# Automatic Face Mask And Temperature Detection System

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**Abstract**

The main aim of the project is to build a Aurdino Uno based safety device for covid-19 safety rules to reduce the disease spread. We focus on most common indoor measurement system to allow the people. This project makes a use of DHT11 temperature sensor to detect the body temperature and camera, openCV to detect the mask whether the person is wearing a mask or not. We introduce an affordable COVID-19 indoor safety system.

**Keywords**

Aurdino Uno , DHT11 Temperature Sensor , LCD Display , Servo Motor , LED/Buzzer , Computer System , Camera , ESP32, Wifi Module

**Introduction**

Recently India along with almost all big and small countries stated emergency conditions for the novel coronavirus (COVID-19). Practically, the whole population of the world is under lockdown and people are wearing a mask as suggested by the World Health Organization (WHO). Precaution is always better than cure. But since there isn't any cure yet available, the only option we are left with is to follow the precautions. And failing to do so may has severe consequences. Since there is no vaccine yet available in the market, the only way to be safe is by taking precautions. It is suggested to wear a face mask that masks help in slowing down the spread of infection as the virus mainly gets transmitted with the aerosols which come out of an infected person's nose or mouth while coughing or sneezing. Currently, Temperature Checkups are done manually using Temperture Sensor. Manual Checkups can be Inefficient, Impractical, and Risky. To solve these problems, we have designed a Aurdino Uno based body temperature measurement and face mask detector which detects whether the person is wearing a mask or not. We focus on most common indoor measurement system to allow the people in. For implementation of mask detection using an OpenCV and camera interfaced to the Aurdino Uno. OpenCV is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection. For detection of person's temperature using contactless IR sensor. The persons pass one by one. In case that person's temperature is High then the Door will not opened. Otherwise, the door is opened to let the person in. The main controlling device of the project is Aurdino Uno. Here we are using Servo motor as door. The status of the project will be displays on LCD module. Here we are using two (RED, GREEN) LEDs for working indication of the project.

**Literature Review**

Many researchers and doctors are working on medication and vaccination for corona. COVID-19 spreads mostly by droplet infection when people cough or if we touch someone who is ill and then to our face (i.e. Rubbing eyes or nose). To maintain social distancing, along with social distancing regular temperature check at entrances of public places are mandatory.

With the references of IJARCCE and International Research Journal of Engineering and Technology(IRJET) paper we should decide to work on this project with additional features. Rehman et al [6] proposed a system that restrict the growth of COVID-19 by finding out people who are not wearing any facial mask in a smart city network where all the public places are monitored with Closed-Circuit Television (CCTV) cameras. While a person without a mask is detected, the corresponding authority is informed through the city network. A deep learning architecture is trained on a dataset that consists of images of people with and without masks collected from various sources. The trained architecture achieved 98.7% accuracy on distinguishing people with and without a facial mask for previously unseen test data. It is hoped that our study would be a useful tool to reduce the spread of this communicable disease for many countries in the world. Toshanlal Meenpal et al [7] designed in such a way that it use a binary face classifier which can detect any face present in the frame irrespective of its alignment. We present a method to generate accurate face segmentation masks from any arbitrary size input image. Beginning from the RGB image of any size, the method uses Predefined Training Weights of VGG – 16 Architecture for feature extraction. Training is performed through Fully Convolutional Networks to semantically segment out the faces present in that image. Gradient Descent is used for training while Binomial Cross Entropy is used as a loss function. Further the output image from the FCN is processed to remove the unwanted noise and avoid the false predictions if any and make bounding box around the faces. Furthermore, proposed model has also shown great results in recognizing non-frontal faces. Along with this it is also able to detect multiple facial masks in a single frame. Experiments were performed on Multi Parsing Human Dataset obtaining mean pixel level accuracy of 93.884 % for the segmented face masks. Nenad Petrović et al [10] proposed a IoT-based system aiming to help organizations respect the COVID-19 safety rules and guidelines in order to reduce the disease spread is presented. It focus on most common indoor measures - people with high body temperature should stay at home, wearing mask is obligatory and distance between persons should be at 11 least 1.5-2 meters. For the first scenario, Arduino Uno microcontroller board with contactless temperature sensor is used, while we rely on Raspberry Pi singleboard computer equipped with camera making use of computer vision techniques for other two scenarios. Python version of OpenCV, open-source computer vision library was used for implementation of mask detection and social distance check algorithms.

