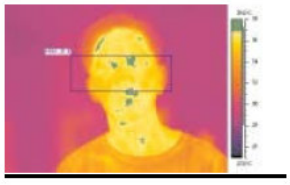
BODY ELEVATED TEMPERARTURE DETECTION BY THERMOGRAPHIC CAMERA

SARS APPLICATION
(Severe Acute Respiratory Syndrome)



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I Severe Acute Respiratory Syndrome: SARS

Severe Acute Respiratory Syndrome (SARS) is a respiratory illness recently reported in Asia, North America, and Europe. A quickly developing fever greater than 38°C is an early warning sign of SARS. Other early symptoms may include headache, an overall feeling of discomfort, and body aches. Some people also experience mild respiratory symptoms. After 2 to 7 days, SARS patients may develop a dry cough and have trouble breathing.

The primary way that SARS appears to spread is by close person-to-person contact. Potential ways in which SARS can be spread include touching the skin of other people or objects that are contaminated with infectious droplets and then touching your eye(s), nose, or mouth. This can happen when someone who is sick with SARS coughs (or sneezes) droplets onto themselves, other people, or nearby surfaces. It also is possible that SARS can be spread more broadly through the air or by other ways that are currently not known.

SARS is a very contagious disease and therefore spreads rapidly at places where large crowds gather such as airports, train stations, hospitals, schools, and factories. The aim is to detect possible SARS patients as early as possible to reduce the possibility of infecting others.

An infrared camera is a simple and very effective tool to detect people infected with SARS at an early stage of the disease.

II Presentation of our SARS detection solution

Our solution, THV A20M – SARS, is an “All in One” solution, based on the last generation radiometric camera, made in Sweden (European product):

- Microbolometer Premium ULIS sensor, manufactured in Grenoble (France)
- Optical unit with internal reference and compensation of integrated drift, in order to guarantee an excellent stability of measurement
- Specific calibration on a narrow range, in order to improve the measuring accuracy
- Image processing, algorithm of analysis on % of covered zone, video and alarms output, the whole integrated in the camera for a greater facility of installation and exploitation.

II.1 Measurement accuracy: +/- 0,5°C

This application is based on the temperature measurement, without contact, on the surface of the face of each person inspected and in a non constant environment (the temperature in an airport will vary in the course of time and the differences in temperature on the human faces can also be important). In order to guarantee the awaited measuring accuracy, the following points are to be taken into account:

- Usually, an infra-red camera is calibrated with an uncertainty of measurement of +-2°C, until 100°C and +-2% beyond.
- Drift of the camera is incontestably the more penalizing criterion
- Environment variations between the target and the camera,
- A maximum resolution on the human face.

II.2 A maximum resolution on the human face

The measurement quality depends of the optical resolution on the object. The more you have details on the object to analyze, more precise will be the temperature measurement. In the case of the SARS, the ideal measurement distance is at approximately 3 meters. This distance is conditioned by:

- Need for keeping a safety distance between the people and the controllers
- A the end of measurement, supervising authorities have sufficient time to intervene delicately and direct the feverish people towards the medical centre,
- At this distance, the differences in sizes between a man, a woman and a child do not imply a great amplitude of adjustment of the camera.

While taking into account these elements, at a distance of 3 meters, a 9° lens is necessary for the application. With this distance, you will analyze, full field, the face of the person. This optics also allows, because of a better resolution on the face (more points of temperature - 19.200 points on 9° X 7°) to decrease the variation in temperature between the camera measurement and the auricular measurement. With this distance and with a 9° lens, the minimal size of the pixel is lower than 3 X 3 mm, instead of 9 X 9 mm.

The maximum of temperature difference of 0,4°C between the two images presented opposite is only due to the geometrical resolution difference between 9° and 19° optics.

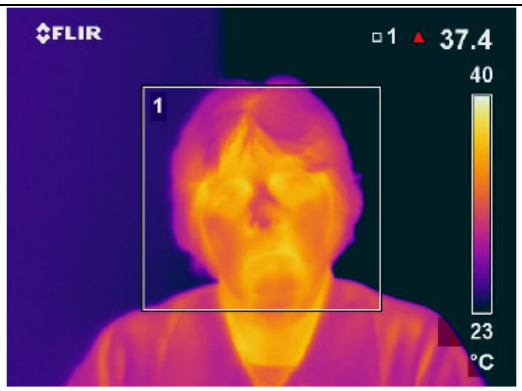


Image distance: 3m - Lens 9°
Max temp. : 37.4°C

Image distance: 3m - Lens 19°
Max temp. : 37°C

II.3 Device sensitivity between 35°C and 45°C

This camera has a sensitivity better than 0,1°C at 30°C.

