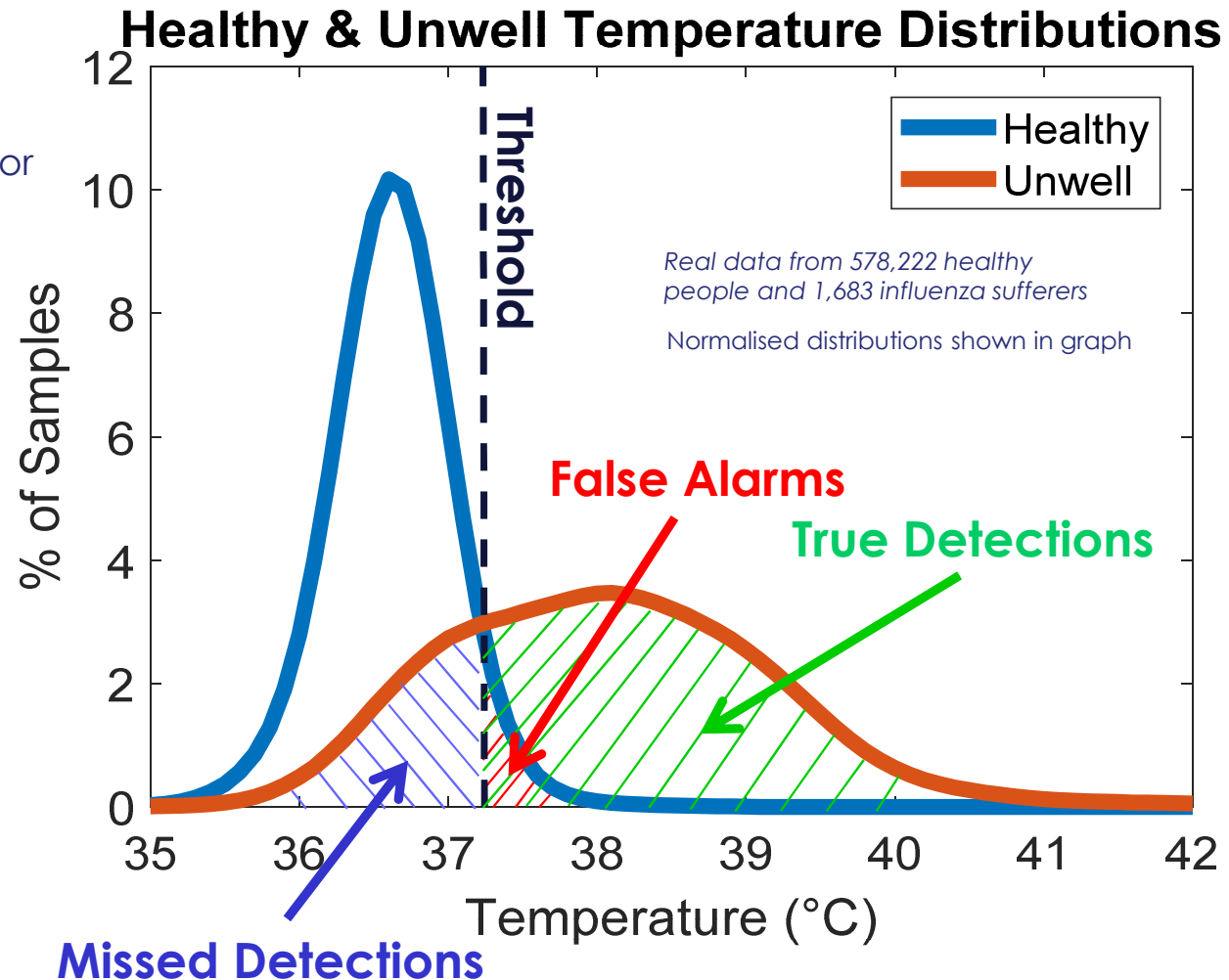
- People who are unwell and have been correctly identified as such by a system

False Alarms

- People who are well and have been incorrectly identified as unwell by a system

Missed Detections

- People who are unwell but who have not been picked up by a system
- This can be due to
 - Not showing an increased temperature when unwell
 - Threshold being set too high in a system



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Accuracy : the real impact is more false alarms

For 50,000 passengers per day

$\pm 0.3\text{ }^{\circ}\text{C}$ vs $\pm 0.1\text{ }^{\circ}\text{C}$

2.5x as many unnecessary retests

(1611 more false alarms)

→ 20% more missed detections (5-8)

