

COVID NORM DETECTION UNIT

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Technology degree in Biomedical Engineering

by

Bhavani Sri S (39240010)



DEPARTMENT OF BIOMEDICAL ENGINEERING

**SCHOOL OF BIO AND CHEMICAL
ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

MAY - 2022



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BONAFIDE CERTIFICATE

This is to certify that this Interdisciplinary Project Report is the bonafide work of Bhavani Sri S (39240010) who has done the Interdisciplinary Project work as an individual who carried out the Interdisciplinary project entitled " COVID NORM DETECTION UNIT" under my supervision from January 2022 to May 2022. .

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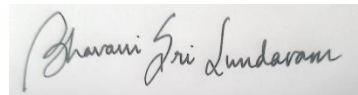
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DECLARATION

I , Bhavani Sri S ,herebydeclare that the Interdisciplinary Project Report entitled “COVID NORM DETECTION UNIT’ done by me under the guidance of Ms. Sabarivani M.Tech.,(Ph.D.) is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Biomedical Engineering.

DATE: 30/04/2022

PLACE: Chennai

A handwritten signature in black ink on a light gray rectangular background. The signature is written in a cursive style and reads "Bhavani Sri Sundaram".

SIGNATURE OF THE CANDIDATE

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ABSTRACT

When the Covid-19 pandemic struck the world, everyone was forced to lock themselves inside their homes. Due to this, the growth of the economies of various developing countries was hindered. To revive the economy, the Indian Government laid down some norms under the WHO Guidelines for the functioning of workplaces, educational institutions, and other commercial activities without compromising on health. The Covid norms include wearing a mask and the temperature must not be more than 98.2. F . When a person is employed to monitor these parameters, there are chances for the person to get infected or that person can become an asymptomatic carrier of the virus, thereby infecting more people. To avoid this situation, we have proposed a project that keeps a check on the above-mentioned Covid Norms with the help of a temperature sensor, and a camera. If a person enters a premise without wearing a mask or the temperature is not within the specified limit a barricade is engaged to stop the entry to the premise.

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LIST OF ABBREVIATIONS

WHO	WORLD HEALTH ORGANISATION
GDP	GROSS DOMESTIC PRODUCT
FY	FINANCIAL YEAR
IATO	INDIAN ASSOCIATION OF TOUR OPERATORS
US	UNITED STATES
UK	UNITED KINGDOM
RTPCR	REVERSE TRANSCRIPTION POLYMERASE CHAIN REACTION
CNN	CONVOLUTIONAL NEURAL NETWORK
ICSP	IN- CIRCUIT SERIAL PROGRAMMING
HDMI	HIGH DEFINITION MULTIMEDIA INTERFACE
RAM	RANDOM ACCESS MEMORY
USB	UNIVERSAL SERIAL BUS
PoE	POWER OVER ETHERNET
LED	LIGHT EMITTING DIODE
IR	INFRARED
CD	COMPACT DISC
DVD	DIGITAL VERSATILE DISC

CHAPTER 1

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by a virus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease has since spread worldwide, leading to the on-going COVID-19 pandemic. COVID-19 transmits when people breathe in air contaminated by droplets and small airborne particles containing the virus. The risk of breathing these in is highest when people are in close proximity, but they can be inhaled over longer distances, particularly indoors. Transmission can also occur if splashed or sprayed with contaminated fluids in the eyes, nose or mouth, and, rarely, via contaminated surfaces. People remain contagious for up to 20 days, and can spread the virus even if they do not develop symptoms

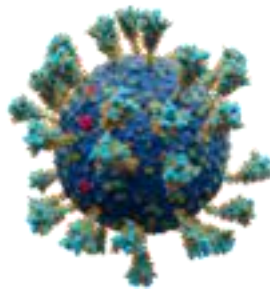


Fig 1.1: Structure of SARS-CoV-2

Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties, loss of smell, and loss of taste. Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease.

The pandemic triggered severe social and economic disruption around the world, including the largest global recession since the Great Depression. Widespread supply shortages, including food shortages, were caused by supply chain disruption and panic buying. The resultant near-global lockdowns saw an unprecedented pollution decrease. Educational institutions and public areas were partially or fully closed in many jurisdictions, and many events were cancelled or postponed. Misinformation circulated through social media and mass media and political tensions intensified. The pandemic raised issues of racial and geographic discrimination, health equity, and the balance between public health imperatives and individual rights.

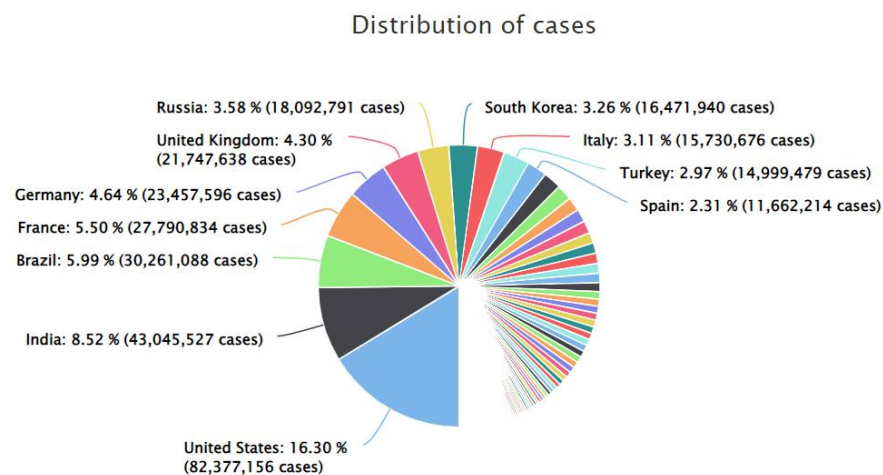


Fig 1.2: Distribution of cases in various countries

The World Health Organization (WHO) declared a Public Health Emergency of International Concern on 30 January 2020 and a pandemic on 11 March 2020. As of 18 April 2022, the pandemic had caused more than 504 million cases and 6.19 million deaths, making it one of the deadliest in history.