II.4 Time of measurement lower than 3 seconds

On an infra-red camera, the more the frequency of analysis is high, better is the performance and the quality of the sensor. Our model has a frequency of analysis of 50Hz (60Hz for model NTSC).
Insofar as the treatment of the signal is directly integrated in the camera, the analysis of the image is thus instantaneous. The time of measurement of the “SARS” camera is lower than 3 seconds.

II.5 Using distance range between 1 and 5 meters

In order to optimize the application, the recommended using distance is approximately 3 meters. Equipped with its 9° lens, with 3m + 0,5m, you will have the people face full field. 5 meters will be the maximum distance of operation of the camera with a 9° lens. At 1 meter, the camera could be equipped with an 19° lens (It should be noted that all our optics are interchangeable)

II.6 Automatic temperature compensator

Thanks to its internal reference, the SARS camera is automatically calibrated. This calibration is done automatically, maximum every 10 minutes, instead of 30 minutes for the traditional versions. Moreover, when the temperature of optics or camera varies more than +: - 10%, the Shutter starts.

Thus, the drift of your camera is controlled perfectly, without the need for using an external source of reference, principle which complicates the setting exploitation of the material.

II.7 Operating temperature range: -15°C to +55°C

The ambient temperature variations are measured and compensated permanently. Within the limit of -15°C and +55°C, there is no influence.

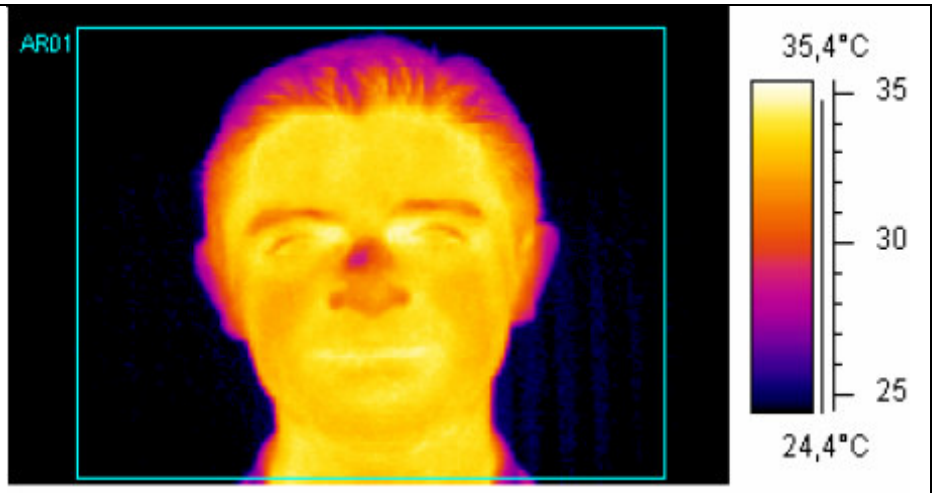
II.8 Integrated software with automatic images storage/deletion

This camera integrates an image processing module. This functionality has those advantages:

- Simplicity of implementation of the solution, it is only enough to supply the camera and its control screen,
- Simplicity of analysis: the operator looks a screen and gets a visual and/or sound release of alarm,
- Automatic restore in case of a power failure (conservation of the parameters of adjustment),

The images in memory can be stored, manually or automatically for model A20M and its deletion is then automatic.

