



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

A futuristic digital interface with a glowing Earth globe in the center. The interface is overlaid on a background of a person's hands reaching out towards the globe. The interface includes various data elements: a 'LOADING 100%' progress bar, a 'MEDIA' icon, a 'BUSINESS' section, a 'NETWORK SEARCH' section, a 'WORLD' section, and several charts and graphs. The overall color scheme is blue and white with a glowing effect.

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.118

 9940 572 462

 6381 907 438

 [ijrset@gmail.com](mailto:ijrset@gmail.com)

 [www.ijrset.com](http://www.ijrset.com)



# Automated Temperature Checkup and Face Mask Detection System

Rohan Yetal<sup>1</sup>, Yash Ahire<sup>2</sup>, Tushar Tupe<sup>3</sup>, Rushikesh Patade<sup>4</sup>, Prof. Y. Y. More<sup>5</sup>

U.G. Student, Department of Mechanical Engineering, PES's Modern College of Engineering College, Pune, Maharashtra, India<sup>1,2,3,4</sup>

Associate Professor, Department of Mechanical Engineering, PES's Modern College of Engineering College, Pune, Maharashtra, India<sup>5</sup>

**ABSTRACT:** Coronavirus diseases (COVID-19) is a kind of pandemic which is growing at a fast rate and causing a health crisis. According to survey reports, wearing a face mask at public places reduces the risk of transmission significantly. In this project, we have discussed on face mask detection using Raspberry Pi and a web camera. It consist a machine learning model for monitoring body temperature and face mask detection The face mask detection model was done with the help of a computer vision, image classification algorithm based on the harcascade classifier. This model can achieve accuracy up to 96.85% Besides, the body temperature of the individual is monitored using a non-contact temperature sensor. This system automatically sends an alert if a person don't have the face mask, to the authorities or the owner of the place. The proposed model can be used for any shopping mall, hotel, apartment entrance, etc. As an outcome a costeffective and reliable method of using AI and sensors to build a healthy environment.

**KEYWORDS:** Machine Learning, Computer Vision, Harcascade Classifier, Temperature Sensor, AI Sensors.

## I. INTRODUCTION

Coronavirus disease(COVID-19) has globally infected over 2.7 million people and caused over 180,000 deaths. In this pandemic detection of face masks can be a tough job. During this period, mask detection received extra attention due to the spread of corona virus disease. This is why various nations adopt the rule "No entry without masking". Facade detection is a critical safety problem and Covid-19 prevention. Masking reduces the risk of the associate of exposure to infected patients, irrespective of the symptoms. The identification of masks is carried out in airports, hospitals, offices and academic areas. The detection of masks has thus become a challenging and highly critical issue. In the medical field, masking lowers the associate's potential risk of exposure to infected patients, whether or not they show symptoms. Airports, hospitals, offices and academic departments are used in mask detection. Mask detection has therefore become an extremely important and difficult problem. The rise in body temperature is considered as the major symptom in the coronavirus. So, the temperature check and mask detection is made as the entry level check in every institution and office. To do this work the humans were appointed and the checking process is carried out. This process takes more time and involves human intervention. The use of AI enabled IR sensor , camera with the Raspberry Pi and Temperature sensor is used which made the system cost-effective and available to all the people. In the fields of facial recognition and computer vision, face mask detection has made significant progress. A variety of techniques and algorithms were used to construct face detection models. The proposed approach in this project leverages profound intelligence, TensorFlow, Keras, and OpenCV to detect face masks. This method can be utilized in defence because it is low-cost to adopt. This technique does have a precision score of 0.9264 and an F1 rating of 0.93. The Haar Cascade algorithm to detect faces in the low-cost Internet of Things using the Raspberry Pi method was used. It is a cutting edge access control scheme. It shows a machine learning approach for facial recognition and detection that makes use of the OpenCV library's hair cascade to complete the task quickly and with a high detection rate.

## II. LITERATURE REVIEW

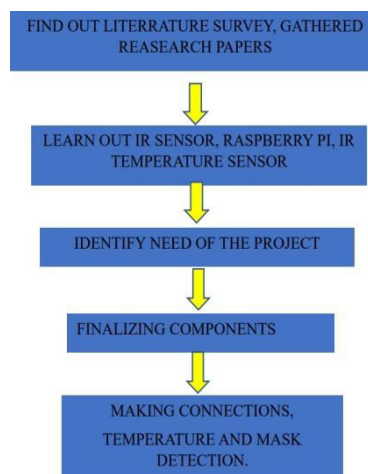
i) Paper Name-IoT-Enabled smart doors for monitoring body temperature and face mask Detection. Author- B Varshini, HR Yogesh, Syed Danish Pasha, Maaz Suhail, V Madhumitha, Archana Sasi. In this we got the information about raspberry pi camera, IR sensor and temperature sensor.and also the methodology to implement temperature and face mask detection. New developments and the availability of smart technologies force to the creation of new models, which will help meet the needs of developing countries. In this paper, an IoT-enabled smart door is developed to

monitor body temperature and detect face masks that can enhance public safety. This will help to reduce manpower while also providing an extra layer of protection against the spread of Covid-19 infection. The model uses a real-time deep learning system using Raspberry pi to detect face masks, and temperature detection as well as monitor the count of people present at any given time. The device performs excellently when it comes to temperature measurement and mask detection, the trained model was able to achieve a result of 97 percent.