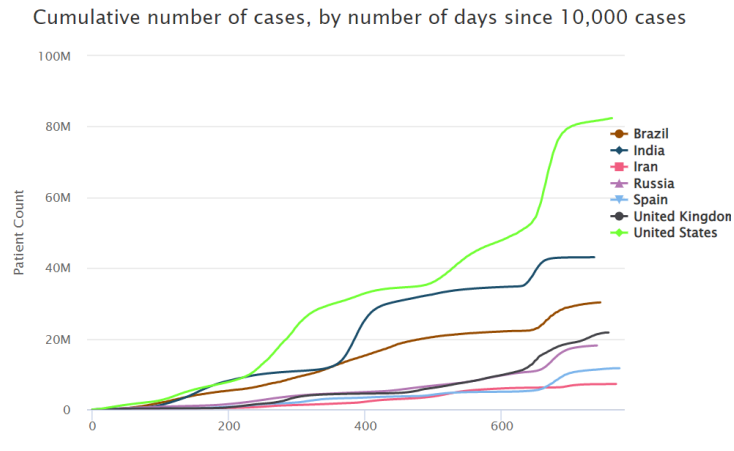


Fig 1.3: Cumulative number of cases across various countries

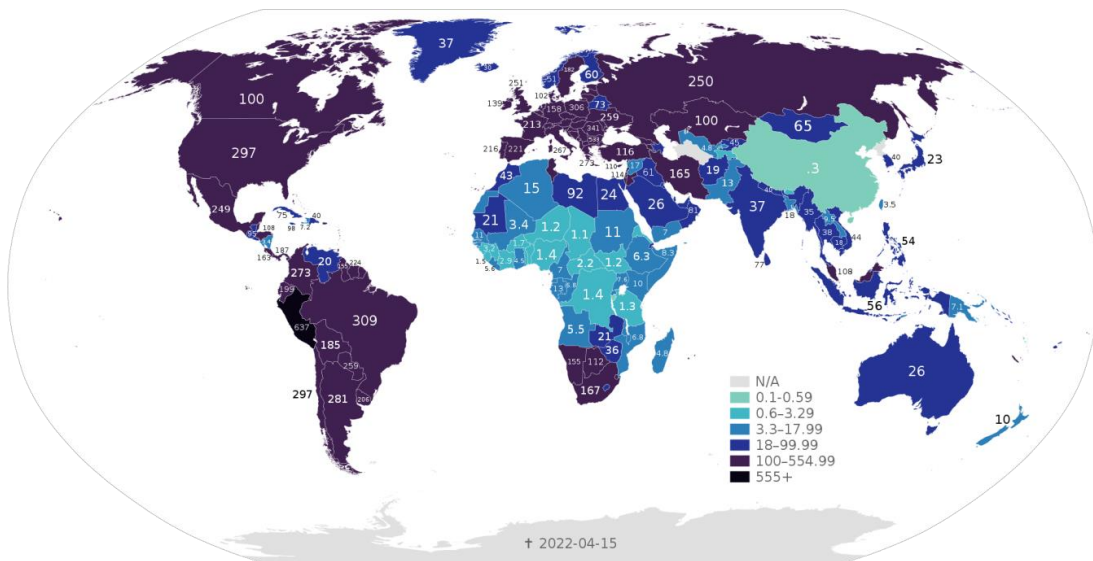


Fig 1.4 :COVID-19 Outbreak World Map Total Deaths per Capita. ■ 555+ deaths per 100,000 inhabitants ■ 100–554.99 ■ 18–99.99 ■ 3.3–17.99 ■ 0.6–3.29 ■ 0.1–0.59 ■ No deaths or no data. Data is converted from deaths per million to deaths per 100,000

1.1 LOCKDOWN AND ITS IMPACT

1.1.1 WORLD

Due to COVID-19 pandemic a number of non-pharmaceutical interventions colloquially known as lockdowns have been implemented in numerous countries and territories around the world. These restrictions were established with the intention to reduce the spread of SARS-CoV-2, the virus that causes COVID-19. By April 2020, about half of the world's population was under some form of lockdown, with more than 3.9 billion people in more than 90 countries or territories having been asked or ordered to stay at home by their governments. . Although similar disease control measures have been used for hundreds of years, the scale of those implemented in the 2020s is thought to be unprecedented.



Fig 1.5: Empty roads of Malaysia

1.1.2 IMPACT IN WORLD

1.1.2.1 Economic Impacts

Pandemic caused a short-term fiscal impact and a long-term economic impact on the nations around the world. Efforts to curb the pandemic include imposing quarantine, preparing health facilities, isolating infectious cases, and tracing contacts involving public health resources, human resources and implementation costs. It also involved health system expenditures to provide health facilities to infectious cases and the arrangement of consumables such as antibiotics, medical supplies, and personal protective equipment.

