

COVID-19 Spread Protection System

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Abstract: The COVID-19 epidemic is causing a global health epidemic. The most powerful safety tool is to wear a face mask within public places and elsewhere. The outbreak of COVID-19 forced governments around the world to take steps to prevent the spread of the virus. According to research reports, wearing a face mask in public places greatly reduces the risk of infection. In this paper, the model is used to monitor body temperature, monitor oxygen level, obtain a face mask and provide a mask using the required human kit. The proposed model can be used in any purchase of shopping mall, hotel, apartment entrance, etc. As a result, it is an inexpensive and reliable way to build a healthy environment. The test of the proposed framework was performed with the Face Mask Detection algorithm, monitoring the human body temperature using a temperature sensor and monitoring the oxygen level using the pulse oximeter method. In addition, the mask dispenser will provide a mask for those who do not have a mask.

Keywords: Mask detection, temperature monitoring, oxygen level monitoring, mask dispenser.

1. Introduction

Coronaviruses are a large group of viruses that cause illness in humans and animals. The outbreak of the Novel coronavirus (COVID-19) was first detected at a seafood market in the city of Wuhan in Hubei Province, China in mid-December, 2019, and has now spread to 214 countries / regions / territories worldwide. The WHO (under International Health Laws) declared the outbreak as the “International Public Health Emergency Response” (PHEIC) on 30 January 2020. The WHO then declared COVID-19 as a pandemic on March 11, 2020 [1].

People infected with the novel coronavirus are a major source of infection. Direct human-to-human transmission occurs through close contact, especially with the respiratory tract that comes out when an infected person coughs, sneezes, or talks. These droplets may also remain on the surface, where the virus remains [2]. Hence it is mandatory to wear mask in public places. The discovery of the face mask has seen significant progress in the fields of image processing and computer vision, since the outbreak of the Covid-19 epidemic. Many face recognition models are created using several algorithms and techniques such as Image processing and Computer vision. [3] The method proposed in this paper uses in-depth reading, TensorFlow, and OpenCV to obtain a face mask detection. This model can be used for safety purposes as it is very effective in use. Also, a person with a high body temperature and low in oxygen should not be allowed to enter public places because

they are at high risk of infection and the spread of the virus. Hence all this safety majors should be taken at entrances of any workplace, supermarkets, and hospital gates.

As a result, a smart entry device that automatically monitors human body temperature, oxygen level and detects a mask in the door opening system is improved. Improved vision is used in this system approach, which is a combination of all three including temperature detection, oxygen monitoring, mask detection and also mask provision using a dispenser.

2. Related Work

This section summarizes applications in which mask detection and other covid-19 safety measures are now being used.

And how this system is made after survey and make it more convenient option as per pre covid safety measures.

Development of real time human body temperature (hypothermia & hyperthermia) monitoring & alert system with GSM & GPS [15]

- LM-35DZ temperature sensor is used for Human body temperature measurement and the record will send to the hospitals or respected person using wireless technology. Also, the GPS is using for location detection of person.
- As per given paper it is clear that LM-35DZ sensor is low-cost sensor with good results. Hence, in this paper LM-35DZ is used for Human Body temperature measurement at the entrance of the Hall, Hospitals, etc., as per covid -19 precautions.

IoT-Enabled smart doors for monitoring body temperature and face mask detection [8]

- In this paper, the face mask detection algorithm using the Open CV library for Mask Detection. In addition, the human body temperature is monitored using an unaffected heat sensor. This proposed system can detect the users from COVID 19 by enabling the Internet of Things (IoT) technology.
- According to referred paper TensorFlow Software library is a good option for the Face mask detection. But as per covid-19 safety measurements, Oxygen level monitoring is also required with Mask detection and Temperature monitoring. Hence in this paper Oxygen level monitoring will also perform.

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Face Counting and mask detection using Deep Learning [7].

