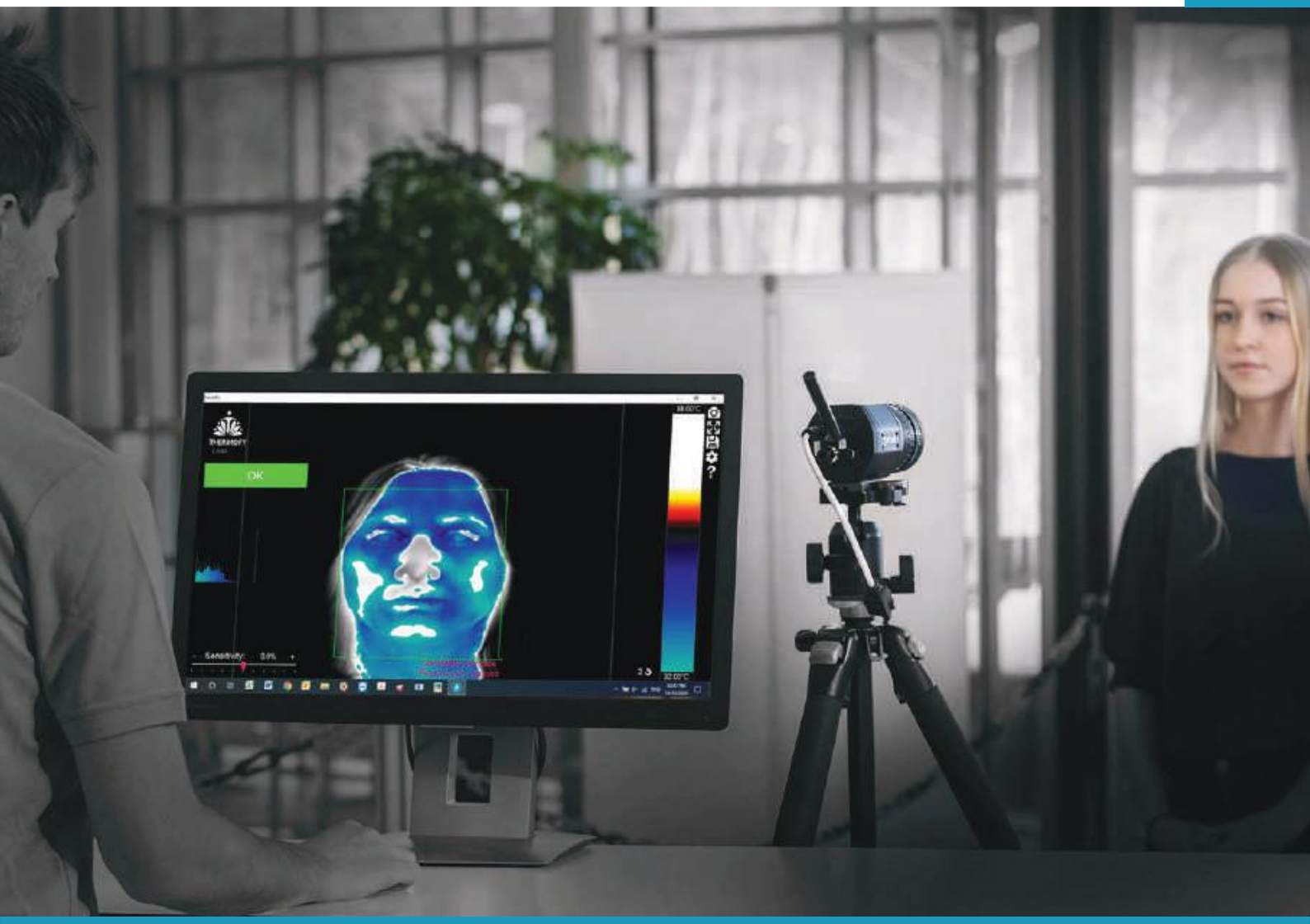
FeverFy

Early, practical and reliable detection through epidemic screening science.

Protection for the whole society.