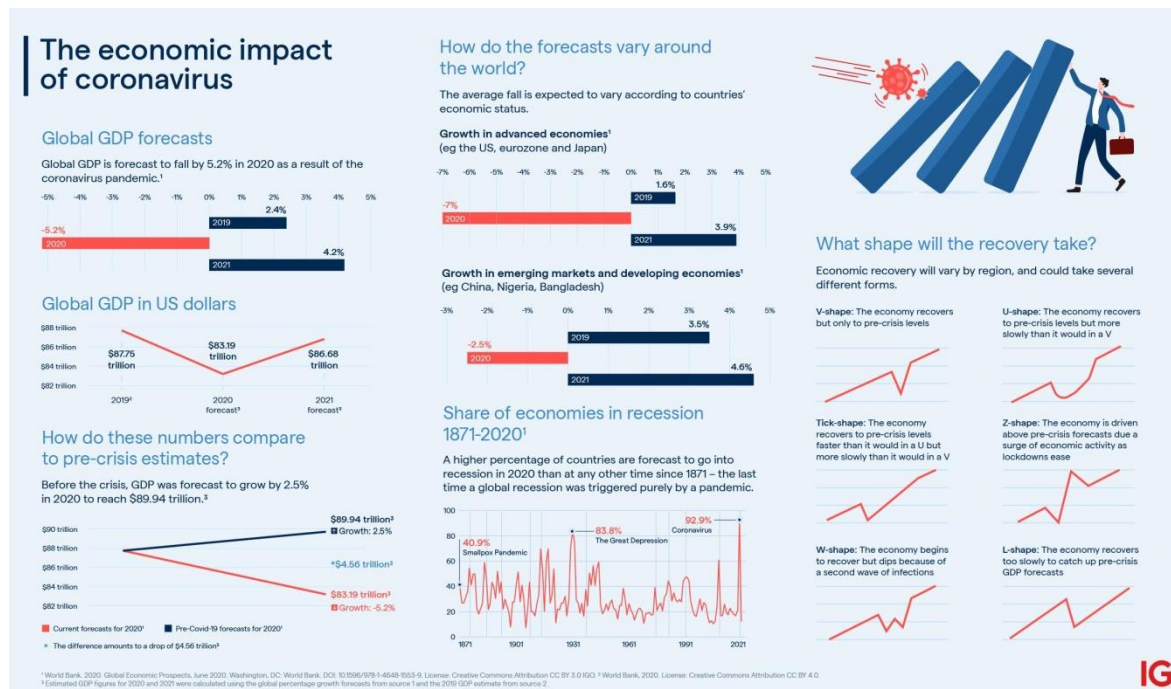


Fig 1.6: Economic impacts of lockdown

Pandemic also resulted in declined tax revenues and increased expenditure, which caused fiscal stress, especially in lower-middle-income countries (LMICs) where fiscal constraints are higher, and tax systems still need improvement. Economic shocks were common during pandemics due to shortage of labour because of illness, rise in mortality, and a fear-induced behaviour. Other than labour shortages, disruption of transportation, closed down of workplaces, restricted trade and travel, and closed land border caused economic slowdown.

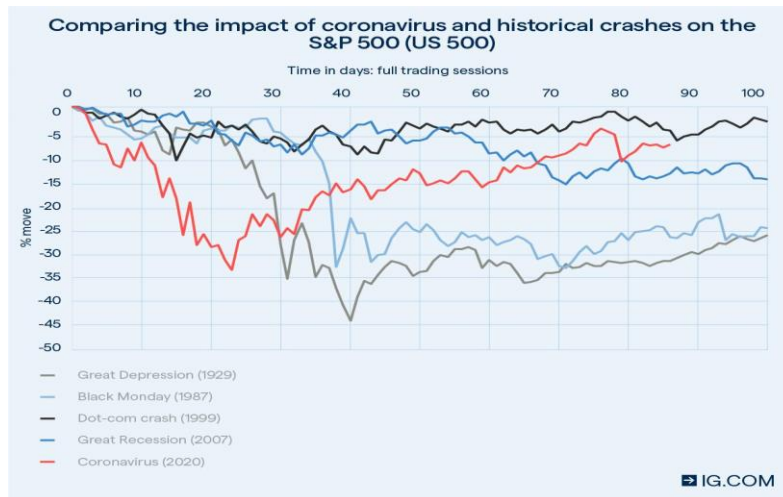


Fig 1.7 :Comparison of Covid with other historic economic recessions

1.1.3 INDIA

On the evening of 24 March 2020, the Government of India ordered a nationwide lockdown for 21 days, limiting movement of the entire 1.38 billion (138 crore) population of India as a preventive measure against the COVID-19 pandemic in India. It was ordered after a 14-hour voluntary public curfew on 22 March, followed by enforcement of a series of regulations in the countries' COVID-19 affected regions. The lockdown was placed when the number of confirmed positive coronavirus cases in India was approximately 500. Upon its announcement, a mass movement people across the country was described as the largest since the partition of India in 1947. Observers stated that the lockdown had slowed the growth rate of the pandemic by 6 April to a rate of doubling every six days, and by 18 April, to a rate of doubling every eight days.