**Implementation**

**Block diagram of the project**
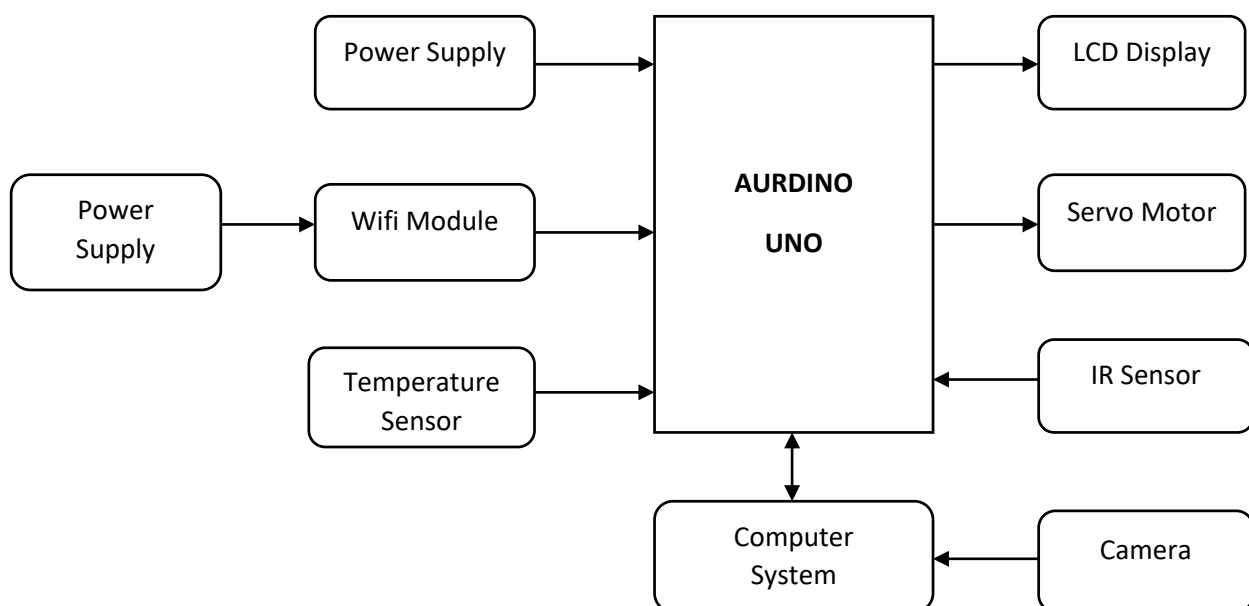
The main controlling device of the project is Aurdino UNO, camera, temperature sensor, Servo motor, LCD display, Power supply, Wifi Module interfaced to the Aurdino UNO. The processor continuously read the data from sensor and camera. In case that person's temperature exceeds average human body or if the person does not contain a mask then Aurdino UNO generates signal to lock the door and gives the alert through Message on LCD display. Otherwise, the door is opened to let the person in. Mask detection: The computer interfaced with camera and open CV. If the face was detected then mouth and nose detection are further applied to the corresponding camera frame version. In case that image does not contain mouth and nose, it means that person wears mask properly and corresponding door will be opened.

## Related Works

The first step to detect COVID is by scanning a temperature. Also we need to monitor every person for a mask. In public places there is a man continuously standing for checking masks and temperature. So this system will be used to do all this checking automatically

When a person will stand in front of camera then system will scan person's wearing face mask or not. when person is without wearing face mask is approaching to the camera , it shows the message  on LCD display for wearing face mask to remind the person.  And we will use a temperature sensor to check the temperature of the person if the temperature is normal then person is allowed to entry otherwise the entry is denied and LCD display shows the temperature of that person. If the person is not wearing face mask properly and body temperature is high then the gate will not open also the temperature and photo of that person will be stored in this system.

Moreover, there is another powerful function cooperating with body temperature detection, "Face Recognition with wearing face mask". Through the wide angle of lens, face captured by the camera will be instantly processing face matching with internal database. Whether wearing face mask, camera can still recognize to identify the personnel identities
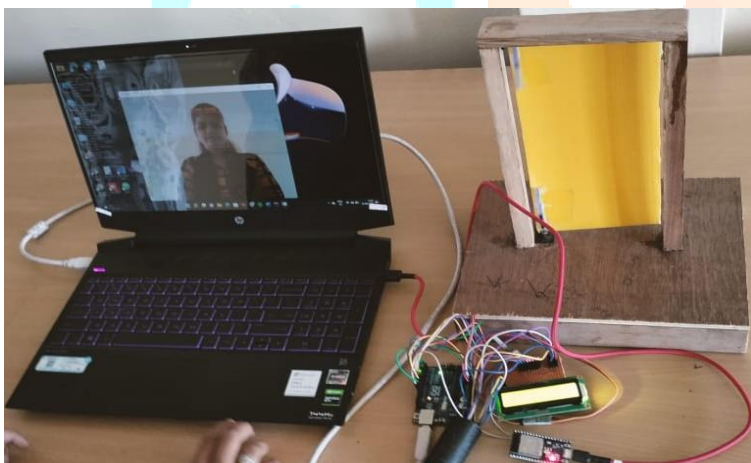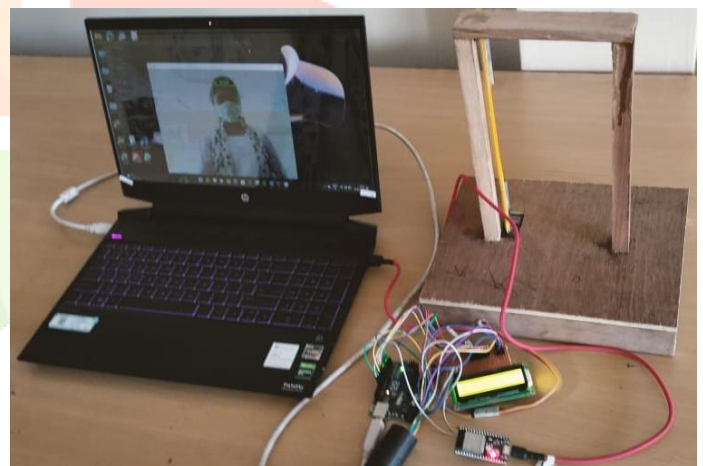


| Fig.1 No mask is detected, gate is close | Fig.2 Mask is detected and temperature is Normal ,gate will be open. |

## CONCLUSION

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with Arduino. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for "**Automatic Face Mask And Temperature Detection System**" has been designed perfectly. Secondly, using OpenCV for mask detection and python language. And also the system able to detects the body temperature using DHT11 sensor, IR sensor. Based on the temperature and mask the system allow the people. In  this project we can reduce the spread of the covid19 virus.  Thus, the project has been successfully designed and tested.

## ACKNOWLEDGEMENT

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