AUTOMATIC TEMPERATURE SCANNER AND FACE MASK DETECTION USING IoT

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Abstract: We propose a fully automated temperature scanner and face mask detection entry provider system. In this system we make use of a contactless temperature scanner and a mask monitor. a person won't be provided entry without temperature and mask scan. Only person having both conditions is allowed inside. The system uses temperature sensor and camera connected with a raspberry pi system that regulates the entire operation. If an individual is flagged by system for top temperature or no Mask the system gives buzzer alert and bars the person from entry and also, the face mask and temperature of person is send out over IOT to server for the authorities**..**

***IndexTerms* - Raspberry Pi, Temperature Sensor, Pi Camera, Face Mask.**

I. INTRODUCTION

Now that a lot of shops, offices and institutions are re-opening again after the Corona lockdown, many businesses are faced with the necessity to supply the most effective possible protection for his or her staff and customers. Face masks and temperature of the person checks play a crucial part within the protection effort. While this is often already done routinely used in an large scale at airports and railway stations, many businesses and institutions are struggling to fulfill the challenge. Mask monitoring often requires additional staff resources. At an equivalent time, temperature of the person checks by staff accompanies certain risks in terms of hygiene and data privacy. Common symptoms of covid-19 include fever, tiredness, sore throat, nasal congestion, loss of taste and smell. In most cases, it's transmitted directly (person to person) through respiratory droplets, but also indirectly via surfaces. Therefore, the usage of face masks and sanitizers has shown positive results when it involves disease spread reduction. However, the crucial problem is that they are lack of approved vaccine and drugs to fight against corona virus.

Thanks to these facts, many protection and safety measures were taken by governments so as to scale back the disease spread, like obligatory indoor mask wearing, social distancing, quarantine, self-isolation, limiting citizens' movement within country boarders and abroad, often alongside prohibition and cancellation of giant public events and gatherings. Despite the very fact that the pandemic seemed weaker at some points, most of safety regulations are still applied thanks to unstable situation. From workplace behavior to social relations, sport and entertainment, corona virus disease poses many changes to our everyday routine, habits and activities.

II. LITERATURE SURVEY

Rehman et al proposed a system that restrict the growth of COVID-19 by finding out people who are not wearing any facial mask in a smart city network where all the public places are monitored with Closed-Circuit Television (CCTV) cameras. While a person without a mask is detected, the corresponding authority is informed through the city network. A deep learning architecture is trained on a dataset that consists of images of people with and without masks collected from various sources. The trained architecture achieved 98.7% accuracy on distinguishing people with and without a facial mask for previously unseen test data. It is hoped that our study would be a useful tool to reduce the spread of this communicable disease for many countries in the world.

Toshanlal Meenpal et al designed in such a way that it use a binary face classifier which can detect any face present in the frame irrespective of its alignment. We present a method to generate accurate face segmentation masks from any arbitrary size input image. Beginning from the RGB image of any size, the method uses Predefined Training Weights of VGG – 16 Architecture for feature extraction. Training is performed through Fully Convolution Networks to semantically segment out the faces present in that image. Gradient Descent is used for training while Binomial Cross Entropy is used as a loss function. Further the output image from the FCN is processed to remove the unwanted noise and avoid the false predictions if any and make bounding box around the faces. Furthermore, proposed model has also shown great results in recognizing nonfrontal faces. Along with this it is also able to detect multiple facial masks in a single frame. Experiments were performed on Multi Parsing Human Dataset obtaining mean pixel level accuracy of 93.884 % for the segmented face masks.

III. PROPOSED SYSTEM

Here we are proposing a completely automated temperature scanner and entry provider system. it is a multipurpose system that features a large selection of applications. In this system we make use of a contactless temperature scanner and a face mask monitor.

The scanner is connected directly with an individual's barrier to bar entry if heat or no mask is detected. An individual will not been provided entry without temperature and mask scan. Only person having both conditions are allowed inside. The system uses temperature sensor and camera connected to a raspberry pi system that regulates the whole operation. The camera is employed to scan for detecting face mask and temperature sensor for detecting person's temperature. The raspberry processes the sensor inputs and decides whether the person is to be allowed. whenever the person has normal temperature and wearing face mask then the system operates a motor to open the barrier allowing the person to enter the premises. If a personal is flagged by system for top temperature or no Mask the system glows the red light and bars the person from entry. Also the face and temperature of person is send out over IOT to server for authorities to wish action.