1.1.4 Impact in India

The impact of coronavirus pandemic on India has been largely disruptive in terms of economic activity as well as a loss of human lives. Almost all the sectors have been adversely affected as domestic demand and exports sharply plummeted with some

notable exceptions where high growth was observed. An attempt is made to analyze the impact and possible solutions for some key sectors.

1.1.4.1 Food & Agriculture

Since agriculture is the backbone of the country and a part of the government announced essential category, the impact is likely to be low on both primary agricultural production and usage of agro-inputs. Several state governments have already allowed free movement of fruits, vegetables, milk etc. Online food grocery platforms are heavily impacted due to unclear restrictions on movements and stoppage of logistics vehicles. RBI and Finance Minister announced measures will help the industry and the employees in the short term. Insulating the rural food production areas in the coming weeks will hold a great answer to the macro impact of COVID-19 on Indian food sector as well as larger economy.

1.1.4.2 Aviation & Tourism

The contribution of the Aviation Sector and Tourism to our GDP stands at about 2.4% and 9.2% respectively. The Tourism sector served approximately 43 million people in FY 18-19. Aviation and Tourism were the first industries that were hit significantly by the pandemic. The common consensus seems to be that COVID will hit these industries harder than 9/11 and the Financial Crisis of 2008. These two industries have been dealing with severe cash flow issues since the start of the pandemic and are staring at a potential 38 million lay-offs, which translates to 70 per cent of the total workforce. The impact is going to fall on both, White and Blue collar jobs. According to IATO estimates, these industries may incur losses of about 85 billion Rupees due to travel restrictions. The Pandemic has also brought about a wave of innovation in the fields of contactless boarding and travel technologies.

1.1.4.3 Telecom

There has been a significant amount of changes in the telecom sector of India even before the Covid-19 due to brief price wars between the service providers. Most

essential services and sectors have continued to run during the pandemic thanks to the implementation of the 'work from home' due to restrictions. With over 1 billion connections as of 2019, the telecom sector contributes about 6.5 per cent of GDP and employs almost 4 million people. Increased broadband usage had a direct impact and resulted in pressure on the network. Demand has been increased by about 10%. However, the Telco's are bracing for a sharp drop in adding new subscribers. As a policy recommendation, the government can aid the sector by relaxing the regulatory compliances and provide moratorium for spectrum dues, which can be used for network expansions by the companies.

1.1.4.4 Pharmaceuticals

The pharmaceutical industry has been on the rise since the start of the Covid-19 pandemic, especially in India, the largest producer of generic drugs globally. With a market size of \$55 billion during the beginning of 2020, it has been surging in India, exporting Hydroxychloroquine to the world, esp. to the US, UK, Canada, and the Middle-East.

There has been a recent rise in the prices of raw materials imported from China due to the pandemic. Generic drugs are the most impacted due to heavy reliance on imports, disrupted supply-chain, and labour unavailability in the industry, caused by social distancing. Simultaneously, the pharmaceutical industry is struggling because of the government-imposed bans on the export of critical drugs, equipment, and PPE kits to ensure sufficient quantities for the country. The increasing demand for these drugs, coupled with hindered accessibility is making things harder. Easing the financial stress on the pharmaceutical companies, tax-relaxations, and addressing the labour force shortage could be the differentiating factors in such a desperate time.

1.1.4.5 Oil and Gas

The Indian Oil & Gas industry is quite significant in the global context – it is the third-largest energy consumer only behind USA and China and contributes to 5.2% of the global oil demand. The complete lockdown across the country slowed down the demand of transport fuels (accounting for 2/3rd demand in oil & gas sector) as auto &

industrial manufacturing declined and goods & passenger movement (both bulk & personal) fell. Though the crude prices dipped in this period, the government increased the excise and special excise duty to make up for the revenue loss, additionally, road cess was raised too. As a policy recommendation, the government may think of passing on the benefits of decreased crude prices to end consumers at retail outlets to stimulate demand.

1.1.5 LIFTING LOCKDOWNS

When the pandemic was contained to a certain extent, the curbs were lifted and safety norms were laid down nationally and internationally.

1.1.5.1 COVID NORMS BY INDIAN GOVERNMENT

- All employees are required to be vaccinated or produce a negative COVID-19 test (RT PCR) weekly and wear a mask at all times while inside facilities.



Fig 1.8 :Person disinfecting the premises of a mall

- All visitors entering the buildings will be screened for COVID-19 symptoms and possible exposure.

- Common areas and frequently touched surfaces are being cleaned daily.
- Working hours have been modified to allow for staggered work shifts to reduce the number of people in the building at one time.
- Workspace layouts and seating arrangements are revised to allow for social distancing.
- Meeting rooms, break rooms and other communal areas have reduced seating and capacity limits.
- Business travel remains restricted to essential travel only.

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE SURVEY

2.1.1 LITERATURE SURVEY 1

TITLE: Mask Classification and Head Temperature Detection Combined with Deep Learning Networks

AUTHORS: Isack Farady; Chih-Yang Lin; Amornthep Rojanasarit; Kanatip Prompol; Fityanul Akhyar,

YEAR:2020

TECHNIQUE: The network architecture of the 3-module object detection

DISADVANTAGES: Some prediction results of head detection were not as accurate as expected. Module 3 sometimes had difficulty detecting an input from another thermal camera with different technical specifications.

