



Corona Sensor

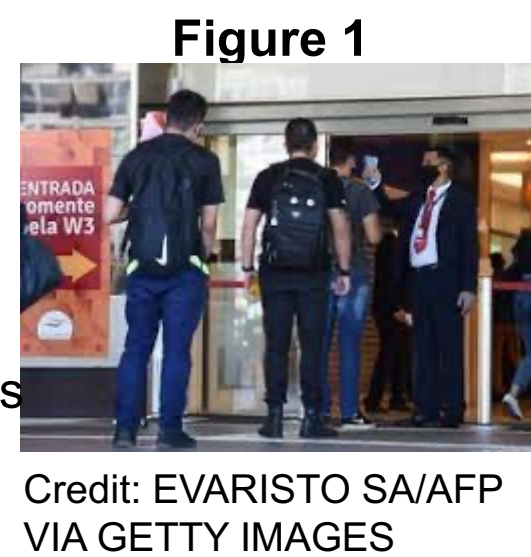
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BACKGROUND

As a result of the COVID-19 pandemic, employers had to employ individuals to manually count people entering stores and check their temperatures as well. The team found this very risky and tedious for these employees and decided to design The Corona Sensor. The Corona Sensor is responsible for counting individuals and measuring their temperatures.

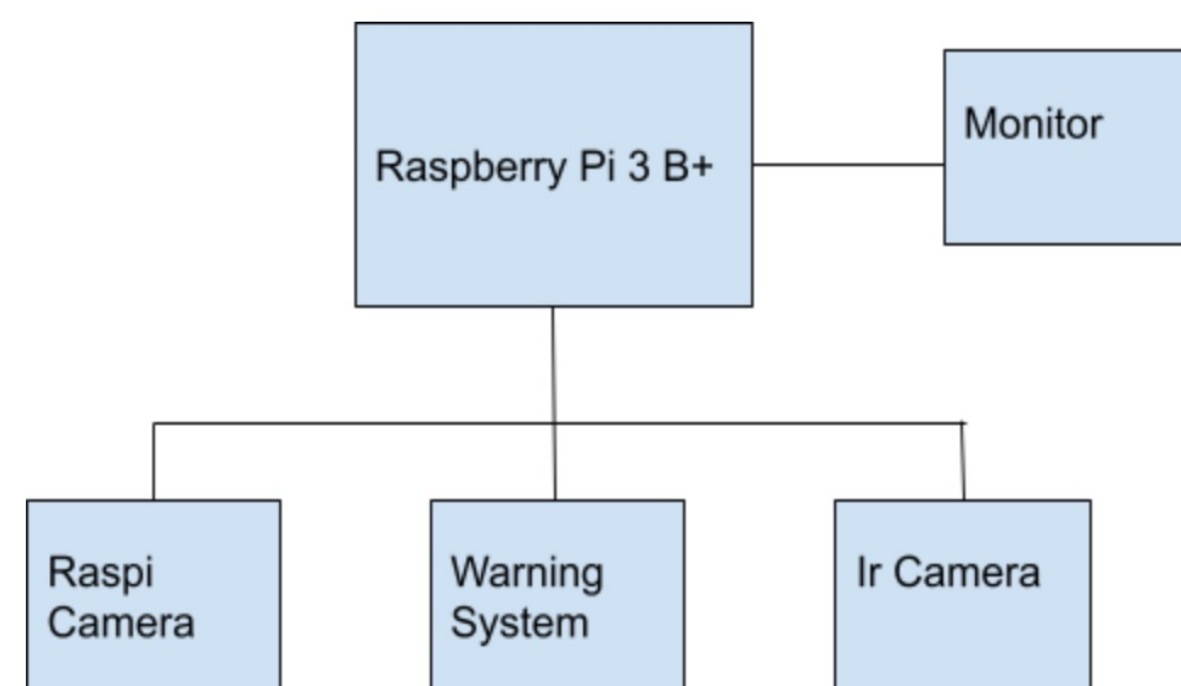


The Corona Sensor has four major components: a Raspberry pi B 3+, a raspi camera, IR camera, and a buzzer. The Corona sensor has a facial recognition feature that detects the faces of people entering the building and detects the backs of heads of people leaving. The raspi camera will be used for this. Another feature this system has is the ability to read temperatures like a thermometer. This is measured using the IR camera which is going to be connected to the raspberry pi board. Another device which serves a similar purpose as ours was the Pearl Wireless People Counter. This is a double sensor system that only counts entries and exits. The difference between the Pearl Wireless People Counter and our Corona Sensor is that ours can detect temperatures of individuals as well.

PROPOSED SOLUTION

We have two main components: the raspberry pi and the raspi camera. There is also an Infrared camera that is used to detect temperature. This part is optional as temperature readings are not always an accurate way to determine if someone is sick. This is connected to the raspberry pi via gpio pins. The IR camera is mounted inside the case and is used to measure the temperature of people entering the building using infrared images. When someone with a temperature above 95 degrees Fahrenheit is detected by the IR camera, a signal is sent to the raspberry pi and the warning system will activate. The raspi camera is used for facial recognition (Figure 4) Each frame is analyzed to see if someone is entering or leaving the building. This is used to detect people coming in and out of the facility and count them. (Figure 5)

Figure 3



SYSTEM DESIGN



Raspberry Pi
Reads input in the form of thermal images from the camera and the raspi IR camera, and activates the buzzer when an undesired input is detected



IR Camera
Detects the temperature of humans nearby using thermal images. With an accuracy of ± 2 degrees Fahrenheit from up to 10 feet away (best results come from 5 feet and closer). Since we are using an infrared camera, it won't be able to detect temperatures as accurately as other thermometers. The FDA recommended safe temperatures with IR thermometers is 91-94 degrees Fahrenheit, with our project anything above 95 degrees will send a warning signal.

