International Journal of Scientific Research in Science and Technology
Print ISSN: 2395-6011 | Online ISSN: 2395-602X (www.ijsrst.com)
doi : https://doi.org/10.32628/IJSRST52310281

Review Paper on Face Mask Detection with Body Temperature Monitoring Using IoT

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ARTICLEINFO

Article History:

Accepted: 01 April 2023
Published: 12 April 2023

Publication Issue
Volume 10, Issue 2
March-April-2023

Page Number
621-624

ABSTRACT

The huge family of viruses known as coronaviruses, which are common, contagious, and hazardous to all humans, have become more prevalent in recent years. It spreads from one person to another by exhaling the contagious breath, which then deposits virus droplets on various surfaces. These droplets are then breathed by additional persons, who eventually become infected. As a result, it is essential that we protect both ourselves and our loved ones from this situation. We may practice safety measures like keeping a safe distance from others, washing our hands every two hours, applying hand sanitizer and most importantly wearing a mask. Therefore, as a precaution, the World Health Organization (WHO) suggested wearing masks in crowded locations. In some places, infections have spread quickly due to improper facial mask usage. We required a dependable solution for mask monitoring to overcome this problem. Face mask detection software based on AI and image processing techniques can help government organizations that are working to make wearing a face mask required. For face detection, helmet detection, and mask detection, the approaches mentioned in the article utilize Machine learning, Deep learning, and many other approaches. It will be simple to distinguish between persons having masks and those who are not having masks using all of these ways. The effectiveness of mask detectors must be improved immediately.

Keywords: Face mask detection, CNN, Object Detection.

I. INTRODUCTION

Since the onset of the most recent coronavirus illness pandemic, face masks are widely worn in public in China and other nations. because of recent. Research suggests that a significant portion of coronavirus patients are asymptomatic (or asymptomatic), and that even those who subsequently acquire symptoms (or are pre-symptomatic) can transfer the virus to others before acquiring symptoms, according to the Health Centre's recommendation. The most recent information also mentions a novel corona virus strain called the mutant corona virus, which has undergone structural mutation. The current RT-PCR technique we employ cannot even detect the new strain. It is therefore imperative that citizens in an overpopulated nation like India wear masks and allow the labour to continue. Nobody can keep track of whether or not each person entering the workspace is wearing a mask. Face mask detection became necessary as a result. The Convolutional Neural Network is the model in this study.

The MobileNetV2 architecture is the Convolutional Neural Network model that was used in this study. A network architecture called Mobile Net uses depth-wise separable convolution as its fundamental building block. Depth wise convolution and point convolution are the two levels of its depth wise separable convolution. This a method to assess whether or not a face mask is worn in workplaces or any other situation where there are many people working. The MobileNetV2 architecture is a convolutional neural network model that is employed here to recognise face masks. After being trained on a real-world dataset, the MobileNetV2 model, a network model using depth wise separable convolution as its fundamental unit, is tested with live video streaming with good accuracy.

II. LITERATURE REVIEW

At present, face recognition devices on the market have relatively single functions and have relatively high requirements on faces. When the face is in a state of large-area occlusion, the recognition accuracy drops rapidly. Especially in the face of the current epidemic situation where all people wear masks, the capabilities of traditional face recognition systems appear to be stretched. Considering that we will try our best to resume production and work while ensuring people's safety, we have designed a smart detection and recognition system for mask wearing. The system is mainly composed of face mask detection algorithm and face recognition algorithm.
The main functions of the system can be divided into three parts: face mask detection, face recognition, and voice prompts. When multiple pedestrians pass by the camera, the camera equipped with this algorithm will first detect the pedestrian's face mask. When the pedestrian wears the mask normally, it will not give a voice prompt. When a pedestrian wears a mask incorrectly, the voice will announce to remind him to wear the mask correctly. When a pedestrian is not wearing a mask, the system will trigger the face recognition module to speak his name and remind him to wear a mask. The system can be used in high-speed rail stations, subways, shopping malls and other crowded areas. Through researching related target detection algorithms, it is found that the deep learning model used for face detection can be applied to the task of mask wearing detection.

III. PROPOSED SYSTEM

The proposed work will keep an eye on the person's body temperature and make sure that they are wearing a mask in an effort to stop the virus from spreading. A ESP32 board is employed in this work. It is a cheap device that connects to a computer. In this prototype, when someone gets into the bus, their body temperature is taken. For this, a body

temperature sensor called the MLX90614 is employed.

A. Temperature Monitoring

Code is created for the MLX90614 temperature sensor, which is connected to the ESP32 GPIO Pin. If the temperature exceeds the threshold value, the red light will be displayed as a warning. If the temperature is normal, the green light will be displayed. Figure 2 illustrates a flowchart of the temperature monitoring process.