Advantages of Proposed system:

- Fully automatic detection of Face Mask.
- Fully automatic detection of Body Temperature
- Fully automatic operation without human use.
- Real time detection of Body Temperature.
- Real time detection of Face Mask.
- No Human errors.
- Results approach is effective.
- Effectively monitoring of personnel.
- Effectively recognize face masks.
- Alerts with Mail
- Alerts with Buzzer Sound
- Bars the person from entry if a person is flagged by system for high temperature or no Mask.

IV. System design & Analysis

Fig -1 : Flow Chart

When the system starts it detects mask and temperature of a person. If there is a mask and temperature is less than or equal to 98.6°F then opens door for the person. If there is no mask for the person then the system alerts with buzzer sound and person will be bars away from entry. If the person is having temperature above 98.6°F then system. Alerts with buzzer sound, send alert mail to admin and person will bars away from the entry. If there is no mask and temperature above 98.6°F then system alerts with buzzer sound, sends alert mail to admin and bars away person from entry.

Steps:

- Whenever the person enters the door the system will detects the temperature by using temperature sensor and check mask by using camera.
- If the person temperature is less than or equal to 98.6 and if he or she wear the mask then the doors will be open and person will be allowed inside.
- If the temperature is normal but he doesn't wear the mask then it shows a red lights, doors will not be open and the person will not be allowed inside
- If the person temperature is high than the normal temperature and person were mask then the image of then the image of that person is send to the administrator by e-mail.