ii.) Paper Name- Multi-angle Head Pose Classification when Wearing the Mask for Face Recognition under the COVID19 Coronavirus Epidemic Author- Shuang Li, Xin Ning, Lina Yu, Liping Zhang, Xiaoli Dong, Yuan Shi This paper gives information about a new method to solve the problem of head pose classification with masks during the COVID-19 coronavirus epidemic. This method that uses the colour texture analysis of images and line portrait. By extracting and processing the pixel information of the H-channel in the HSV (Hue Value Saturation) colour space to distinguish the face and mask in the image. Guide the CNN to learn more valuable information through the input image. The evaluation of MAFA dataset show that the proposed method in this paper is superior to other methods listed. The solution of this problem also provides help for the study of multi-angle problems. In practical applications, we can use a face detection algorithm that distinguishes between wearing a mask and not wearing a mask. This paper gives information of MAFA dataset. It also compares various algorithms like HGL, line, RGB, FSA-Net, E PnP-LAB. This paper shows that among all four algorithms HGL algorithm have highest accuracy of 93.64%.

iii) Paper Name- Raspberry Pi as Internet of Things hardware: Performances and Constraints Author- Mirjana Maksimović, Vladimir Vujović, Nikola Davidović, Vladimir Milošević and Branko Perišić This paper gives information about Raspberry Pi, structure and multiple core components of Raspberry. This paper also includes comparison between Raspberry pi, Arduino and Udoo. This paper also gives information about operating system Raspbian of Raspberry Pi. Raspberry Pi's performances are compared with some popular boards and development platforms on a general level by computing power, size and overall costs of the solutions. Based on performed analysis, it can be stated that Udoo has the best performances among considered IoT hardware platforms, but at the same time its price is quite high. On the other side the detail analyses of Raspberry Pi have shown that as ultra-cheap-yet-serviceable computer board, with support for a large number of input and output peripherals, and network communication is the perfect platform for interfacing with many different devices and using in wide range of applications.

### III. METHODOLOGY



1. Place your hand in front of the temp
2. Temp sensor checks body temp
3. Simultaneously the camera checks for face mask
4. Security guard receive message if body temp above normal body temperature





IV. SOFTWARE REQUIREMENT

**Python**

Python is a popular programming language. It was created by Guido van Rossum, and released in 1991. Python is a high-level, interpreted, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. It is used for web development (server-side), software development, mathematics, system scripting. Tkinter is the standard GUI library for Python. Python when combined with Tkinter provides a fast and easy way to create GUI applications. Tkinter provides a powerful object-oriented interface to the Tk GUI toolkit. RPi.GPIO library is another Python library. It provide basic interactions with the GPIO pins. Raspberry-gpio-python or RPi.GPIO, is a Python module to control the GPIO interface on the Raspberry Pi. It was developed by Ben Croston and released under an MIT free software license.

**Opencv**

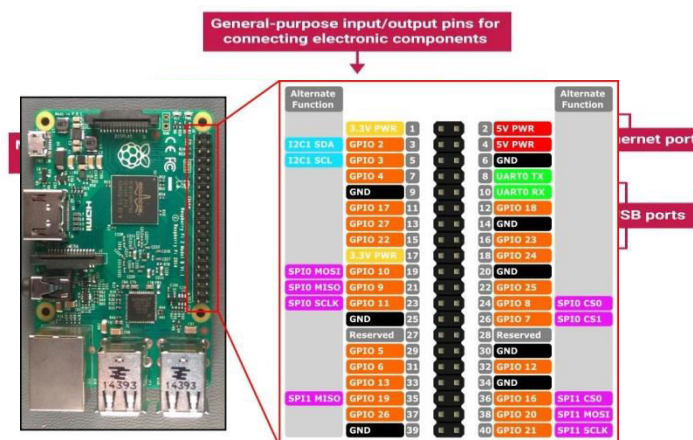
OpenCV is an open-source library which is primarily used for Computer Vision Applications. This contains many functions and algorithms for Motion tracking, Facial recognition, Object Detection, Segmentation and recognition and many other applications. Images and real time video streams can be manipulated to suit different needs using this library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code. The library has more than 2500 optimized algorithms, which includes a comprehensive set of both classic and state-of-the-art computer vision and machine learning algorithms. These algorithms can be used to detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, produce 3D point clouds from stereo cameras, stitch images together to produce a high resolution image of an entire scene, find similar images from an image database, remove red eyes from images taken using flash, follow eye movements, recognize scenery and establish markers to overlay it with augmented reality, etc.

