IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

Face Mask Detection Technique and Temperature Sensing System Using IOT

Sukhbir Singh Menor, Lokesh Burile, Sanket Patil, Aman Gour, Apurva Sengar, Dr. P. R. Bokde
Department of Electronics and Communication Engineering
Priyadarshini Bhagwati College of Engineering, Nagpur, Maharashtra, India

Abstract: *The COVID 19 outbreak is wreaking havoc on the world's health. Wearing a face mask in public places and elsewhere is the most effective safety gear. COVID 19 has led governments all around the world to install shutters to prevent the virus from spreading. Wearing a face mask in public settings, according to studies, dramatically minimises the chance of infection. In this study, a machine learning model is used to monitor body temperature and recognize face masks in an intelligent IoT-enabled department. Any shopping mall, hotel, apartment entrance, and so on can employ the proposed approach. As a result, a low-cost and dependable method of using AI and nerves to produce a healthy atmosphere has emerged. The proposed framework was put to the test on the Face. The Massage Acquisition algorithm was created using the Sensor Flow software library. In addition, an unmodified heat sensor is used to monitor the human body temperature. By utilising Internet of Things (IoT) technologies, this proposed programme can get users to COVID 19.*

Keywords: Covid -19, IoT Module, Face Mask, Temperature Sensor, Arduino Uno, and other terms.

I. INTRODUCTION

Coronavirus, or COVID-19, emerged in Wuhan, China, and quickly spread to other countries, including India, the world's second most populous country with over 134 billion people. With such a large population, India may have difficulties in controlling the spread of the coronavirus.

The most effective strategies to minimise transmission are face masks and sanitizers. When it comes to preventing disease transmission, this has had great outcomes. Coronavirus infection can cause fever, sore throat, exhaustion, loss of taste and smell, and nasal congestion.

The majority of the time, it is broadcast in an ambiguous way to a larger number of sites. In severe situations, the incubation period might be just as long as 10 to 14 days. Respiratory droplets can transmit the virus directly (from one person to another). The COVID-19 epidemic affects everything from activities to social connections, as well as all types of sports, along with off-screen and on-screen entertainment. People with a high fever should not be permitted into public places if they're at danger of infection and virus spread; wearing a mask is recommended.

Temperature and mask checks are necessary at the entrances to any city, workplaces, supermarkets, and hospitals. As a result, a smart entry device identifies a mask on the door and automatically checks the human body temperature. This system technique, which includes temperature detection, total population detection, and mask detection, makes use of improved vision.

II. PROJECT BACKGROUND

The detection of a person wearing a mask and their temperature is referred to as face mask and temperature detection. Herbalists frequently rely on handcrafted items.

2.1 Role of AI

The Face Mask Detection Platform uses the Performance Network to detect when a user is not wearing a mask and when the temperature is high and sends a cell phone alert to the person to get a reminder of unstable security measures followed to maintain the well-being of the community.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

Figure 1: Face with & without mask

2.2 Face Detection Methods

Face detection can be achieved in two ways:

- Feature Based Approach
- Image Based Approach

A. Feature Based Approach

- Objects are often characterized by their distinctive features. There are many features on the outer part of the body, which can be seen between the face and many other things.
- Distinguishes face by removing structural features such as mouth, nose, eyes etc. and uses it to see faces. so use them to get a face. There are certain mathematical categories used to distinguish facial and non-facial recognition.
- The human face has certain processes that help to distinguish the face from other objects. Based on this approach, we will use a feature-based approach using Open CV.

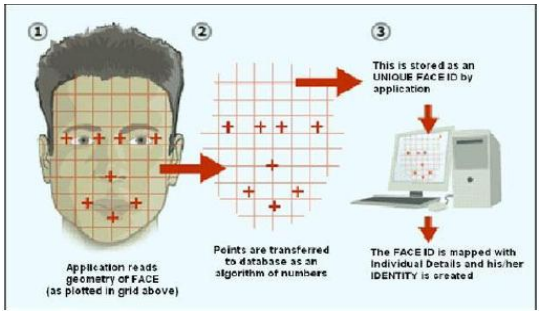


Figure 2: Feature Detection in face

B. Image Base Approach

Image-based methods are based on techniques from mathematical analysis and machine learning to determine the appropriate features of facial and non-facial images. The features studied are in the form of distribution models or discriminatory functions used for face detection.