2.1.2 LITERATURE SURVEY 2

TITLE: Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV

AUTHORS: Arjya Das; Mohammad Wasif Ansari; Rohini Basak

YEAR:2020

TECHNIQUE: The proposed method consists of a cascade classifier and a pre-trained CNN which contains two 2D convolution layers connected to layers of dense neurons.

DISADVANTAGES: The main challenges faced by the method mainly comprise of varying angles and lack of clarity. Indistinct moving faces in the video stream make it more difficult.

2.1.3 LITERATURE SURVEY 3

TITLE: Face Mask Detection Using OpenCV

AUTHORS: Harish Adusumalli; D. Kalyani; R.Krishna Sri; M. Pratapteja; P V R D Prasada Rao

YEAR:2021

TECHNIQUE Training the model to detect face masks, A default OpenCV module was used to obtain faces followed by training a Keras model to identify face mask..

DISADVANTAGES: The developed system can detect the live video streams but does not keep a record. Unlike the CCTV camera footage the admin can not rewind, play or pause it.

2.1.4 LITERATURE SURVEY 4

TITLE: The Face Mask Detection For Preventing the Spread of COVID-19 at Politeknik Negeri Batam,

AUTHORS: Susanto Susanto; Febri Alwan Putra; Riska Analia; Ika Karlina Laila Nur Suciningtyas

YEAR:2021

TECHNIQUE: In order to detect the face mask, a YOLO V4 deep learning has been chosen as the mask detection algorithm. The experimental results have been obtained.

DISADVANTAGES: The detection was not fully effective in highly crowded areas.

2.1.5 LITERATURE SURVEY 5

TITLE: Face mask detection using deep learning: An approach to reduce risk of Coronavirus spread

AUTHORS: Shilpa Sethi, Mamta Kathuria, and Trilok Kaushik

YEAR:2021

TECHNIQUE: The proposed model is based on the object recognition benchmark. According to this benchmark, all the tasks related to an object recognition problem can be ensembled under three main components: Backbone, Neck and Head.

DISADVANTAGES: Precision and Recall are taken as evaluation metrics for identity prediction. The Precision and Recall for identity predictor are 98.86% and 98.22% respectively. Not 100% accuracy

2.1.6 LITERATURE SURVEY 6

TITLE: Face Mask Detection and Thermal Scanner for Covid Care

AUTHORS: Karthik M Hadagali, Priyanka M N, Rithika Reddy V B, Pradeep Kumar B S, Sandeepa G S

YEAR:2021

TECHNIQUE: This system will recognize people wearing a facemask on an image/video stream using Deep Learning and Computer Vision techniques and libraries such as OpenCV, Keras, TensorFlow and are classified using Haar cascading

DISADVANTAGES: No sensor to show the need to refill sanitizer

2.1.7 LITERATURE SURVEY 7:

TITLE: Spartan Face Mask Detection and Facial Recognition System

AUTHORS: Ziwei Song , Kristie Nguyen , Tien Nguyen , Catherine Cho and Jerry Gao

YEAR:2021

TECHNIQUE: It uses an end-to-end comprehensive system that supports face mask detection, mask position detection, mask type detection, and facial recognition with masks. This Spartan system is built with five components which are training platform, server, supporting framework, hardware, and interface.

DISADVANTAGES: Correctness of the model is evaluated by probability for each classification. The probability is different for each model and each class.

2.1.8 LITERATURE SURVEY 8

TITLE: Artificial Intelligence Based Mask Detection With Thermal Scanning and Hand Sanitization Based Entry System,

AUTHORS: Ashlesha D. Mahalle , Mr.Rahul Nawkhare and Mr.Ashish Bandre

YEAR:2021

TECHNIQUE: The proposed framework uses an OpenCV-based computer vision and machine learning algorithm to identify a person wearing a face mask in a picture or video stream. The system uses Caffe algorithm for classification

DISADVANTAGES: Fine-tuning of the hyper parameters to make a highly accurate solution is required

2.1.9 LITERATURE SURVEY 9

TITLE: Temperature and Mask Scanning System

AUTHORS: Uzma Takrim, Farinnaj Sheikh, Nahid Sheikh, Masarrat Bano, Sanhita Hazra

YEAR:2021

TECHNIQUE: The process of Temperature Check-ups by using Facial Land marking & Contactless IR Temperature Sensor and Mask Detection using Deep Learning Neural Network

DISADVANTAGES: The proposed solution is usable for its purpose under certain performance limitations (such as number of processed frames or measurements per second).

2.1.10 LITERATURE SURVEY 10

TITLE: Temperature and Mask Scan Entry System

AUTHORS: N.Saibabu, P. Chandra Shekar, R.Dineshreddy, K.Snehalatha

YEAR:2021

TECHNIQUE: This is a raspberry pi based contact less body temperature measurement and face mask detector which detects whether the person is wearing a mask or not.

DISADVANTAGES: Experiments were performed on Multi Parsing Human Dataset obtaining mean pixel level accuracy of only 93.884 % for the segmented face masks.

CHAPTER 3

AIM AND SCOPE

3.1 AIM

To develop a Covid Norm detection unit with the help of temperature sensor, and camera that allows only people wearing a mask and temperature below 98.2 F and inside the premise engaging a barricade .

