DESIGN SYSTEM FOR FACE MASK DETECTION AND BODY TEMPERATURE ANALYZER

Tejaswini Thool*1, Anand Bhende*2, Prachi Jamankar*3, Twinkle Bankar*4, Sahil Amale*5

*1,2,3,4,5 UG Students, Department of computer engineering, Bapurao Deshmukh College Of Engineering, Sewagram, Wardha, Maharashtra, India.

ABSTRACT

System For Face Detection And Body Temperature Analyzer used to reduce spread of Covid-19 pandemic at public places. The purpose of this project is to ensure the safety from Covid at public places. In this system sensors & other devices used to analyze the person wearing mask or not . also temperature of person analyze as body temperature is higher in case of Covid. so this system helps to reduce spread of Covid at heavy rush places, increases safety at this place. In this paper, we have proposed reliable methods based on face mask recognition methods and tools and features based on IoT to solve the problem of facial detection and body temperature analysis. With the face mask we use (CNN) Convolutional Neural Network to capture facial areas such as the eyes and the front. The Bag-of-features paradigm is then placed on CNN's final layer to measure the face and represent it on the old CNN using the Multilayer Perceptron (MLP) process to display the face with high respect. In this way, taking a picture of the mask facing us using a webcam which is an excellent tool for IoT. And then for body temperature analytics we used the LM35 temperature sensor which is a good IoT tool for measuring temperature. According to the LM35 temperature sensor, the c ++ embedded language that uses and detects mask detection using high-performance Python language. Using these two technologies we created a college campus app to keep us safe from corona virus and its symptoms. This is an app that everyone can use by installing on mobiles, tablets, laptops and desktops, etc.

Keywords: Covid-19, Covid Safety, Face Mask Detection, Body Temperature Analyzer, Covid Safety System.

I. INTRODUCTION

Covid-19 pandemic created demand for innovative technology to reduce spread of covid. The pandemic has brought many challenges, restrictions like maintain social distancing at every places such as school, colleges, shopping malls etc. and wearing mask at public places to ensure safety from corona. But most of the peoples not follow social distancing rules and also not wear mask while surfing at public place. So there is need of design of such system which analyses mask wearing and analyse temperature of people at public places. So We are create design system for face detection and body temperature analyzer for Covid Symptoms And Safety.

The COVID-19 virus can be transmitted through contaminated contact areas, therefore, classical biometric systems based on passwords or fingerprints are no longer secure. So face recognition is very safe without the need to touch any device. As facial recognition is important to keep people safe from the corona virus, measuring a person's body temperature is also an important function. Recent studies on the corona virus have proven that wearing a face mask by healthy and infected people greatly reduces the transmission of the virus. However, wearing a face mask causes the following problems:

1) Use a mask, thieves commit crimes without being identified.
2) When a large part of the face is hidden by concealing facial verification it becomes a very difficult task.
3) Existing face recognition methods do not work well if you are wearing a mask that can give the whole face image to be defined.
4) Exposure of the nose area is very important in the face recognition function because it is used to familiarize the face, make adjustments, and match the face. As a result of these problems, face masks strongly objected to existing facial expressions. In previous research papers they found forehead heat but the problem is that the hardware tool that was too tight in the nose would increase the chances of the virus spreading and the cost of that tool is expensive. Then we move the position from the forehead to the wrist. Sensing the temperature from the forehead area is very difficult but in our project it will be easier because we move the position of the temperature sensor part of the wrist. By detecting facial disturbances, we use the convolutional neural network.
(CNN) method and the multilayer perception (MP) method that assesses whether a person is wearing a mask or not. This can be used in public places where the mask is mandatory and to cover the temperature analysis issues using the LM35 temperature sensor which is very easy to carry and its cost is low.

1.1. FEATURES OF SYSTEM
a. Recognize the face whether that person is wearing mask or not.
b. Measuring the temperature of peoples whether that temperature is normal or abnormal.