You can also use this product with an advanced software installed in a computer…



Normal temperature

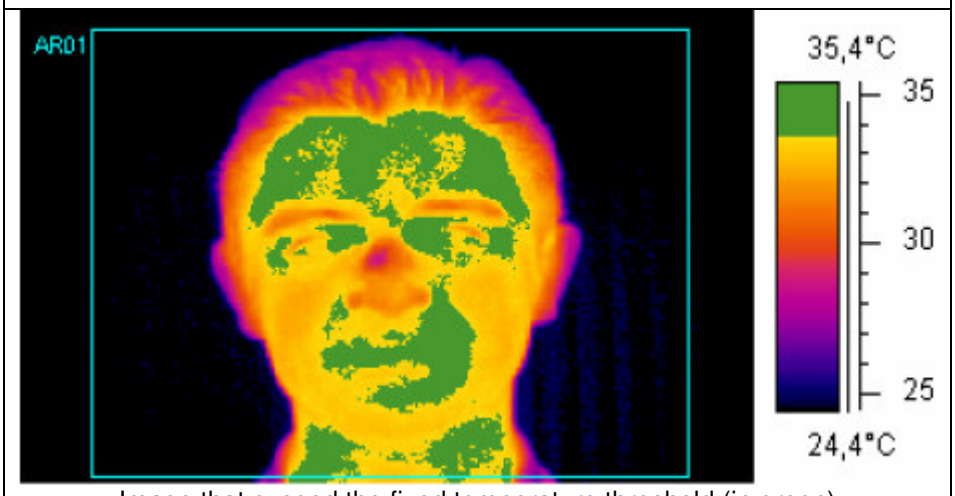


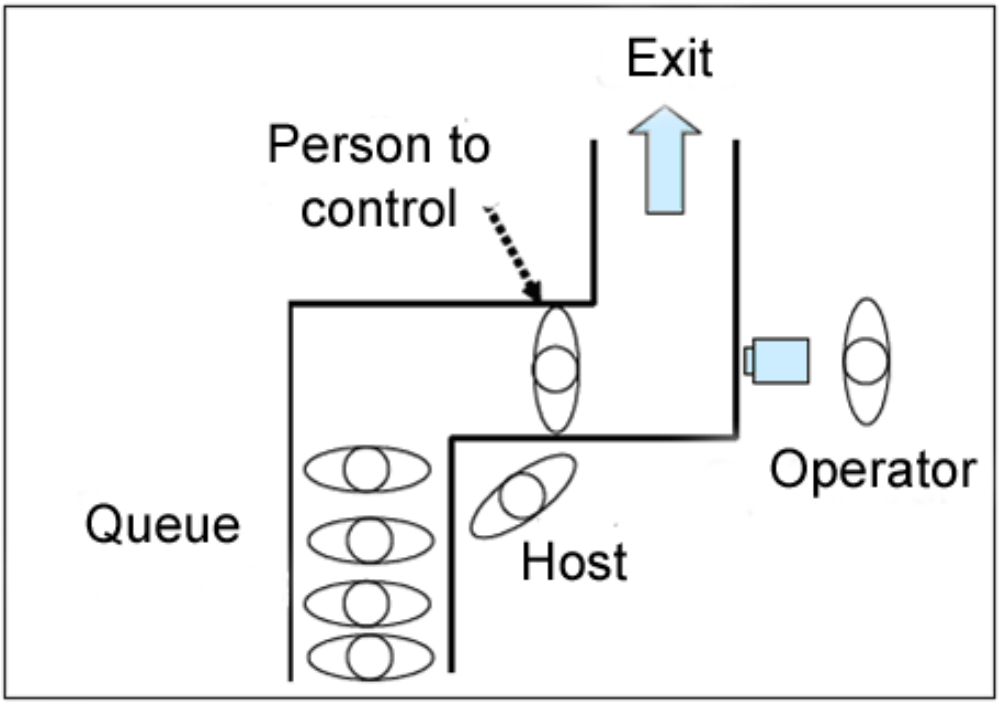
Image that exceed the fixed temperature threshold (in green)

III Presentation of SARS detection camera

- THV A20 M thermographic camera, fixed solution, with integrated image processing, manual or automatic image storage, alarm outputs, 8/16 bits digital output and PAL/NTSC analog output
- Spectral output: 8 -12 µm
- Focal plane array, with 19.200 points of measurement
- High analysis frequency
- Lens : 9° or 19°
- Temperature reading accuracy better than 0,1°C at 30°C
- Temperature range measurement -20°C to +100°C
- Optimized calibration between 20 and 40°C and integrated drift compensation with internal reference in order to ensure a precision and a repeatability of measurement of + 0,5°C at 35°C
- AC adapter
- Tripod mounting
- Weight : 800g
- Integrated image processing functions, in particular the displaying of the maximum temperature and isotherm and isothermal % in a specific zone for fast detection of a feverish person
- Selection of different color palettes and temperature threshold, in order to guarantee a fast analysis of the inspected cases
- Manual or automatic images storage
- 16 bits digital and analog (0-5V, 0-10V) Inputs/Outputs
- Alarm outputs
- Color video output for displaying on an external screen
- Shock : operational 25G
- Vibration : operational 2G
- Size : 157 x 75 x 80 m

IV Methodology of operation to ensure a good diagnosis

The people must be examined one by one. They must remove their glasses and stay without moving during 2 to 3 seconds. Behind the examined person, the background must not have an object hotter than the ambient temperature, in any case not more than 30 °C. A hot object in the field of the subject, if it is in the zone defined for measurement, can generate a “false / positive”. It is necessary to ask the people to make the tail on a line, between cords. Here an example of good configuration.