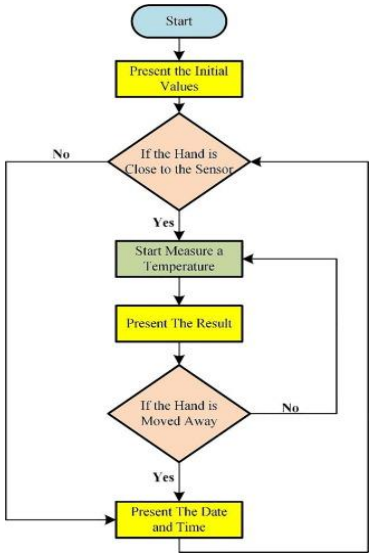

Figure 1: Temperature Monitoring System Flow chart

B. Mask Detection

Face mask recognition uses the Convolution Neural Networks (CNN) Technique, a deep learning algorithm. It is mostly utilised for image analysis and picture recognition. A final result is produced by combining around 1000 filters, and the output is then forwarded to the neural network's next layer. Utilizing the face mask detection algorithm and the TensorFlow software library, the proposed solution is evaluated. In this approach, if an individual tries to enter the bus without wearing a mask, the buzzer will be heard on the bus.

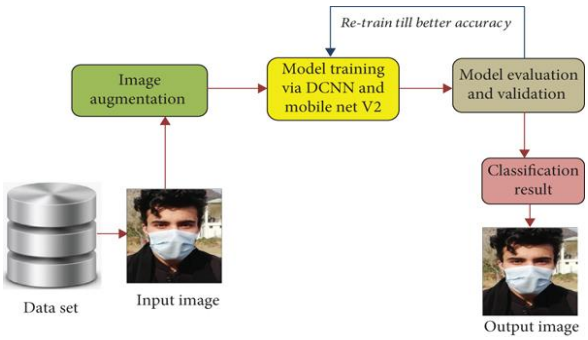

Figure 2: Face Mask Detection using DCNN & Mobile Net V2

C. MLX90614 Sensor

A non-contact infrared temperature measurement tool is the MLX90614 model. It makes use of a strong DSP processing unit with high-temperature resolution and measurement precision, a low-noise amplifier, and a 17 b A/D converter. The thermometer has a range of -40 to +125 degrees. The sensor also produces reliable digital signals that are linearly connected with temperature, simplifying the design. The sensor communicates with the microcontroller using the I2C protocol and measures the object's temperature using IR rays without making any physical contact.

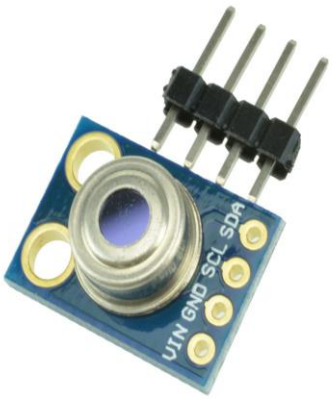

Figure 3: MLX90614 Sensor

IV. FUTURE TRENDS

The suggested system combines temperature monitoring and face mask detection. When a person

is found without a face mask or with a high body temperature, it sends out a warning signal. The adopted approach will have a significant positive impact on the healthcare system. Eventually, the model can be enhanced to detect the presence of a virus-prone mask. The model might be improved further to assess whether a mask is surgical or not.

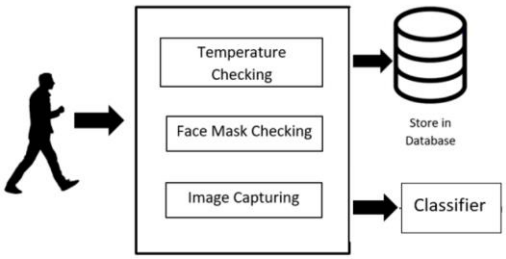

Figure 4: Face Mask Detection & Temperature Monitoring Module

V. CONCLUSION

The proposed device records temperature readings and scans for face masks that might increase public safety. The MLX90614 thermometer is used to gauge body temperature. The facemask detector is modelled using the Convolution Neural Network method. The model is trained, validated, and tested using a dataset consisting of 3000 images of both uncovered and mask-covered faces. These images were produced using tools like Kaggle. This idea can be applied in many places, such as shopping centres, airports, and public transit, to slow the spread of the disease.

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Cite this article as :

Sh Bharath Tewar, Rohan Patel, Vaishali Deshmukh, Komal Thote, Rutika Kunjam, Pravin Lakhe, "Review Paper on Face Mask Detection with Body Temperature Monitoring Using IoT", International Journal of Scientific Research in Science and Technology (IJSRST), Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 10 Issue 2, pp. 621-624, March-April 2023. Available at doi : https://doi.org/10.32628/IJSRST52310281
Journal URL : https://ijsrst.com/IJSRST52310281