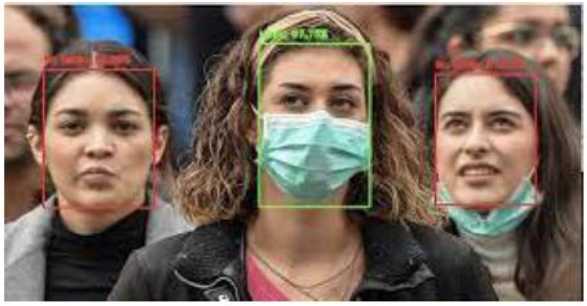


Figure 3: Image Based detection

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

III. Literature Review

Since December 2019, a new strain of coronavirus pneumonia (COVID-19) has spread rapidly across the country and worldwide [1]. As of July 15, 2020, more than 13.65 million confirmed cases have been reported in more than 220 countries and territories around the world, and more than 580,000 patients have died. Meanwhile, it continues to spread at a high rate [2]. A new strain of coronavirus is highly contagious. It can be transmitted by contact, droplets, aerosols and other carriers in the air, and can live up to 5 days in a convenient location.

"Guidelines for the Prevention of New Coronavirus Infection Pneumonia" issued by the National Health Commission emphasized that when people go out to public places, seek medical help and take public transportation, they should wear a medical surgical mask or N95 mask to prevent illness. the spread of the virus. Therefore, it is everyone's responsibility to wear a mask in public places during the epidemic, but this requires not only individual careful obedience, but also the acceptance of certain measures of administration and management.

At present, although there is no algorithm used specifically for facial mask wear, with the development of in-depth learning in the field of computer vision, target-based detection algorithms are used for targeted pedestrian detection, facial detection, and distance hearing. target image. Discovery, medical imaging and natural scene document detection are widely used in the fields. Face detection algorithms rely on a high level of recognition accuracy, and have great classroom application capabilities, authentication, access control systems, access and open, and communication platforms.

At present, face recognition devices on the market have relatively single functions and have relatively high requirements on faces. When the face is obstructing a significant section of the face, the recognition accuracy falls drastically. Traditional facial recognition methods look to be stretched, especially in light of recent pandemic situation, where everyone is wearing a mask. We have devised a clever detection and recognition system for mask wearing in the hopes of resuming production and work while maintaining people's safety. Face mask detection and identification algorithms make up the majority of the system. The system's primary functions are divided into three categories: face mask detection, face recognition, and audio prompts.

IV. Block Diagram of Working Model

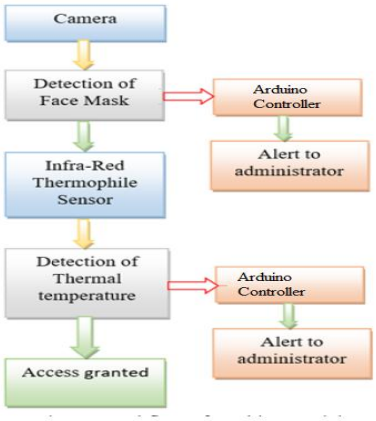


Figure 4: Block Diagram of system

V. Working

- The IR temperature sensor in our model relies on the basis of an infrared thermopile sensor for temperature measurement, which detects the temperature and verifies whether it exceeds a predetermined limit.. If the temperature exceeds the limit of 97.5F, it sends the signal to Arduino Control.
- A Arduino Controller is a credit card sized computer which receives the signals from the IR Sensor. With that signal, the camera is stimulated. Arduino Control camera captures the image of the Person. The captured image is compared to images of the Employee/Person in the database that is linked to our device and collects the Person's Employee/information.
- Now the Arduino Controller 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.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

VI. COMPONENTS SPECIFICATION

- Arduino Uno Controller
- LCD display
- Buzzer
- IR Sensor
- ESP32-CAM
- Temperature Sensor MLX90614
- IOT Module
- 7805 IC Module
- Adapter
- LEDs
- Others

6.1 Arduino Uno (12v)

Arduino Uno is an open source microcontroller board based on the microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital anchors and analog input / output (I / O) that can be connected to various extension boards (shields) and other regions..