→ Workload : 3.3+ persons

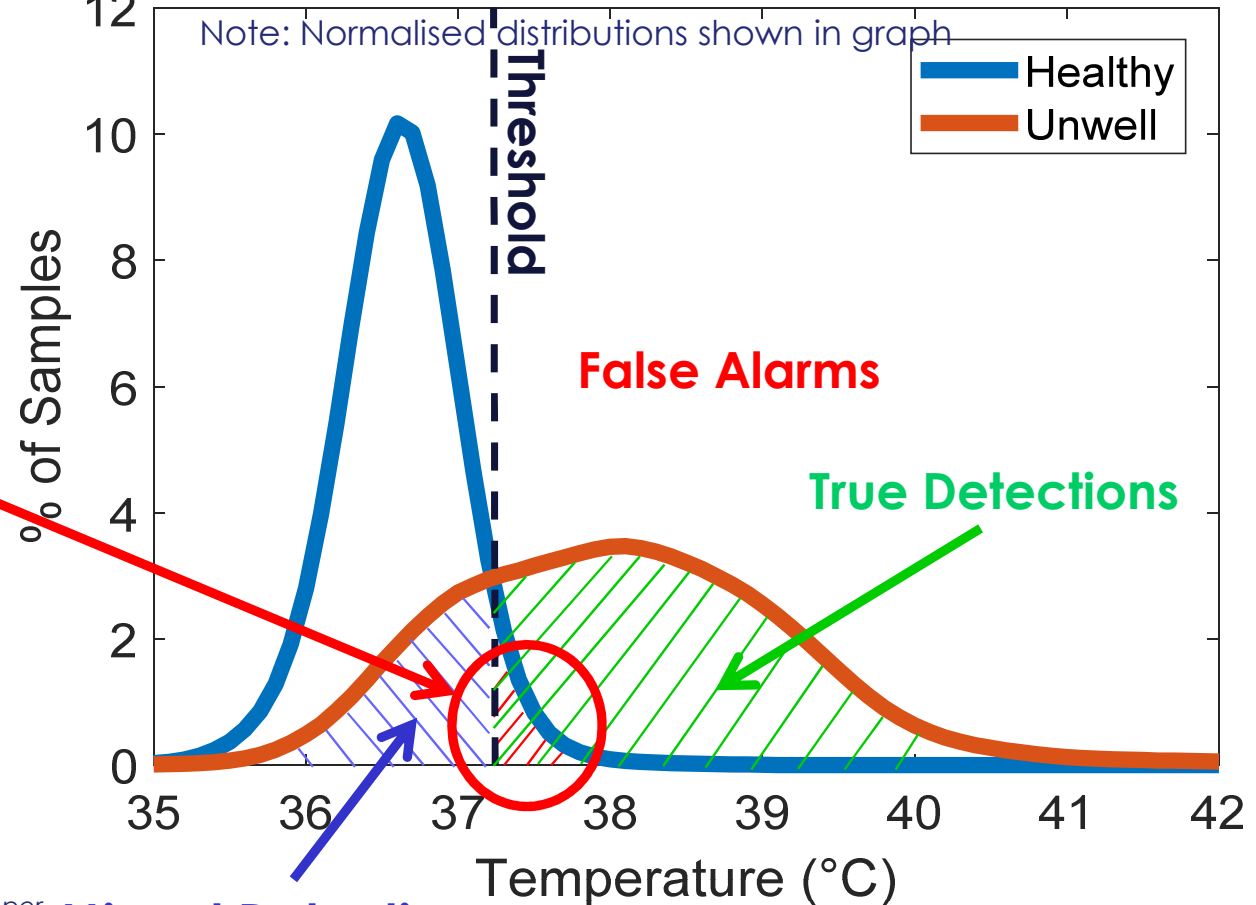
$\pm 0.5\text{ }^{\circ}\text{C}$ vs $\pm 0.1\text{ }^{\circ}\text{C}$

5x as many unnecessary retests (6765 more false alarms)

→ 44% more missed detections (11-16)

→ Workload : 14+ persons

Healthy & Unwell Temperature Distributions



Missed Detections

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- Figures for threshold at 37.5. If 37.2, figures are higher
- Best case workload to handle re-tests, assuming 8 hrs work day, 1 min per false alarm, and assuming these persons can cover all gates (not true in an airport)

4 HTD offers for 4 different use cases

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	Single person	Multiple person
Standard Accuracy +/- 0.3C	HTD standard single ± 0.3°C Gate access control – low volume (< 1000) Transient proximity, Less sensitive e.g. enterprise buildings	HTD standard multi ± 0.3°C Queue monitoring Less confined, transient e.g. Schools, Railways, ...
Advanced accuracy +/- 0.1C	HTD advanced single ± 0.1°C Gated access control High volume of passengers / visitors More confined areas – Fast flow needed e.g. airports, ships, hospitals,... e.g. staff / crew	HTD advanced multi ± 0.1°C Queue monitoring Confined and/or Fast flow e.g. airport, cruises, ...

HTD offer content

Included : Stand alone system with HW, SW & cameras

- Provides high temperature detection & Face mask detection

Additional Options

- Face matching – Software update
- Security Digital Platform - Security Box - server and software for aggregation of data across multiple check points

Maintenance 15% per annum

- Upgrade to new face and thermal algorithms anytime

Volume discount available

Refer to your key contact for pricing

Can integrate with SDP for bigger picture (Security Digital Platform)



Take-aways: Why Thales HTD?

- Greater accuracy means more detections, less reprocessing
- Thales algo ignores others things in view
- Thales algo measures using the most reliable facial features (not the hottest)
- Own self-calibrator means easier installation and maintenance
- Can be part of a bigger system from Thales, e.g face recognition or enterprise security platform.
- Made in Europe/N.America

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Thank You

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