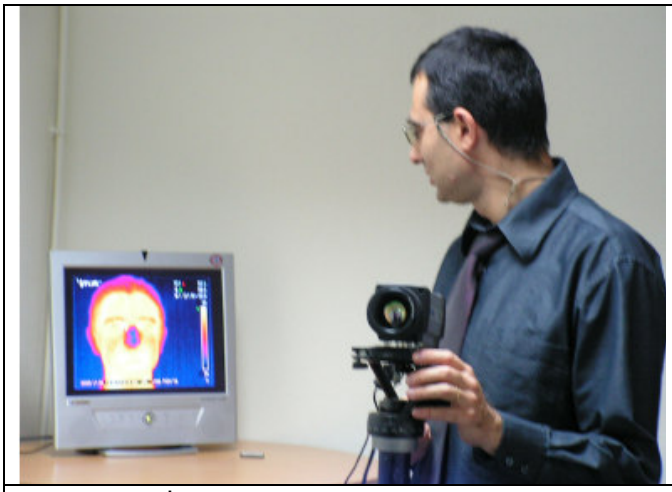
Examination area configuration example

The ideal distance for inspection is approximately 3 meters, which requires the use of a 9° lens.

This model of camera does not require a PC for a simple use. Thus, the installation of the material is very easy, the startup is fast, only one button to be engaged, 2 cables to connect (cable for the power adaptor and cable for video output).

Example of the great simplicity of implementation of our solution:

Installation THV A20M - SARS example: a video screen is necessary if you want to see thermal images coming from the camera

	
Instantaneous measurements	Clear and fast analysis of the situation

V SARS solution technical specifications

- Optimized calibration for SARS application,
- Internal drift compensation in order to ensure a precise and repeatability of measurement of + 0,5°C,
- A range of visualization between 35°C and 45°C,
- 19.200 points of measurement and a thermal sensitivity better than 0,1°C at 30°C,
- A internal reference for system auto calibration,
- An 9° lens for a better analysis of the human faces,
- Images can be stored and deleted automatically,
- Fast thermal images analysis in order to guarantee a time of measurement and interpretation lower than 3 seconds
- Integrated image processing, with visual and electrical alarm output, in case of high temperature detected
- All in one concept, ergonomics and easy to install, can work without a PC for simple use, or with a PC and high level application: events can be stored in a client/server database, multiple cameras can be connected to 1 PC…
- A reduced weight : 800g,
- PAL/NTSC vide output
- Power source 220 VAC,
- Analogical and digital Inputs/outputs,
- A European manufacture (Sweden) with the integration of a French sensor

VI References

Companies and governments equipped with infrared cameras for SRAS detection.

Asia :

- Hong-Kong : 30 cameras frontiers control
- CKS International Airport (Taiwan)
- Taiwan : 150 infrared cameras : Ports, factories, buildings, hospitals, State Departments
- Taiwan Disease control center : 50
- Incheon International airport (Korea) : 7
- Australia : 28 – control sick birds
- Philippines : Manila and Sebu airports: 6
- Philippines : Health Department
- Singapore : Hospital, ferries landing stage…

Other countries :

Apart from the Asian countries, more than 150 infra-red cameras was used for the fight against the SARS (the USA, Canada) :

- AIRBUS (Blagnac (31), France).
- “La Pitié-Salpêtrière” hospital : Neurology (Paris (75), France)
- CRSSA (France)
- L'OREAL (France)
- EVIC France (Bordeaux (33), France)
- UCB PHARMA (Belgium)
- INRA Service BIOCLIMATIQUE (Avignon (84), Bordeaux (33) France)
- Pierre FABRE Research Institute (Toulouse (31), France)
- CEA CADARACHE (Atomic Energy Center) (ST-PAUL LES DURANCE (13), France)