6.2 ESP32-CAM

ESP32- The ESP32-CAM can be used in a variety of IoT systems. Ideal for smart home devices, industrial wireless control, wireless monitoring, wireless QR detection, wireless system signals, and other Internet of Things applications. It's a great solution for IoT applications.

6.3 LCD Display

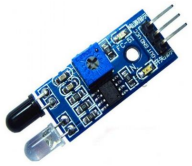
Liquid crystal display (LCD) is a small, flat panel used to display electronic information such as text, pictures, and moving pictures. LCD stands for Liquid Crystal display. The LCD gets a wide range of replacement LEDs (seven-segment LEDs or more segmented LEDs).

• 16 * 2 LCD display.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

6.4 IR Sensor

The IR sensor module consists mainly of IR Transmitter and Receiver, Op-amp, Variable Resistor (Trimmer pot), LED outlet and a few shortcuts. IR LED Transmitter. IR LED emits light, in the range of infrared frequency.



6.5 IOT Module

Internet of Things ("IoT") refers to the ability of everyday objects to connect to the Internet and send and receive data. The ESP8266 WiFi Module is an independent SOC with an integrated TCP / IP protocol that can give any microcontroller access to your WiFi network. ESP8266 is able to host the program or free up all Wi-Fi network activities in another application processor..

6.6 Temperature Sensor MLX90614

Temperature sensor (MLX90614) acts as an unobtrusive infrared temperature reader that reads temperature without contact. Both the Signal ASSP and the IR Sentiment Detector Chip are in the same TO-39 (a type of 'metal can' package (also known as a 'metal head') for semiconductor devices.). A sound-reducing thermometer, 17-bit ADC, and a powerful DSP unit are used that help achieve greater accuracy.

VII. ADVANTAGE

- Finding a mask is accurate, quick and easy to apply.
- The response time for face mask detection is less than the seconds that detect people accessing a supervised area.
- Many industrial applications benefit from this technology due to their uninterrupted communication.
- Infrared thermometers have the ability to monitor the temperature in situations where the object is inaccessible to the sensor, and the contact is not possible due to very high temperatures, when the object is electrically operated.
- An economically viable model and can be used in many major sectors..

VIII. DISADVANTAGE

- Individual concerns
- Confidentiality of Data by Face Recognition
- Racial Discrimination and Face Collection
- Integrity will be low and Lack of Regulation

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

IX. RESULTS AND DISCUSSION

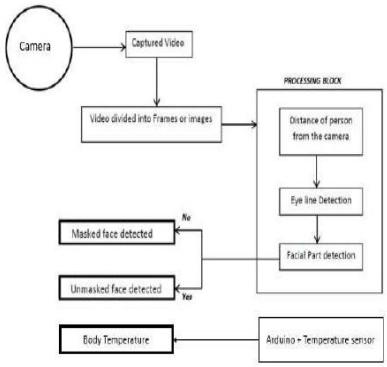


Figure 5: System Flow

9.1 System Architecture

Step 1: Data Visualization

In the first step, let's visualize the total number of images in our database in both categories namely face mask and face mask.

Step 2: Data Augmentation

In the next step, we can add our database to include a large number of photos of our training. In this step of enlarging the data, we rotate and rotate each image in our database.

Step 3: Splitting the Data

In this step, we split our data into an image-based training set in which the CNN model will be trained and a graphic test set in which our model will be tested.

Step 4: Building the Model

In the next step, we build our CNN Series model with various layers such as Conv2D, MaxPooling2D, Flatten, Dropout and Dense. In the dense final layer, we use the 'softmax' function to generate a vector that provides an opportunity for each of the two classes.

Step 5: Pre-Training the CNN Model

After building our model, let's create a 'train_ generator' and a 'confirmation_ generator' to fit our model in the next step.

Step 6: Training the CNN Model

This step is a key step where we integrate our images into a training set and test set on our sequence model that we use using the keras library.