1.2. OBJECTIVES
1. Develop an effective college, corporate or industrial work plan for their safety (for employees, for employees) against the corona virus.
2. To build or maintain a safe environment for the college, company or industry of the people who work there.
3. Improving complex background challenges, too many faces in photos, abnormal expressions, lighting, minor adjustments, facial closures, skin color, distance and posture that reduce face detection and detection using face recognition technology.
4. Using a heat sensor somewhere to measure the user’s body temperature.

1.3 PROBLEM DEFINITION:
Covid cases are growing rapidly in India and many people are suffering from them for not following WHO (World Health Organization) guidelines. So large pharmaceutical companies around the world are developing guidelines for corona virus to protect a person from it. But we can stop the virus from spreading to our country by detecting its symptoms using a computer-based program that is very helpful to man.

II. LITERATURE REVIEW
we discuss research papers describing detailed tests and the study of the theoretical process regarding facial mask detection and body temperature analysis.

Ali Mouseli et al. [1] are researching corona disease and are trying to find a solution to it. But as an important feature of the novel corona virus disease 2019 (COVID-19) it is its fastest transmission. It is very difficult to stop this virus. Researchers can therefore overcome this problem by using technology that can play a significant role in controlling the disease. Therefore, this study aims to investigate the technology used to solve the COVID-19 problem. But some of their issues in this research paper are the techniques for obtaining a mask and temperature monitoring techniques that have not been included. We therefore think that this technology is very helpful in solving the problem of coronary symptoms. [1]

Raju Vaishya et al. [2] talked about the use of advance information technology that created the requirements for COVID 19 (Corona virus) health care equipment and medicines. They have used Industry 4.0 known as the fourth name of the industrial revolution, which has the potential to meet a customized requirement during the COVID-19 disaster. Industry 4.0 has applications for digital production technology and information. They found that industry 4.0 assists in detecting and diagnosing COVID-19 symptoms and using this change to make face masks, gloves, and a collection of health care systems that control and treat patients with covid with appropriate surveillence and will help improve education and communication about public health. which provides many new ideas for combating the covid problem. [2]

Cahit Gurel et al. [3] use a face recognition system and the acquisition of their college students using biometric procedures. This app works with white balance adjustment, skin like circuit splitting, facial feature removal and facial image removal etc from the person to be tattooed on the face. And they concluded, the app only worked to find the last face in a college database with certain restrictions. [3]

Swapnil Vithal Tathe et al. [4] introduced some computer viewing technology that informs the face of the video. By using this technology they have created a face tracking framework using Haar features, recognition using the Gabor feature, matching using combination points and tracking using a Kalman filter. This method removes the difficulty of seeing faces and acquisitions such as lighting, natural features, scale, posture and posture. [4]

Pedro Valente et al. [5] he and his research team developed face recognition algorithms into an attractive field for computer-based application development. They have created a look, model and hybrid methods for these
three types of algorithm based on face extraction techniques. They discussed research on applications for facial authentication, classification, distance measurements, and facial information details. [5]

### III. METHODOLOGY

In this project, we create an application campus for candidates due to the COVID-19 pandemic which is very dangerous at this time. By using our knowledge of computer-based applications we can stop the corona virus from spreading in the environment. We cannot prevent all the symptoms of corona infection by using computer-based technology but we can prevent some symptoms from spreading among humans. We therefore use two technologies to do our project i.e. face detection and analysis of body temperature. Using these two technologies we can provide a solution to the two main symptoms of corona infection e.g. sneezing in the nose and raising body temperature. To stop the first covid symptoms we use the process of getting a face mask i.e. finding a person's face whether you are wearing a mask or not. In this process we use the language of advanced python programs and it is used to identify a person. We therefore use the production of QR code method directly connected to the database. After that to measure body temperature we use a temperature sensor connected to the system by Arduino (IoT). And by writing codes in it we use the dot editing programming language where the second covid symbols are formed. Analyze, use and store data using the oracle database in our project.

#### 3.1. SYSTEM REQUIREMENT

**A ) Hardware requirements:**

1) **Personal computer:** - This computer is assigned to the administrator itself. The administrator can manage everything with the help of the program such as program management, add, delete, delete and update the data reader or user, remove system errors, manage and manage the database, send a user or student activity message via messaging service or gateway.

