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Face Mask and Temperature Detection

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Abstract:- We are all aware that Covid-19 has affected the world in a very severe manner. And many countries have undergone Lockdown as a precautionary measure. One of the main methods to save ourselves and society from Coronavirus we should wear masks and Sanitize Ourselves frequently. And now the government is coming forward to give some relaxation in Lockdown to maintain a financial Balance of the Society.

They have insisted on wearing a Face mask while coming outside from our living place and Surveillance in manual methods of wearing masks by People is a Challenging factor. So, In this paper I have proposed a Face mask Detection to recognize if a person is wearing a mask and infrared sensor will be able to detect the thermal temperature of the person. And an app which is connected to that system will send an alert to himself to safeguard a community from coronavirus.

If a person works for the company and he has registered with the respective application in the case if he is not wearing a mask and there is a thermal Heat in body .He will get an alert by himself as a part of the company employee. If a camera captures an unrecognized face (Visitor's face),alert will be sent out to the authorities of the company directly.

A company has a feature to download the data that shows the number of alerts sends to the employees by the AI alert notification with the picture of the person. It allows the company to enforce the wearing of the mask and check the thermal heat of the person to forestall community spread of the coronavirus within the workplace.

I. INTRODUCTION

The World Health Organization(WHO) has presented a pandemic condition of coronavirus disease 2019 (COVID-19) that has globally infected over more than 3 Million Peoples and caused more than 200,000 deaths.

In addition the World Health Organization (WHO) also stated that There are similar Large-Scale Serious Respiratory illnesses which are such as severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS),which occurred in the past few years ago. And the spread rate and mutation rate of Covid-19 is high compared to SARS.

Fig 1:- Economy vs Pandemic

Therefore, more and more people are concerned about their health and the government also considers that top priority is public health rather than the financial balance of the Country.

Many public service providers and multi-national companies order customers & their employees to wear masks. Face mask detection plays a major role in computer vision to help the global society, but research related to face mask and temperature detection is limited.

Face mask and temperature detection refers to detecting whether a person is wearing a mask and thermal temperature of the person. Traditional object detectors are usually supported on handcrafted feature extractors.

- *Role of AI :*

Face Mask Detection Platform uses Artificial Network to acknowledge if a user isn't wearing a mask and if the thermal temperature is high then it sends an alert through the mobile app to the person to get a reminder of the Safety measures which he has not followed to maintain the social well being of the community.

Fig 2:- Face with & without mask

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II. FACE DETECTION METHODS

There are two main approaches for Face Detection:

- Feature Based Approach
- Image Based Approach

- *Feature Based Approach :*

Objects are usually recognized by their unique features. There are many features during an external body part, which might be recognized between a face and lots of other objects.

It classifies faces by extracting the structural features like mouth, nose, eyes etc. and it uses them to detect a face. so use them to detect a face. There are some statistical classifications that are used to differentiate facial and non-facial recognition.

Human faces have particular textures that help to differentiate a face and other objects. Based on this approach, we are going to implement a feature-based approach by using OpenCV.

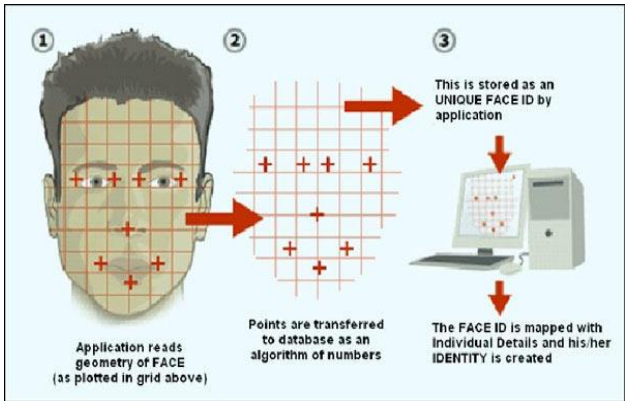

Fig 3:- Feature Detection in face

- *Image Base Approach*

Image-based methods depend on techniques from statistical analysis and machine learning to seek out the relevant characteristics of face and non-face images. The learned characteristics are in the sort of distribution models or discriminant functions that are consequently used for face detection.

In this system, we use different algorithms like Neural-networks, HMM, SVM, AdaBoost learning and it detect faces with MTCNN or Multi-Task Cascaded Convolutional Neural Network, which is an Image-based approach of face detection.

Image based approach is less effective and not accurate compared to feature based approach in the large sectors.

Fig 4:- Image Based detection

III. USAGE OF THE SYSTEM

- Detects people that pass through a security-like camera.
- Identify face mask usage.
- Detects thermal heat of people who are symptomatic.
- Collect reliable statistics (% people wearing masks).
- An effective method for Face mask and Temperature Detection

- *Software Used:*
  - Anaconda Navigator
  - Python idle
  - Net beans
  - Android Studio

- *Hardware Used:*
- Raspberry pi3b+
- Surveillance Camera
- Connecting wires
- Infrared thermopile sensor.