Step 7: Labeling the Information

After creating the model, we label two opportunities in our results. ['0' as 'without_mask' and '1' as 'with_mask']

Step 8: Identifying Masked and Unmasked Faces

In the last step, we use the OpenCV library to launch an endless loop to use our webcam where we find faces using Cascade Classifier. Web camera code = cv2.VideoCapture (0) refers to the use of a webcam. The model will predict the probability of each of these two categories ([without_mask, with_mask]). Based on what the opportunities are, a label will be selected and displayed on our faces.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

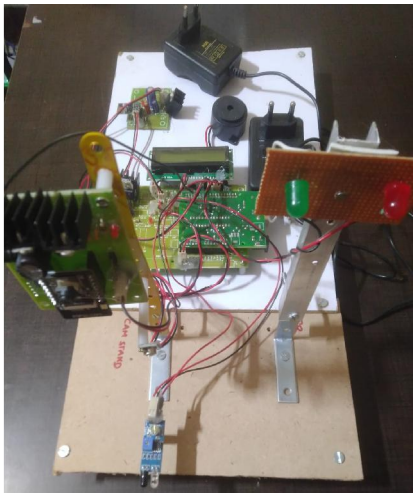


Figure 6: Project Images

X. CONCLUSION

The proposed system for distinguishing facial mask detection is used to detect COVID-19 both in photographs and videos using the neural convolution network. Comprehensive testing of data sets and performance evaluation of the proposed methods is presented. In addition, we have made a concerted effort to maintain the diversity of stages between the acquisition stages of the face mask using a symbolic method. We learned about different classifications like Vector support machine and Symbol Integrator. This project is being developed as an example of monitoring temperature measurements and getting people a mask. The work is designed to provide a safety net for people to avoid COVID-19. We have developed continuous monitoring of human conditions and stored human data on the server using the concept of advanced reading. From the results we can see that, the available results of the model method are better than the standard method.

XI. FUTURE WORK

For this project, we proposed a face mask scanner and temperature detection using an IR sensor, which can contribute to public health care. For future work, we will consider improving the speed of the proposed route.

REFERENCES

[1]. Pattanasethanon, P. & Savithi, C. (2012). Human Face Detect ion and Recognition using Web-Cam. Journal of Computer Science, 8(9), 1585-1593. https://doi.org/10.3844/jcssp.2012.1585.1593

[2]. P aul Viola, Michael J. Jones, " Robust Real-Time Face Det ection", published on the Internat ional Journal of Computer Vision 57(2), 2004.

[3]. S. Feng, C. Shen, N. Xia, W. Song, M. Fan, B.J. " Cowling Rat ional use of face masks in the COVID-19 pandemic" Lancet Respirat. Med., 8 (5) (2020), pp. 434-436.

[4]. X. Liu, S. Zhang, COVID-19: Face masks and human-to-human t ransmission, Influenza Other Respirat . Viruses, vol. n/a, no. n/a, doi: 10.1111/irv.12740.

[5]. "WHO Coronavirus Disease (COVID-19) Dashboard." ht tps://covid19.who.int/(accessed May 21, 2020).

[6]. T. Ojala, M. Piet ikainen, and T. Maenpaa, "Mult iresolut ion gray-scale and rotat ion invariant texture classificat ion with local binary patt erns," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 24,no. 7, pp.971–987, July 2002.

[7]. Y. Shi, L. I. Guanbin, Q. Cao et al., " Face hallucination by attentive sequence opt imizat ion with reinforcement learning," IEEE Transactions on Pattern Analysis and Machine Intelligence, 2019.

[8]. I. Firouzian, N. Firouzian," Face Recognit ion by Cognitive Discriminant Feat ures", elect ronic, ISSN: 2008 -6822 , vol. 1, pp. 7- 20, 2020.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 1, May 2022
Impact Factor: 6.252

[9]. Z. Abidin, A. Harjoko, "A Neural Network based Facial Expression Recognition using Fisherface", Internat ional Journal of Computer Applicat ions (0975 – 8887), Vol.59– No.3, 2012.

[10]. T. Schenkel, O. Ringhage, N. Branding," A COMPARATIVE STUDY OF FACIAL RECOGNITION TECHNIQUES With focus on low computational power", 2019.