Version 2.0.43

www.feverfy.com

FeverFy

Overview

Thermofy is a cloud platform that uses artificial intelligence and big data analytics to help screen for risk factor. Founded in 2018, Brazil, **Thermofy's team of innovators have more than 20 years of experience** and more than 200 published articles in the medical thermography field.
Thermofy solutions are present worldwide (from South America, to the United States, to Europe and the Middle East). Those have helped in the analysis of cardiovascular, metabolic and neurological disorders, the assessment and prevention of injuries in athletes, the detection of fever and much more.

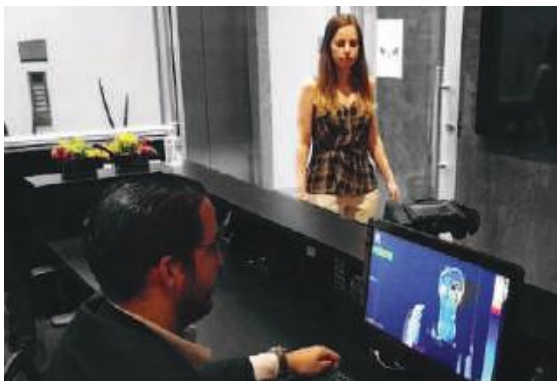
Founded in 2017, Lebanon, **SHRC which, is a pioneer rehabilitation center in the ME that due to 40 years of experience in Rehabilitation**, Research, Education and Implementation of CAM (Complementary and Alternative Medicine) using avant-garde technology has upgraded the definition of rehabilitation.

SHRC
Dr. Saad M. Halimi Rehabilitation Center
مركز د. سعد محمد حليمي لإعادة التأهيل

FeverFy: Introduction and Advantages

It is a new system for the early screening of the infection risk using thermal imaging which landmarks many points of the face to anticipate fever.

This **intelligent infrared** tracking allows the premature recognition of suspicious cases, contributing to delay or limit the spread of the virus before a new infection occurs, providing additional security in the monitored location.



The solution is harmless, offering no risk to health, eliminating the use of radiation, physical contact and contrast elements. It is totally safe, even for children and the elderly (groups most at risk). This is made possible by combining **the science of feverish anticipation** in conjunction with the science of screening for epidemics.

Designed to protect the population, travelers, companies, factories, events, hospitals, medical centers, airports, ports, pharmacies, supply establishments and national security itself through continuous surveillance. This process assists in the implementation of measures to contain the earlier viral spread, such as social withdrawal, isolation of infected people, quarantine of suspected cases of infection or treatment with antivirals, if necessary.

Temperature Monitoring

Even though **high temperature** is not always the most effective way of knowing whether a person has been infected with the new coronavirus (COVID-19) or not, but it's one of the **most frequent symptom** found in people suffering from COVID-19. It's not definitive to diagnose this infection because medications such as amphetamines, alcohol withdrawal and non-infectious diseases such as rheumatoid arthritis, can increase the temperature of the face. In all conditions, this should be reported by the patient if the person is stopped for clinical examination after going through the alert system.

Currently, there are two models of infrared temperature monitoring systems, those with or without softwares that can generate thermal images:

1-The **point infrared thermometer** measures the temperature of a surface to which it is being directed, having **lower accuracy** compared to the second model.

2-Thermography devices, presented on many websites by engineering companies, despite evaluating an image that covers the entire face, essentially also **evaluate only the temperature** corresponding to a **single pixel** (Inner canthus of the eyes).

The drawback of the two strands of systems is that both are based only on a reference point corresponding to the maximum temperature recorded. This methodology substantially decreases **the confidence of the readings,** which highlights partial inaccuracy since factors such as distance between the equipment and the individual, ambient temperature and humidity, the exact region to which the device is pointing and the period and process in which it is maintained until the reading is recorded, directly influence the quality of the data to be collected.

Literature Review

The usefulness of conventional thermal imaging systems for mass fever screening has been evaluated in many studies; its sensitivity varies from 40% to 89.4% under various circumstances. With the **combination** of integrated use of **artificial neural network** (ANN* or AI* such as radial basis function network), bio-statistical and ROC methods, advances were further made in thermal imaging application with regard to **achieving a higher level of consistency**. For mass screening of fever, the precision rate of the proposed integrated artificial intelligence technique obtained a high accuracy of 96%, sensitivity of 95% and specificity of 85.6%. This is better than the method used by researchers during the SARS-2003 outbreak, which has 93% accuracy, 85.4% sensitivity and 95% specificity.

