

**Deccan Education Society's  
Fergusson College (Autonomous), Pune - 4**

**Case Study on Electronics in Health sector during the  
COVID-19 pandemic**

Surveyed by,

**Mrs.Sayali Prani**

Assistant Professor

Computer science department

(Electronics)

Fergusson College (Autonomous),

Pune – 4

**Ms. Panchsheela Kamble**

Assistant Professor

Electronic Science department

Fergusson College (Autonomous),

Pune – 4

## Abstract

Presenting a short case study of various electronic devices and gadgets which can be employed as a safer way during this COVID-19 pandemic. The burning issue of COVID-19 caught the attention of every one and in this pandemic the awareness for maintaining social distancing is must. The basic and most common symptoms for this coronavirus disease are fever, dry cough, cold and tiredness. In order to conduct check-ups, we need to take care that the human body temperature has to be measured from a specific distance from the patient or the person with some of the above COVID-19 symptoms, therefore our case study is about the electronic devices and gadgets which is used to measure human body temperature from specific distance thus maintaining social distancing.

**Keywords:** *COVID-19, social distancing, infrared thermometer (non -contact thermometer), spot infrared pyrometer.*

## Introduction

With this pandemic situation of COVID-19, the numbers of cases registered daily are increased by an exponential rate making it vital for scrutinized routine check-up of measurement of human body temperature as the fever is the one of the symptom of corona virus disease.

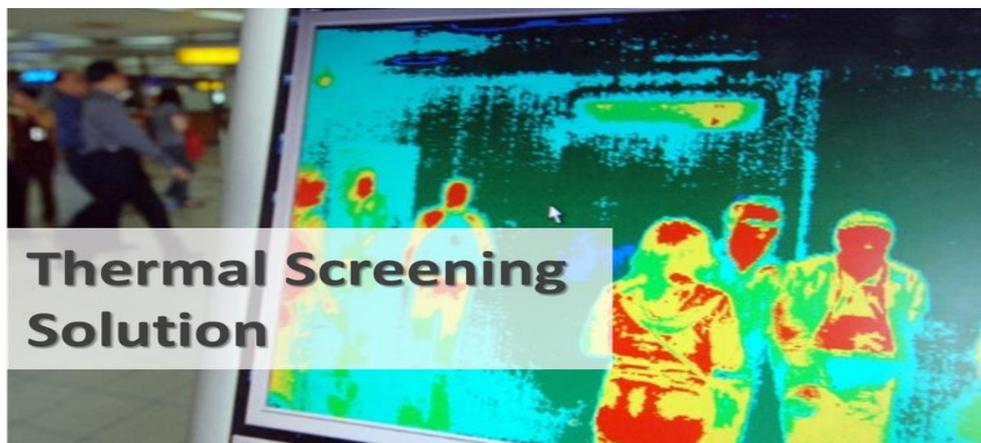
According to the US National Library of Medicine, the average normal body temperature is generally accepted as 98.6°F (37°C). But some studies have shown that the 'normal' body temperature can have a wide range from 97°F (36.1°C) to 99°F (37.2°C). A temperature over 100.4°F (38°C) is most often presumed to be fever caused by an infection or illness. The human body temperature also normally changes throughout the day. But at the same time one has to take care that there should be no contact with the person adhering COVID-19 symptoms/patient of COVID-19, while performing the check-up. This can be achieved by gadgets or electronic devices with **non-contact thermometer** employed in them. These thermometers check human body temperature by sensing the infrared energy radiated by the body.