IV. WORKFLOW

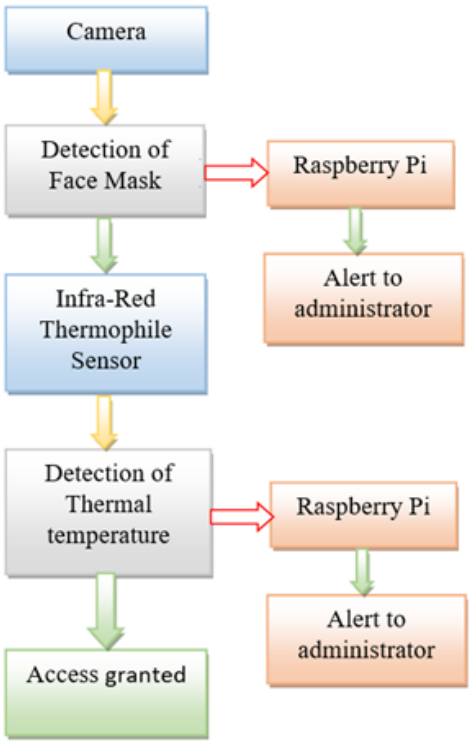

Fig 5:- Workflow of working model

➢ *Working Model:*

In our model, the IR temperature sensor works on the principle of InfraRed thermopile sensor for temperature measurement, that measures the temperature and checks whether the temperature crosses the predefined limit. If the temperature exceeds the limit of 97.5F, it sends the signal to Raspberry pi.

A Raspberry Pi is a credit card sized computer which receives the signals from the IR Sensor. With that signal, the camera is stimulated. Raspberry pi camera captures the image of the Person.

The captured image is compared with the images of the Employee/Person in the database which is linked with our device and collects the details of the Employees/Persons. Now the raspberry pi sends an alert through the mobile app to the person to get a reminder of the Safety measures which he has not followed to maintain the social well being of the community.

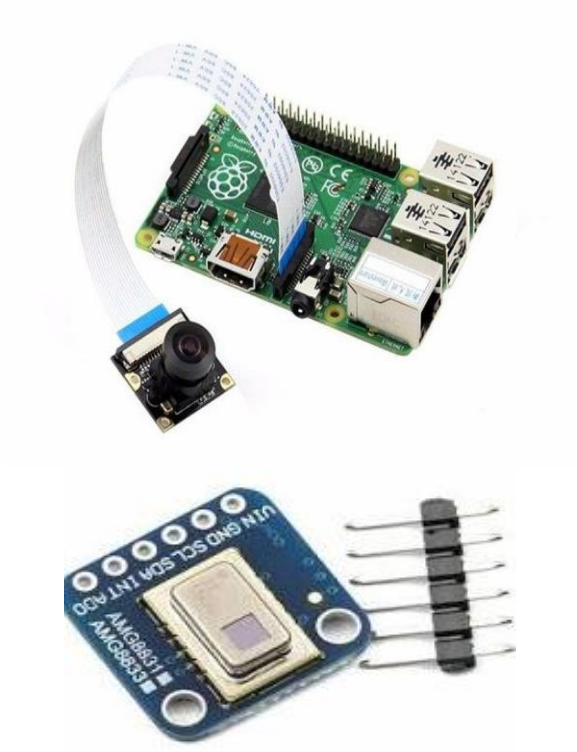

Fig 6:- Raspberry pi module

V. FEATURES OF DETECTION

➢ *Feature of Mask Detection :*

Face mask detection captures the image of a person who is not wearing a mask. Next to that captured image will be sent to the administrator of the organization and an alert will be sent to the respective person.

➢ *Features of temperature detection:*

Temperature detection detects the temperature of the person using IR thermopile Sensor to identify a sick person in the community and simultaneously alert notification will be sent to the administrator.

➢ *Multi-Channel Recognition:*

Attach multiple cameras and sensors on various areas in a few minutes and enable all the cameras to access the AI capability of recognizing faces and Sensors to identify the thermal of the persons.

VI. ABOUT THE SYSTEM

➢ *Advantage:*

- Mask detection is accurate ,fast and convenient to use.
- The response time of a face mask detection is less than a seconds that analyzes people in having fast track access to the monitored area.
- Many industrial applications benefit from this technology due to their non-contact nature.
- Infrared thermometers have an ability to monitor temperature in situations where the object is inaccessible by a contact sensor, and contact is not possible due to extremely high temperatures, where the object is active electrically.
- An economically cost effective model and can be used by many large Sectors.

➢ *Disadvantage:*

- Concern in privacy individuals
- Data Privacy Concern with Facial recognition
- Racial Bias and Collection Facial Image
- Reliability will be low and Lack of Regulation

VII. USE CASES OF THIS SYSTEM

➢ *Airports*

In airports, face mask and temperature detection system can be used to detect travelers without wearing masks and sense their temperature. In entrance, faces of every traveler are captured. In that case a traveler without a mask can be found using that detection method. Then the captured image and their sensed temperature will be sent to the airport authorities so they could take quick action.

Fig 7:- Surveillance in airport

In addition to this, Detection method also detects the face and temperature of the airport authorities working there and it sends the alert to the airport authorities phone. So, we can easily identify the persons without masks and we can prevent and reduce widespread coronavirus in the community.

➢ *Offices*

The face mask and temperature detection plays a major role in offices. Our system detects every employees who are not wearing mask and it senses the temperature. Then the image of every employees without mask is captured and it sends an alert to every employee through SMS or email with their temperature. So this detection helps to reduce the widespread of coronavirus in workplace and they can be protected.

Fig 8:- Surveillance in offices

➢ *Hospitals*

Using Face Mask Detection System, Hospitals can monitor if their staff is wearing masks during their shift or not and they can monitor their temperature. There if any staffs are not wearing a mask, a notification to wear a mask will be sent to the respective staffs with their temperature.

In addition to this, if quarantine people who are required to wear a mask, the system notices it and sends a notification to administrator the quarantine people who are not wearing a mask.

Fig 9: -Surveillance in Hospitals

VIII. CONCLUSION

In this paper, we have proposed a face mask detector and temperature detection using IR sensor, which can be able to contribute to public healthcare. For future work, we will consider improving the speed of the proposed method.

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