V. OUTPUTS

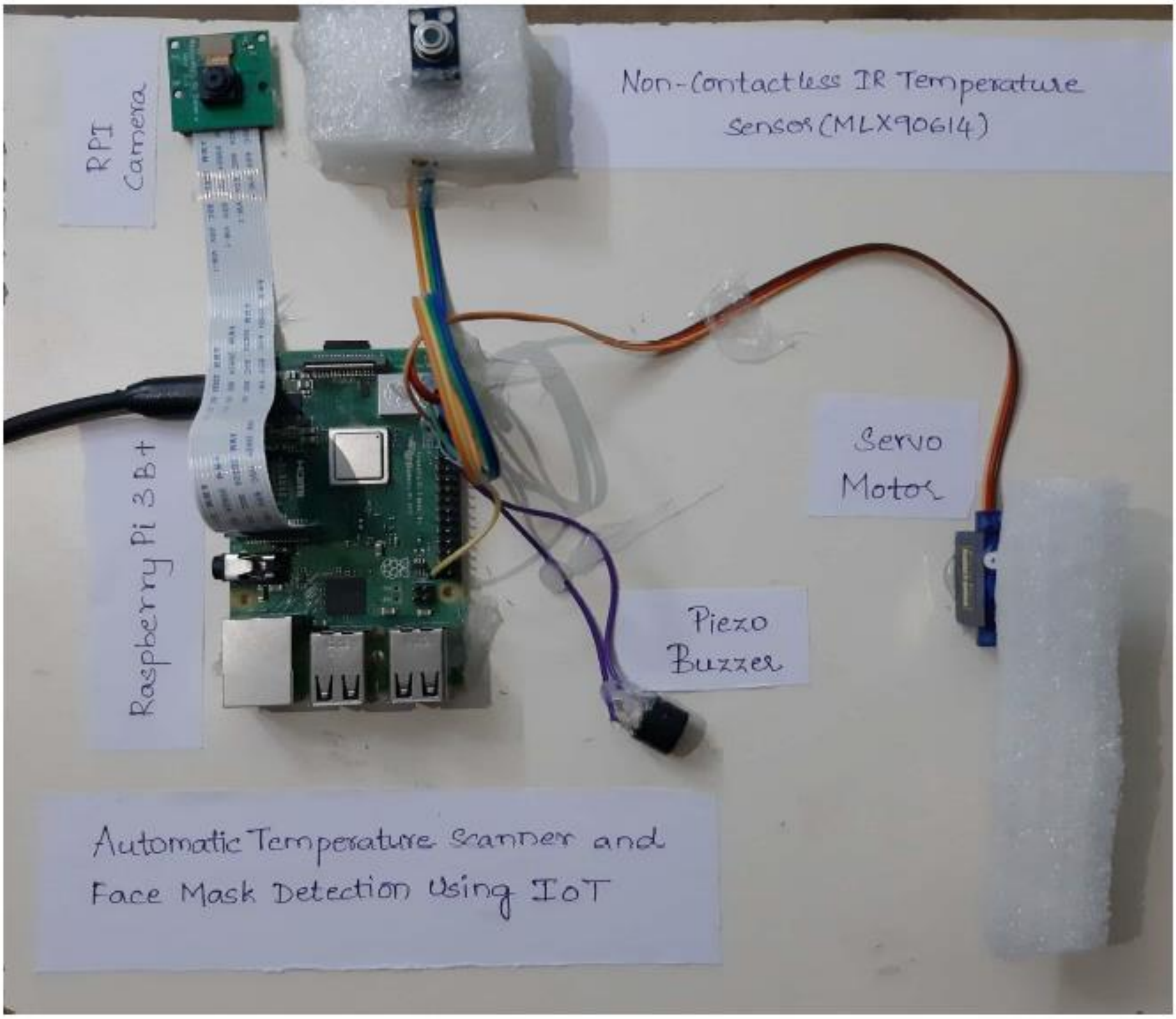

Fig 2: ProtoType.

The block diagram contains Raspberry pi 3B+, Camera, Servo Motor, wireless temperature sensor, Buzzer. RPI camera module is connected to the CSI port on the Raspberry pi. We have connected the pins of Non Contactless Temperature sensor to Raspberry Pi 3 B+ as SDA pin of sensor to SDA pin 3 (GPIO 2) of pi and SCL pin of sensor to SCL pin 5 (GPIO 3) of pi. VIN to 5v pin 2 and GND to GDN of pi. We have connected the pins of Buzzer to Raspberry Pi 3 B+ as +ve pin of buzzer to pin 16 (GPIO23) of pi and -ve pin of buzzer to GDN of pi. We have connected the pins of Servo motor to Raspberry Pi 3 B+ as BROWN wire of servomotor to GND of pi, RED wire of servomotor to 5v pin 4 and ORANGE wire of servomotor to pin 11 (GPIO 17) of pi.

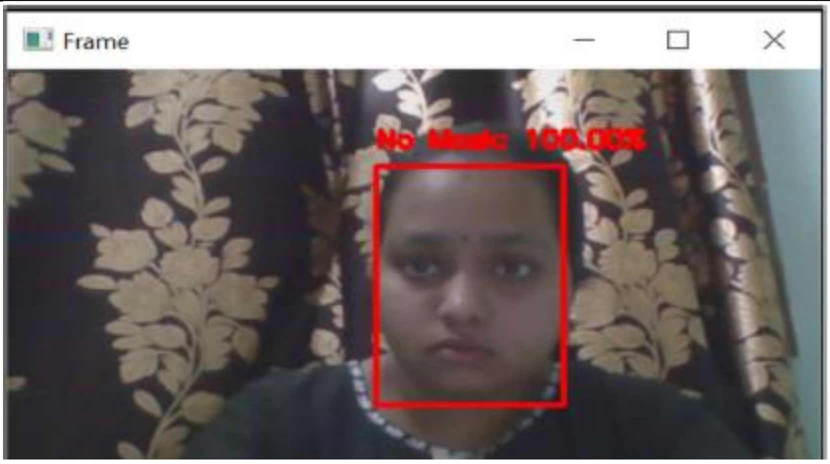

Fig -3: person without Mask.

The above figure shows that the person does not wear mask then it shows a red book around his face and door was not open.