- The aim of this paper is to present the problems & issues that occur in a face recognition system in detecting & recognizing faces accurately due to light, aging, expressions, similarity in faces and other systematic problems like noise, image acquisition, video camera distortion etc. In this article using TensorFlow this problem can be rectified.
- As per study, because of very high performance of tensorflow, hardware that uses TensorFlow is also required to have a matching high performance. In addition, although it can be said that distributed learning of data calculation can be said to be an advantage, it can be said that preparing an environment for doing that is a bit more difficult. Instead, we can use OpenCV, it is a computer vision framework that helps you do all sorts of processing on images and videos. Since its release, it's been a widely used tool for image processing tasks. It enables you to manipulate pixels easily, so that you can build your own image and video processing algorithms if you wish to do so.

Design Simulation and Implementation of a Digital Pulse Oxygen Saturation Measurement System Using the Arduino Microcontroller [16]

- This paper reports on the design, simulation, and implementation of a device to measure pulse oxygen saturation based on a light photoplethysmography (PPG) system that uses the MAX30100 sensor as the primary component of this health monitoring device. The life parameter level is the level of oxygen in the blood (SpO₂) in the peripheral capillary. This work was started using the Arduino Uno R3 microcontroller and this integrated sensor circuit (IC).

Prediction of the type of ventilator for a patient using IoT based oximeter [17].

- The current paper shows a heart rate monitor, which can also be used to measure oxygen saturation levels using the MAX30102 sensor. All measured results were analyzed by the Arduino platform to determine the patient's health status. Ratings received and monitored using a mobile application by both Caregiver and Doctor. The design of this device depends on many types of platforms such as Arduino, Android and Cloud Server

In both paper [16] & [17] the oxygen level in the paper is measured using the MAX30100 or MAX30102 sensor. After comparing both sensors it is noted that the MAX30102 is a much better option than the MAX30100 sensor. The following are some of the comparison points:

- (MAX30100: 16-bit, MAX30102: 32-bit FIFO) MAX30102 has high data storage that will be transferred to a smaller controller, resulting in faster data transfer.
- (MAX30102: 18-bit, MAX30100: 16-bit ADC resolution) MAX30102 is very sensitive to changes in

IR receiver voltage.

- The MAX30102 has a smaller LED range, which leads to lower power consumption.

After reading all these papers it is clear that all the systems provide one or two tested parameters but in this paper all safety parameters will be monitored at the input. Oxygen level using the MAX30102 sensor, Temperature using the LM-35DZ sensor, and mask detection using OpenCV.

3. Methodology

It is proposed to design a system that can monitor temperature, body oxygen level, identify a person's face, even with or without a mask, and provide the necessary human mask. For the system to work properly it is necessary to divide the system into two parts:

A. Detecting Face mask and providing mask using dispenser

This section focuses on finding the location and size of one or more faces, whether they are wearing a mask or not, within the image. In this case, a face detection model based on OpenCV Deep Learning is used and, as a result, an area of interest (ROI) is obtained that contains data such as location, width, and face length.

Then a stage-level training was done to get the face in and out of the mask. In this case, the "Real-World-Masked-Face-Dataset" website available on Git-Hub is in use.

B. Monitoring Body temperature and oxygen level:

In this system, when the person enters the system first check the body temperature by using temperature sensor and then check oxygen level using pulse oximetry method. If both temperature and oxygen level of the human body is under valid range system will allow that person to move forward for next step.

4. Advantages and Disadvantages of the System

A. Advantages

- Fully automatic detection
- Man power reduces.

B. Disadvantages

- Needs power supply
- Needs to be mounted to floor

5. Conclusion

New developments and the discovery of the power of intelligent technology in the development of new models, which will help to meet the needs of developing countries. In this work, an intelligent system was built to monitor body temperature and oxygen level, detect a face mask and provide a mask using a dispenser that can improve social Security. This will help to reduce staff capacity while also providing an additional layer of protection against the spread of Covid-19 infection.

The model uses a deep real-time learning system using Raspberry pi to get a face mask, as well as temperature and oxygen detection and monitoring the number of people present

at any given time. In addition, there are many ways to improve performance to improve results. Future development will be included to improve the accuracy of these steps, using a combination of varieties features, performance enhancement, and mobile app development with user-friendly monitoring interface.

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