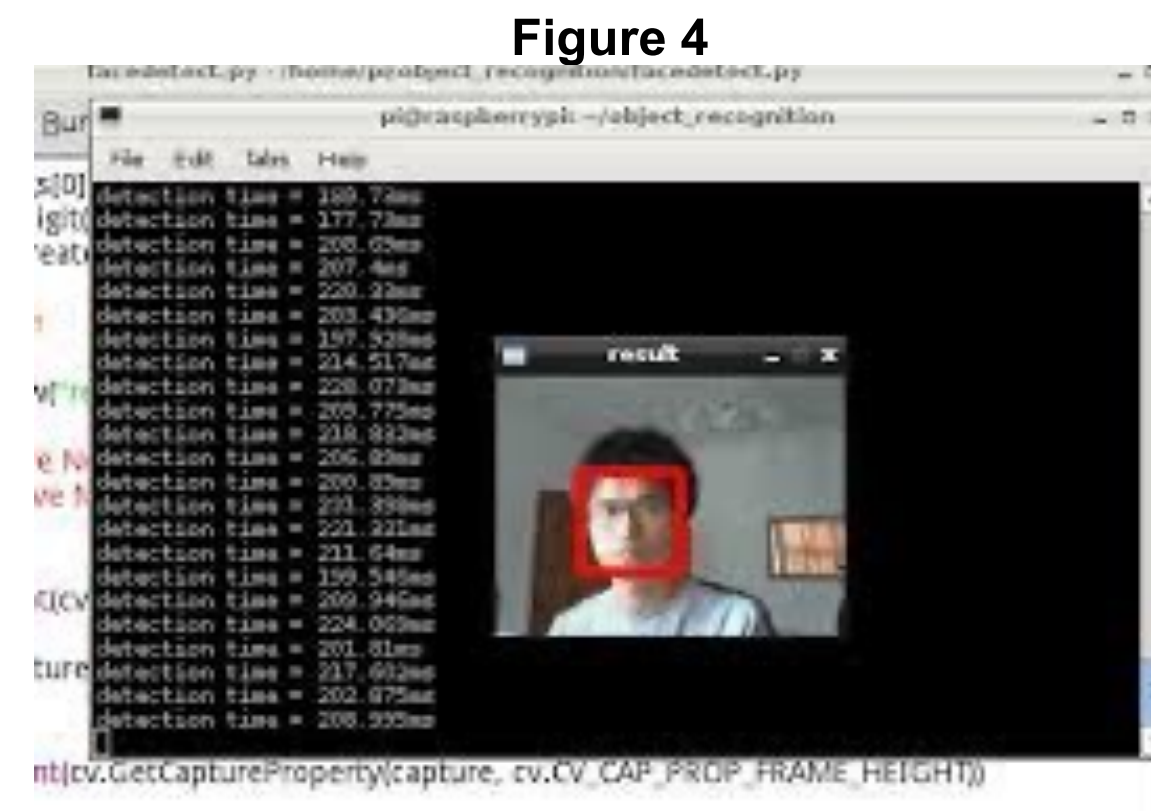


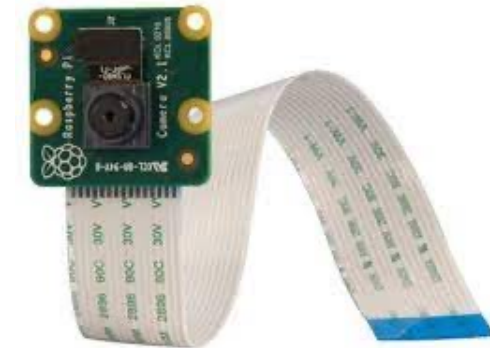
Figure 4

Figure 5



Raspi Camera

The camera captures video at 30 frames per second and each frame is analyzed using OpenCV to detect if there's any faces in the frame. This camera can detect faces up to 10 feet away



A monitor

This will be the main component of the system. It will be the power source of the buzzer. Also, the Arduino board will be connected to the laptop. This monitor would also be the interface for the whole system



Warning System

The buzzer serves two purposes;

- Sounds when a human with a temperature above 95 degrees Fahrenheit.
- Sounds when maximum occupancy of the facility is exceeded

REGULATORY INFORMATION

- ISO/IEC 19794-5 (standard for codifying data describing human faces)
- ISO 18251-1 (safety protocols for IR camera use. [Non-destructive testing])

FUTURE DIRECTION

1. Use custom components to reduce the size of the product.
2. Improve the graphical interface to be more user friendly .
3. Improve the facial recognition to serve security purposes.

REFERENCES

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3. ServersCheck, "Corona Covid-19 thermal camera and infrared IR sensor solution," *ServersCheck*. [Online]. Available: <https://serverscheck.com/solutions/corona-covid-19.asp>. [Accessed: 03-Dec-2020].

PROJECT CONSTRAINTS

- Accurately tracks temperature -must be within in 2 degrees Fahrenheit
- Accurately detects humans -must accurately detect each person entering the building
- Correctly keeps track of the number of people in the building -correctly counts

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CONTACT INFORMATION

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