2) **Web Camera:** - A webcam is a digital video device usually built into a computer and its main function is to send pictures or photos online. We use it for our project to get a face or user face detection.

3) **LM35 temperature sensor:** - LM35 integrated circuit heat sensor, whose output power varies depending on the body temperature of the person around it. It measures the temperature in Degree and Fahrenheit.

4) **Arduino Uno kit:** - This kit is an open source electronic platform based on simple hardware and easy-to-use software. This kit can read inputs such as a light sensor, finger button, or message and can be turned into output by entering system codes.

**B) Software requirements:**

1) **Microsoft Visual Studio:** - Microsoft Visual Studio is an integrated development platform (IDE) from Microsoft. It is used to improve computer programs and websites, web applications, mobile applications. Includes code editor that supports intellisense and reusable code.

2) **Visual basic .NET:** - An object-based programming language used in the NET framework. It has full access to all libraries in the NET framework. We use this software for messaging service and QR code creation in our project.

3) **Python:** - Translated, object-oriented, high-level programming language with dynamic semantics and built into data structures combined with dynamic typing and binding. It makes it a lot of fun in faster app development, as well as being used as a scripting or paste language to connect an existing object together. For this reason we use python 3.7 software to scan QR code and face detection for our project.

4) **C ++ embedding:** - Also the programming language targeted at the object. It is more powerful than other programming languages because it has higher operating requirements, a more secure security system, reduced resources like memory and CPU power. Thanks to this language we are able to access and manage Hardware directly without fail. This is the language we use for the LM35 sensor to monitor the body temperature that connects to the Arduino Uno kit.

5) **Oracle 10g:** - Oracle 10g database for business grid computing. It is a flexible and expensive way to manage data and applications. We use this database to store our project plan data.
IV.  PROPOSED SYSTEM

The proposed plan for this project consists of three main sections provided below:

1) Entrance Gate:
In the first step, the user will enter from the gateway. First before entering the gateway the user must perform the registration process (user details such as name, mobile number, address, semester, etc.) using the in-app application and after completing the registration process the user can receive his most important QR code. QR on the web camera with continuous process i.e. detection of face mask. In the process of getting a face mask scans the QR code and after scanning the code the user has to show his face. After doing so the system checks the user wearing a mask or not. If the user is wearing a mask he can go through a continuous process otherwise not. After this procedure the user should check his or her body temperature carefully for a temperature sensor kit placed somewhere at the entrance gate. Subsequently performing a temperature monitoring process checks that the temperature is in the normal range or above its limit. If the body temperature is normal then the user can go on a continuous process in step 2 or otherwise the user should stop.

![Figure 1: Proposed system design for college campus](image)

2) Database of college campus:
After the completion of the first phase process user data for face mask detection and body temperature analysis is transferred to the college campus database. That information also goes to the head of the college campus on their computer through the next phase 3 process.

3) Head of college campus:
After performing the second phase process, the head of the college will receive a confirmation message about the user’s status of the first and second grades on his or her computer. Then the head of the college will present the message on his or her computer on the user's mobile device which means "You have permission to enter college". The performance of all categories depends on that user and resumes with a new user.

V.  DESIGN OF SYSTEM

5.1. ARCHITECTURE OF SYSTEM DESIGN:
System structure can be divided into three main modules.

1) Admin module: It manages the system, removes errors and resolves problems while running the system. The manager may be able to manage the activities of the program or the activities performed by him in the program. The manager must use the system without tolerating errors which means he will use the system without any failures because he has a saving part in it. And there are no difficulties while using the system.

2) User Module: In the user module, the student or user must create an account in the system by adding his/her details such as student id, name, email id, mobile number, semester, etc. After adding all this information the reader or user can get the QR code generated by the module module. Again the student or user must scan his QR code in front of the camera. After scanning the QR code the system checks whether it is correct or not. If the QR code found the right one the student or user can go to the next process, otherwise not.

3) Head of the campus module: This module has campus and management controls and system check status.
The campus head will take action if a mistake has been made in the system by the user. He can therefore send a message to the user via admin and then admin through the database. Otherwise, all operations of the system user or student can be performed completely without any interruption.