Fever is a medical condition diagnosed in values that can range from 37,0°C to 38,5°C (98.6°F to 101.3°F), varying according to the individual's age and sex. Therefore, there is no cut-off value that can be defined in the devices as the only reliable parameter, especially those used in industry, calibrated to check electrical equipment and even ovens that reach temperatures above 500 °C (932 °F). This can cause false positives or negatives depending on the settings.

Contrarily, FeverFy is a **specific software** used for infection, pre-febrile stage or the stage of hyperthermia which allows, through the interpretation of thermal data using **artificial intelligence**, to identify a morbid state that is common in viral infections. Fever occurs when the body's immune system recognizes an invader and begins releasing chemicals that increase body heat. This heat serves to make the body less habitable to invaders and happens in spikes. But the production of inflammatory vasoactive substances, such as interleukins, changes the thermal distribution of the face, even before fever manifests itself. It's not 100% accountable for a **definitive diagnosis** and it should be complemented with laboratory tests.

Many ongoing studies are currently being conducted around the world for the use of certain software that will use this artificial intelligence to assist with the identification and prevention of the risk of infection.

As well, the software has an intelligent warning system that assesses the thermal distribution in specific areas of the face, which changes when the infection is active. The **inflammation** can be mapped, qualified, quantified and thus, it will trigger the alert system even **after taking antipyretics** (Paracetamol, Aspirin, Ibuprofen...) to reduce fever.

The benefit of Feverfy is to reduce the contact between people who are either infected or at risk of infection, with the rest of the population. It helps reducing the number of medical or paramedical personnel which can **reduce the exhaustion** of healthcare workers in the first place, and will lead the community to narrow down the spread of an epidemic.

Just like a well-trained physician would do, the AI is able to analyze the **heat distribution** caused by inflammatory vasoactive substances on the face and **compare** its pattern with a healthy or unhealthy pattern.

FeverFy is a targeted system that uses FLIR technology (Series A, E, P & S), which is CE and EU marked and US **FDA approved,** to detect elevated body temperature, for Pre-Febrile State and also fever with hyperthermia. In addition to allowing temperature recordings, it analyzes the thermal distribution of the face and its correlation with the normal pattern and the pattern in the state of an **active infection**.

According to international ISO standards and international epidemiological protocols, this alert system can be used in any environment, but it's better to be a closed place to reduce humidity and temperature artefacts.

Direct Beneficial Aspects

Advanced algorithm, using multiple factors for greater accuracy in the classification of risks of public health problems. Greater safety at work.

Medical support with 20 years' experience in the area of Thermology and Thermography for implantation and logistics.

Application of the most current international epidemiological and logistical protocols for the correct installation of the alert system.

It can work in line with results of laboratory tests, medical-hospital and governmental disease control centers.

It allows a safe bounce back of the economy,

to a pre-pandemic baseline

To use FeverFy, you will need:

1-FLIR thermal camera (E 85)
2-Windows 10 operating system (32 or 64 bits)
3-USB communication cable
4-Software activation key

Recommendations

In order to optimize the results of FeverFy, the following recommendations are suggested for the assembly and operation of the system:

1-The system must be mounted in an environment that provides a distance of 1 meter between the person being evaluated and the thermal camera.

2-Environment variables, such as temperature and humidity, can affect the results obtained with FeverFy. Install the thermal imager in an environment that has control of such variables to maximize results.

3-To stabilize the thermal camera, it is recommended to turn it on 30 minutes before starting to use it.

Abbreviations

- ANN is a mathematical representation of the human neural architecture, simulating its "learning" and "generalization" abilities that are trained with thousands of images of people with and without fever. ANN's are **widely applied in the support of diagnoses** because they can model highly non-linear systems in which the relationship among the variables is unknown or very complex.
- AI: **Artificial Intelligence**

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Lebanon & Middle East Partner with ThermoFy international.

SHRC by Dr. Saad M. Halimi

SHRC
Dr. Saad M. Halimi Rehabilitation Center
مركز د. سعد محمد حليمي لإعادة التأهيل

www.shrchealth.com

Lebanon & Middle East Commercial Representative

Partners & Beyond, Beirut - Lebanon

Partners & Beyond

T. *+961 1 30 31 31*

M. *+961 81 008 600*

E. *info@partnerandbeyond.com*