**Haarcascade**

OpenCV Haar Cascade is the machine learning method where a classifier is drilled from a great deal of positive and negative photos. The algorithm is put forwarded by aul Viola and Michael Jones. Haar feature-based cascade classifiers are the classifiers implemented for object detection. This classifier chases machine learning procedure in which a cascade operation is inculcated from the photos to discover items in additional photos. Face detection and facial expressions in an image are also successfully detected. The exercise is finished by offering positive and negative pictures to the classifier. Then the characteristics are drawn out from the picture.

V. HARDWARE REQUIREMENT

**Raspberry Pi**



The Raspberry Pi is a low-cost tiny computer that connects to a computer monitor or television and operates with a regular keyboard and mouse. It is a handy little gadget that focuses on teaching people of all ages about scripting languages like Scratch andpython. It can perform all the functions of a desktop computer, such as internet surfing and viewing greater-definition clip, worksheets, and playing games. It has a 1.2-GHz quad-core chipset BCM2387 with a GPU support of a dual-core and a video core multimedia co-processor and the GPU, which includes dual core

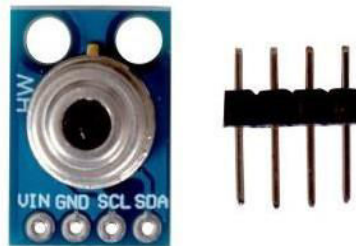
multimedia coprocessor, including a Bluetooth 4.1 (Bluetooth and Bluetooth Classic). With Bluetooth Low Energy (BLE) and BCM43143 Wi-Fi, the Raspberry Pi 3 offers an upgrade towards a new main processor and improved networking.

### Web Camera



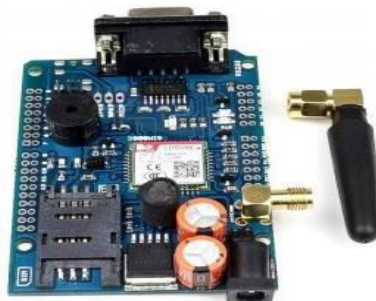
This 20 megapixels web camera comes with an adjustable focus (5 cm to infinity), CMOS sensor and a frame rate upto 30 fps that all together promises good quality image. The USB 2.0 connectivity allows you to easily connect it with your laptop or raspberry pi. It has a built-in microphone which ensures amazing sound clarity.

### Temperature Sensor



The temperature sensor (MLX90614) acts as an infrared non-contact temperature reader that reads the temperature without contacting them. These sensors work by focusing the energy emitted by an object/person on to one or more photodetectors. These photodetectors convert that energy into an electrical signal, which is proportional to the infrared energy emitted by the object. MLX90614 is an IR based contactless temperature sensor that can measure the temperature of a particular object between  $-70^{\circ}\text{C}$  –  $382.2^{\circ}\text{C}$  and an ambient temperature of  $-40^{\circ}\text{C}$  –  $125^{\circ}\text{C}$  without even making physical contact with an object under observation. It is embedded with an I2C port to communicate temperature readings to microcontrollers over an I2C bus.