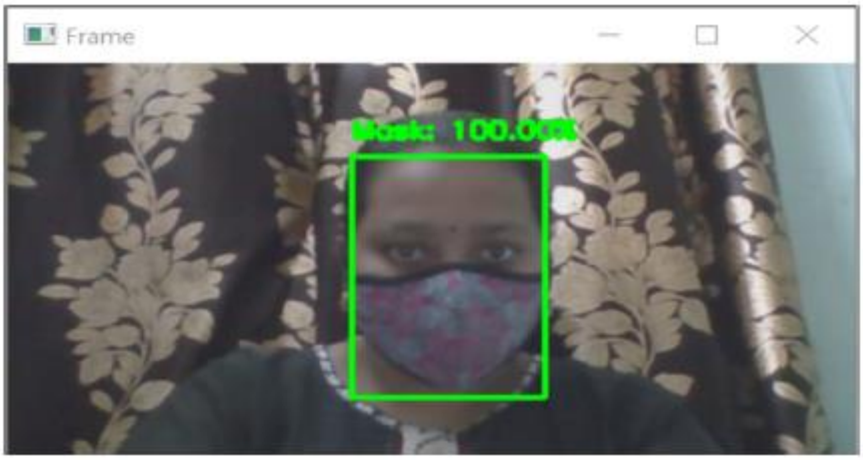

Fig -4: Person with Mask.

The above figure shows that the person wear mask then it shows green box and then it checks for temperature of it is normal then the doors get open and person can enter inside.

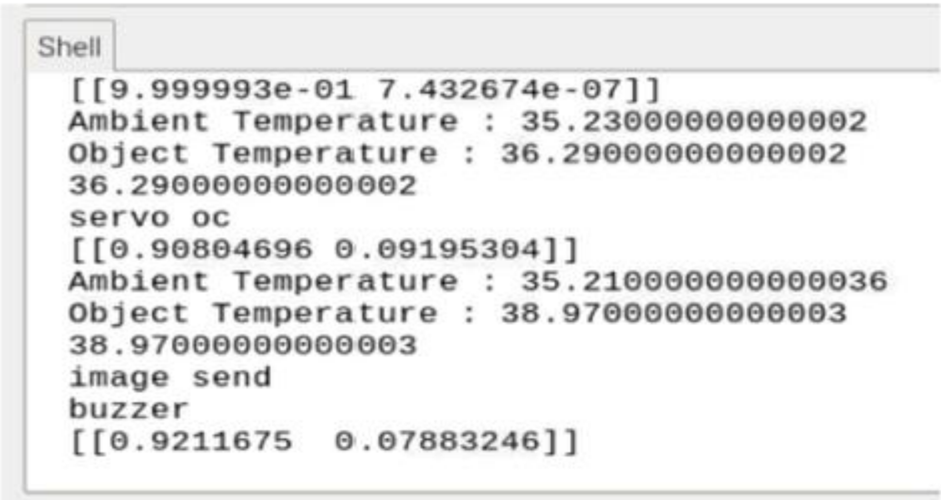

Fig-5: Shows temperature of person.

The above figure shows that if the person is having high temperature then it alerts with buzzer sound and image is send to admin. If the person is having low temperature then servo motor opens door.