3.2 SCOPE

3.2.1 DISADVANTAGES OF MANUAL SCREENING OF TEMPERATURE AND MASK

- There is the risk of spreading the disease due to the close distance needed to take a person's temperature between the person using the thermometer and the person being assessed.
- The manufacturer's instructions for reducing spread by cleaning between uses may or may not be followed. Hand hygiene (either hand washing or use of an alcohol-based hand rub) might not be performed before and after touching each person.
- The person interpreting the data may not be trained in what the recorded temperature means and what action(s) are appropriate
- People generally don't wear the masks properly. Masks are effective only if they cover the mouth, nose and chin. Three familiar mask mistakes which people tend to make:
 - **Wearing loose masks.** If the mask has large openings around the nose, mouth and the sides of the face, it can't effectively protect from viruses that can slip through those cracks.

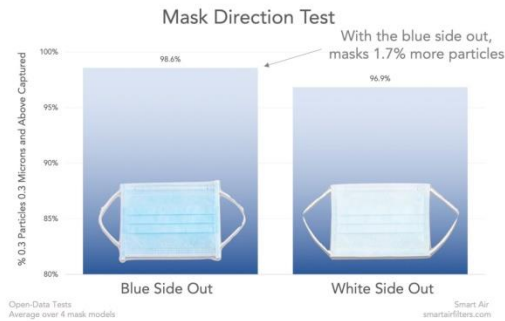


Fig 3.1: Common mistakes during mask and temperature screening

- **Proper covering of nose.** Nose needs to stay inside your mask -- the virus is respiratory and travels through the air, and you could breathe it in.
- **Wearing the mask inside out:** Surgical masks are made up of 3 layers, and there is a specific way to wear them: with the coloured, rough-textured side out. Wearing surgical masks with the wrong side out decreases filtration of 0.3-micron particles by 1.7% on average.

CHAPTER 4

MATERIALS AND METHODS

4.1 COMPONENTS USED

4.1.1 ESP32 CAMERA

The ESP32-CAM is a full-featured microcontroller that also has an integrated video camera and microSD card socket. It's inexpensive and easy to use, and is perfect for IoT devices requiring a camera with advanced functions like image tracking and recognition.



Fig 4.1 :Real time image of ESP32 camera

4.1.2 RELAY MODULE

A relay is an electromagnetic switch operated by a relatively small current that can control much larger current. They are designed to be controlled with low voltages like 3.3V like the ESP32, ESP8266, etc, or 5V like your Arduino. This will help in opening and closing of the barricade.



Fig 4.2: Real time image of Relay module

4.1.3 ARDUINO UNO BOARD

Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits. The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms.

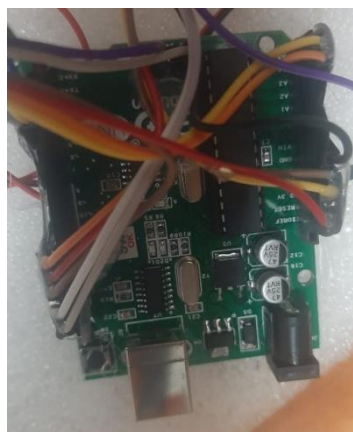


Fig 4.3 :An Arduino Uno board

4.1.4 RASPBERRY PI 4

It is a high-performance 64-bit quad-core processor .It has dual display support with resolutions up to 4K via a pair of micro-HDMI ports. It can do hardware video decoding up to 4K. It has a 4 GB of RAM .It also has a connection to the dual-band wireless local area network 2.4/5.0 GHz. Bluetooth 5.0 / Gigabit Ethernet / USB 3.0 / PoE features (via a separate HAT PoE add-on module)are also present.



Fig4.4:Raspberry Pi 4 board

4.1.5 LCD

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.



Fig 4.5: LCD Display

4.1.5 MLX90614- CONTACTLESS INFRARED TEMPERATURE SENSOR

Contactless Infrared Temperature Sensor measures the surface temperature of an object depending on the emitted IR waves of the target without touching it and also measures the average temperature over an area. It is a Contact-less, high precision, high resolution and a fast response sensor.



Fig 4.6: Contactless Infrared Temperature Sensor

4.1.6 ULTRASONIC SENSOR

This is the HC-SR04 ultrasonic distance sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit. There are only four pins that you need to worry about on the HC-SR04: VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground). You will find this sensor very easy to set up and use for your next range-finding project.



Fig 4.7: Ultrasonic Sensor

4.1.7 SERVO MOTOR

A servomotor (or servo motor) is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. Servo motor applications are also commonly seen in remote-controlled toy cars for controlling the direction of motion, and it is also very widely used as the motor which moves the tray of a CD or DVD player. Besides these, there are hundreds of servo motor applications we see in our daily life. This will help in the up and down movement of the barricade.



Fig 4.8: Servo Motor

4.1.8 USB CABLE

The term USB stands for "Universal Serial Bus". USB cable assemblies are some of the most popular cable types available, used mostly to connect computers to peripheral devices such as cameras, camcorders, printers, scanners, and more.



Fig 4.9:USB cable use for connecting Raspberry Pi to Computer

4.1.9 12V ADAPTOR CABLE

An adapter is a device that allows a specific type of hardware to work with another device that would otherwise be incompatible. Examples of adapters include electrical adapters, video adapters, audio adapters, and network adapters.