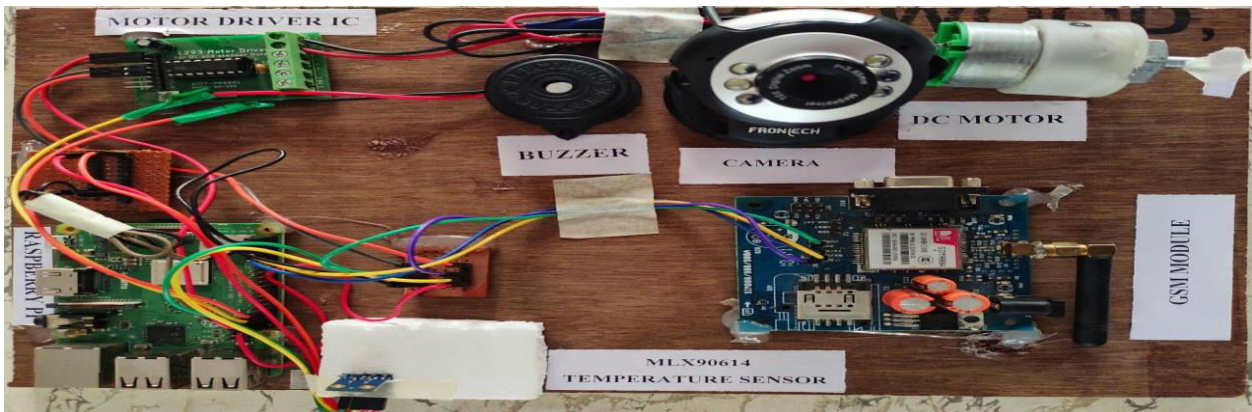
### GSM Module



GSM stands for global system for mobile communication module. It is designed for short messaging services (SMS). This module is able to receive the data from devices and transmit the data in text SMS format. SIM900A GSM Module is the smallest and cheapest module for GPRS/GSM communication. It is common with Arduino and microcontroller in most of embedded applications. The module offers GPRS/GSM technology for communication with the use of a mobile SIM. It uses a 900 and 1800 MHz frequency band and allows users to receive/send mobile

calls and SMS. SIM900 has multiple kinds of communication and I2C is one of them due to its popularity. The module has a single I2C protocol pin, which helps to build the application with any module with that communication. SDA Pin 37 for data and SCL Pin 38 for clock pulse.

## VI. EXPERIMENTAL SETUP



## VII. EXPERIMENTAL WORK

Here we are proposing a completely automated temperature checkup and mask detection system. In this system we made use of a contactless temperature sensor and a face mask monitor. The system uses temperature sensor and camera connected to a Raspberry Pi system that regulates the whole operation. The camera is employed for detecting face mask and temperature sensor for detecting person's temperature. An individual will not be able to enter building premises without temperature and mask detection. The person satisfying both conditions are allowed to enter. Whenever the person has normal temperature and wearing face mask then the system operates DC motor to open the barrier allowing the person to enter the premises.

If a person's temperature is higher than normal body temperature or person without mask then the buzzer will turn on. Also a message is sent to security guard.

Advantages of Proposed system:

1. Automatic detection of Face Mask and body temperature
2. Real time detection of Body Temperature.
3. Real time detection of Face Mask.
4. Effectively recognize face masks.
5. Alerts with message and Buzzer Sound.

## VIII. CONCLUSION

In this work, an IoT-enabled smart door is developed to monitor body temperature and detect face masks that can enhance public safety. This will help to reduce manpower while also providing an extra layer of protection against the spread of Covid-19 infection. The model uses a real-time deep learning system using Raspberry Pi to detect face masks, and temperature detection as well as monitor the count of people present at any given time. The device performs excellently when it comes to temperature measurement and mask detection, the trained model was able to achieve a result of 97 percent. The test results demonstrate a high level of accuracy in detecting people wearing and not wearing facemasks, as well as it also generates alarms monitored and recorded. Furthermore, there are numerous techniques to enhance performance to improve results. Future development will include improving the



accuracy of these steps, using a combination of various features, and improving performance, as well as producing a mobile app with a user friendly interface for monitoring

#### REFERENCES

1. B Varshini, HR Yogesh, Syed Danish Pasha, Maaz Suhail, V Madhumitha, Archana Sasi , IoTEnabled smart doors for monitoring body temperature and face mask detection Global Transitions Proceedings 2 (2021) 246–254
2. Shuang Li1, Xin Ning, Lina Yu1, Liping Zhang, Xiaoli Dong, Yuan Shi4 , Wei He, Multi-angle Head Pose Classification when Wearing the Mask for Face Recognition under the COVID 19 Coronavirus Epidemic 978-1-7281-6512- 7/20/ ©2020 IEEE
3. Janik Mabbouxa, Dr. Joachim Steinwendnera, Contactless temperature measuring with low-cost embedded device using deep learning, Procedia Computer Science 192 (2021) 3517–3533
4. Preeti Nagrath a, Rachna Jain a , Agam Madan a , Rohan Arora a , Piyush Kataria a, Jude Hemanth b, SSDMNV2: A real time DNN-based face mask detection system using single shot multibox detector and MobileNetV2, Sustainable Cities and Society 66 (2021) 102692
5. Abirami M, Saundariya K, Senthil Kumaran R, and Yamuna I, Contactless temperature detection of multiple people and detection of possible corona virus affected person using AI Enabled IR sensor camera, 978-1-6654-4086-8/21 @2021 IEEE | DOI: 10.1109/WISPNET51692.2021.9419439
6. Mirjana Maksimović, Vladimir Vujović, Nikola Davidović, Vladimir Milošević and Branko Perišić, Raspberry Pi as Internet of Things hardware: Performances and Constraints.





**INNO SPACE**  
SJIF Scientific Journal Impact Factor  
**Impact Factor: 8.118**



**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details