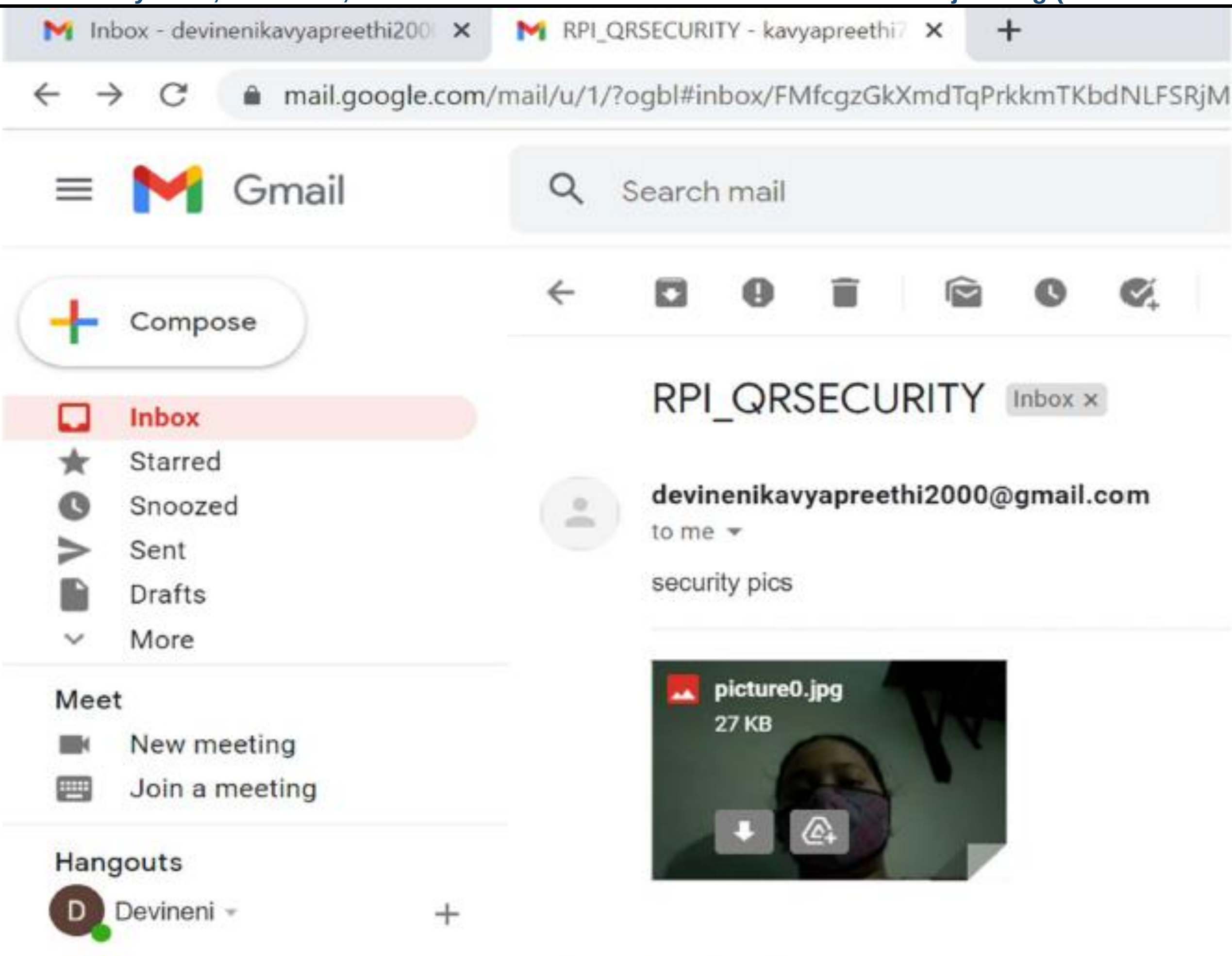

Figure: 4(e) Mail

Fig-6: Send mail to administrator.

The above figure shows that sends mail alert to the administrator when the conditions of temperature are dis-satisfied.

VI. Conclusion

In this project we have successfully implemented a working prototype for Face Mask and Body Temperature detection system. This project can be used in places where large gatherings of people occurs such as schools, colleges, offices, shopping malls etc. The system first detects whether the person is wearing a facemask and sends the data to the microcontroller. The non-contact temperature sensor reads the person's body temperature and upon checking it opens the barrier arm and allows the person inside. The accuracy of facemask detection can be achieved by training the module with a larger image dataset.

Raspberry Pi 3B+ has almost the necessary computational power for detecting facemask from image/video stream.

In conclusion, Face Mask and body temperature detection can help us in the large gathering of people in one place without masks and also by this we can reduce the risk of getting infected.

VII. Future scope

According to the achieved results, the proposed solution is usable for that reason it was proposed and under certain performance limitations (such as number of processed frames or measurements per second). Moreover, it depends on both open hardware and free software, being definite and desirable advantage for such systems.

In future, it is planned to experiment with various deep learning and computer vision frameworks for object detection on Raspberry Pi in order to achieve higher frame rate. Moreover, we would like to extend this solution with environment sensing mechanisms for suitable building air conditioning and ventilation airborne protection in order to reduce the spread of coronavirus indoors, especially during summer. Finally, the ultimate goal is to integrate the system presented in this paper with our framework for efficient resource planning during pandemic crisis in order to enable efficient security personnel scheduling and mask allotment, together with risk assessment based on statistics about respecting the safety guidelines and air quality.

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