An infrared thermometer, which measures temperature from a portion of the thermal radiation which is radiated by an object. Infrared thermometers works on black body radiation, any material with a temperature above absolute zero has molecules moving within it. As temperature increases the molecules move faster. The molecules emit infrared radiation as they move, and emit more radiation, including visible light, as they get hotter. This is why a heated metal emits a red or white glow. Infrared thermometers detect and measure this radiation. Infrared light can be focused reflected or absorbed like visible light. Infrared thermometers have a lens to focus infrared light from an object onto a detector. The function of the detector is to absorb infrared radiation and convert it to heat. The component used in detector gets hotter as it absorbs more and more infrared energy. The excess heat is converted into electricity, which is transmitted to a detector which determines the temperature of the object. Then this heat is amplified then some signal conditioning techniques are used and as the heat is analog data it has to convert in digital form as display is mostly digital. so for this purpose analog to digital converter (ADC) is used to get the data in readable form. The most common IR thermometer is the spot infrared pyrometer. This is used to measure the temperature at a spot on a surface, in this a visible red dot on the centre of the area being measured.

**Thermal body scanners** are also used for temperature screening for COVID-19, these scans are being used to identify potential patients of Covid-19 who are prevented them from entering crowded establishments such as government offices and even residential housing societies. A large number of residential housing societies have also deployed these scanners and are keeping a check on visitors.

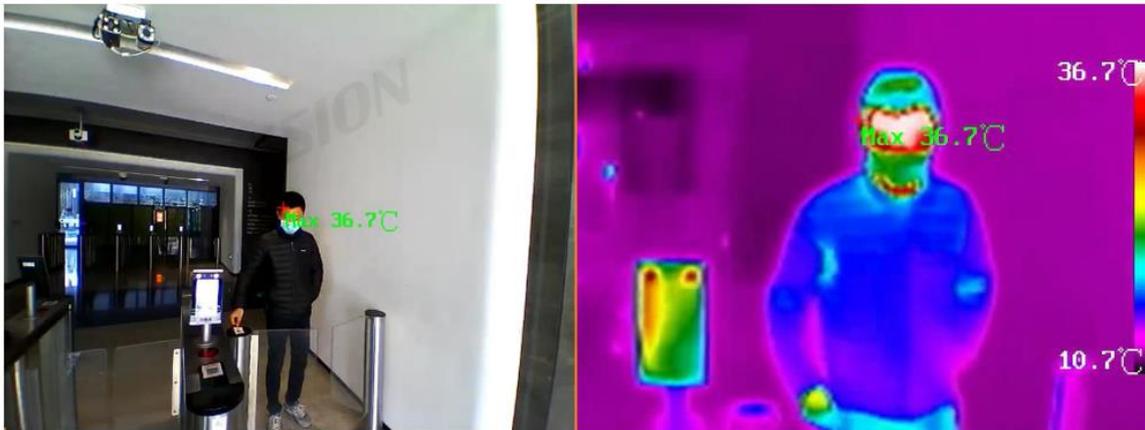


**Thermal scanners** are effective in detecting people who have developed a fever (i.e. have a higher than normal body temperature) because of infection with the new coronavirus. However, they cannot detect people who are infected but are not yet sick with fever. Below is the image of a airport using thermal scanner.



Fast, preliminary detection for temporary deployment is done as shown in below image:

1. **Location:** cameras set up on a tripod or other temporary installation are placed at existing entrances at train stations, bus stations, subways, airports, etc.
2. **Advantages:** can be deployed and removed quickly based on the entrances in use and in the case of an emergency



In order to **maintain social distancing, automatic sanitizer dispenser, touchless hand wash timer and alert system** some electronics based open source hardware and software prototypes and frameworks can be developed using Arduino, raspberry pi boards with some other effective sensors like IR, Ultrasonic sensors.



Image courtesy: [https://www.espressif.com/en/news/wearable\\_distance\\_monitor](https://www.espressif.com/en/news/wearable_distance_monitor) and <https://hackaday.com/2020/04/09/ultrasonic-sensor-helps-you-enforce-social-distancing/>

#### 🚧 Future scope

One can implement this infrared thermometer by using raspberry pi technology with low cost. For this we need to use some sensors. Although not visible to the human eye, all objects emit infrared light rays and the concentration varies depending on temperature. By detecting the IR rays, we can perceive the temperature range.

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