Fig 4.10: 12V Adaptor cable for Servo Motor.

4.1.10 JUMPER WIRES

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.



Fig 4.11: Jumper Wires to connect components

4.2 COVID NORM DETECTION UNIT

We have two inputs that is obtained from the person standing in front of the unit. First the temperature is measured with the help of MLX90614 contactless IR temperature sensor. If the temperature is greater than 39°C the barricade remains closed. Second input is the face which is captured by the ESP32 camera via live streaming through Raspberry Pi's IP address connected to the Mobile Hotspot.

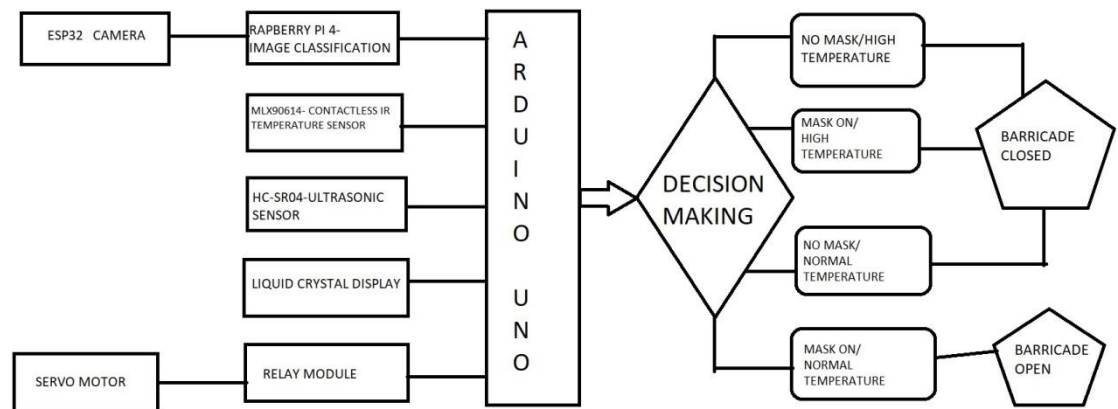


Fig 4.12 Block diagram of Covid Norm Detection Unit

The Raspberry Pi is compiled with the image classification code, which helps to differentiate people wearing mask and people who are not. The instructions are shown in the LCD. The Servo motor is connected to a relay module, which in turn is connected to the Arduino Uno board. All other components –Raspberry Pi , MLX90614 contactless IR temperature sensor, HC-SR04 ultrasonic sensor(which is used to measure the distance) and LCD are also interfaced to Arduino Uno board.

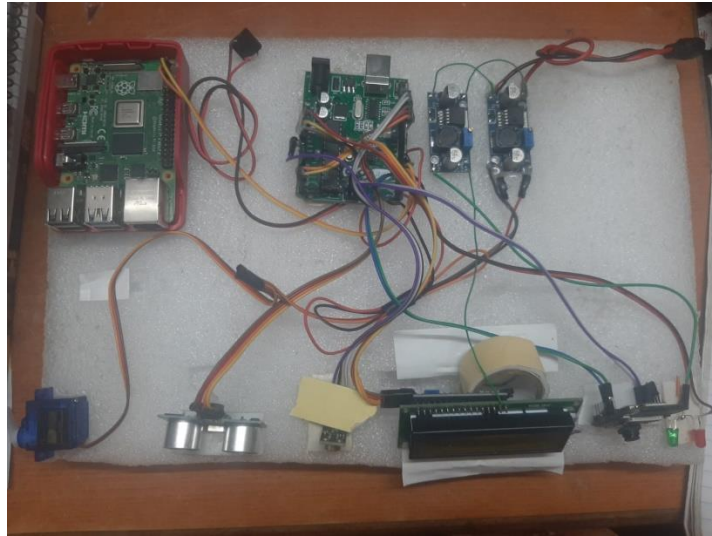


Fig 4.13 Circuit Connections

The decision making program is loaded in to the Arduino Uno board, the decision is based on four conditions:

- No Mask and High temperature
- No Mask and Normal temperature
- Mask on and High temperature
- Mask on and Normal temperature

The barricade connected to the servo motor gets closed during the first three conditions and opens only in the fourth condition.

CHAPTER 5

RESULT AND DISCUSSION

5.1 RESULT

5.1.1 ESTABLISHMENT OF WIFI CONNECTION

After the establishment of connection between the circuit and the IP of the Raspberry Pi board the message is displayed. This achieved by connecting the mobile hotspot to the same. The output is shown in figure 5.1

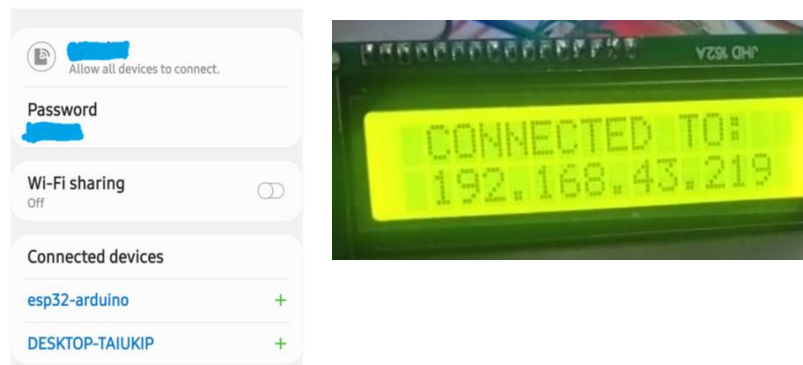


Fig 5.1: Establishment of connection between Raspberry Pi and Computer using mobile hotspot

5.1.2 TEMPERATURE SCREENING BY IR TEMPERATURE SENSOR

The LCD displays the next instruction, that is the temperature measurement with the help of IR temperature sensor. When a person shows their backside of the hand the temperature is read by the IR sensor. If the temperature is greater than 39°C the LCD will display a message “ Body Temp HIGH” when it is lower than 34°C “ Body Temp

LOW” will be displayed. When it is of optimum temperature LCD displays “ Body Temp OK” as shown in figure 5.2.

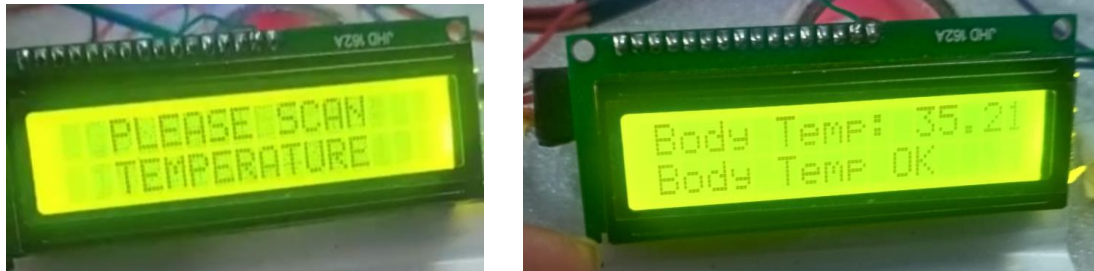


Fig 5.2: Message displayed in the LCD before and after screening.

5.1.3 MASK SCREENING BY ESP32 CAMERA

The ultrasonic sensor measures the distance between the subject and the camera. The distance must be maintained between 35-60 cm for proper capturing of the picture. When the distance is greater than 60 cm ,LCD displays a message “ Move closer” whereas when the distance is lesser than 35 cm “ Take a step back” message is displayed. If the distance between the range the process of scanning is initiated followed by a message “ Scanning , pls wait and hold “ in the LCD screen as shown in figure 5.3.

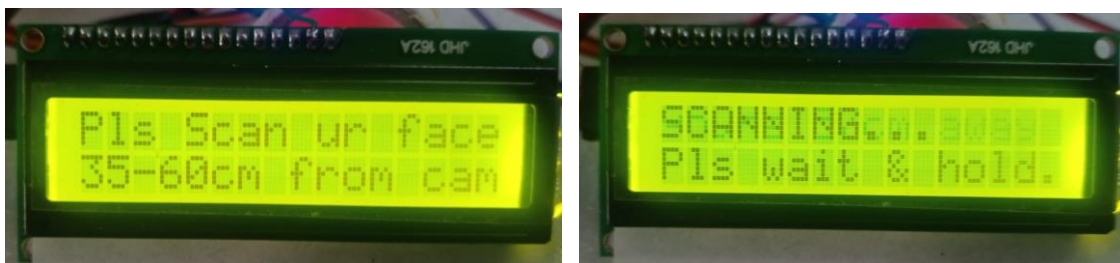


Fig 5.3: Message for mask scanning and during scanning.

When the person entering the premise wears a mask the LCD displays a message “ Enter Allowed” as shown in figure 5.4.



Fig 5.4: Message when person wearing the mask.

When a person entering the premise does not wear a mask, the LCD will display a message "PLEASE WEAR MASK" along with a red LED turned on depicting denial of entry into the premise, as shown in figure 5.5. When the scanning process is not proper, or the subject is not still the LCD displays a message "Take a step back and rescan"



Fig 5.5: Red light is depicting the entry is denied

5.1.4 MOTION OF BARRICADE

When the person is wearing a mask and the temperature is between the desired range the barricade opens. It does not open if the mask is not worn, but temperature is between the desired range, or mask is worn but the temperature is higher than the specified limit, or the mask is not worn and the temperature is higher than that of the specified limit. The motion of barricade when it is closed or open is depicted in figure 5.6.



Fig 5.6 :Barricade Open and Barricade Closed

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 SUMMARY

This device is the need of the hour. This gives accurate results and there are very less chances false negatives. This device is economical and servers the purpose of containing the spread of the virus.

When this device is installed in various premises where congestion is ubiquitous it helps by:

- Giving accurate results
- Growing the sense of responsibility among people who make excuses for not abiding by the Covid norms
- Containing the spread of disease inside office premise and thereby increasing the productivity.

6.2 CONCLUSION:

When the world was in complete lockdown for months due to the SARS-CoV-2 (Covid virus), all gatherings, offices, educational institutions and commercial places were shutdown to contain the spread of the virus. These curbs were lifted, and people were allowed to gather but with stringent restrictions. These restrictions are manually screened and involves huge work load. But installing a device which automatically does the mask and temperature screening and allows to enter a premise only when these norms are abided will reduce the human intervention as well as gives accuracy and contain the spread. That is the very motive of this project and it has been achieved.

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