5.2. FLOWCHART:

This flowchart provides complete details of the various functions that can be performed with the system. Provides complete status from the user login function to receive the permission message from the college computer header. It also describes the step-by-step process of project flow that describes the entire event or activity that will take place. The following figure is a flowchart for the entire project plan.

6.1. RESULT:

This project is largely based on the problems associated with the symptoms of the corona virus and its operation is simple. So in our project we will see the face of the visitor wearing a mask or not and his body temperature. By following this process we will be able to tell you what kind of analysis we see in project data. While you want to design this type of program with computer hardware you will need a very small amount to

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Figure 2: System Architecture

Figure 3: Flowchart

VI. RESULT AND ANALYSIS
build this project. This project can determine how we can live a normal life in this modern age which means we are actually making good moral thoughts in people’s minds.

6.2. Screenshots of System:

1) **Login:** The login interface of the project shown in screenshot. Here login is done with ID & password in the system.

![Login Interface](image1.png)

**SCR.No.6.2.1. Login interface**

2) **Dashboard of System:** The UI of the Dashboard of Project Which Contain Various Section i.e. Total Visitors, Temperature Monitor Section, Scan Student Section etc. Scan student section shows all information of student. Temperature monitor section shows temperature of visited person.

![Dashboard Interface](image2.png)

**SCR.No.6.2.2. Dashboard of system**

3) **Add Student Data:** Add student information like student ID, student name, gender, email id, department of college, semester & address of student. Adding the New student to the data base for generate the QR Code for identification. Submit the Filling the student Details and Submitting the record to the database of ID 24.

![Add Student Interface](image3.png)

**SCR.No.6.2.3. add student data**
4] **Generate QR Code** - here is QR code generated for add student data. Save the QR Code – After saving the data of student of ID 24 Generate the QR Code and Save to System file. System File – System File Contain generated QR Code Of the Visitors or Students

**SCR.No.6.2.4.** Generate & Save the QR code


- Detect Mask – Detecting the Visitors where the Visitors wear mask or not. Identified where the Visitors wear mask or not, If not wearing, warning gave by the administration. Then send the data to Dashboard.
- Exit - UI Of the program for Visitors identification and face mask Detection.

**SCR.No.6.2.5.** UI program of face mask detection (Shows the status of mask and id of visitor)

6] **Visitors Details** – Data Collected by Student Details from program for visitors identification and face mask Detection except temperature block. Following screenshot shown the data in the system like number of visitors, number of student visited in campus & number of person wearing the mask
7] Temperature Monitoring section – Sensor Configure – Connecting the temperature sensor to the System port for measuring the temperature of visitors. Temperature Monitored By temperature sensor of ID 24 visitors, which is 97.52 Fahrenheit (Normal). If visitor temperature is abnormal, System will automatically inform the Administration for further action. Temperature block in student details is automatically filled by Detected temperature. Then data submitted in the system.

8] Number of visitors Detection list - Detection List will show visitors. Set the Date for Fetching the list of Visitors. Date fetching for particular visitor shown in screenshot(ID 24 is Detected in the Detection List). Also Graph is generated based on the Today's Visitors where visitors wear mask or not.
9] System Dashboard For Particular Campus Of College (BDCE College) - it shows total number of students enter in college gate, total number of persons whose mask detected & total visitors. Number of male & female students enter in college according to save list of students. Shows all the information about college student in dashboard.

SCR.No.6.2.9. College Campus Dashboard

10] Face Detection With Mask - when student/visitor see in the camera frame, system shows person is wear mask or not. If the person wear the mask system allows a student to enter in campus.

SCR.No.6.2.10. System Shows Face Detection With Mask

11] Face Detection Without Mask - when student/visitor see in the camera frame, system shows person is wear mask or not & if the person not wear the mask system alert that you not allow to enter in campus.

SCR.No.6.2.11. System Shows Face Detection Without Mask
6.3. Analysis:
In the analysis of the project we found that out of 100 people 3 out of 5 people we find have unusual temperatures. So after finding those 3 to 5 people by the act of the administrator taken to save the rest of the people who affected those 3 to 5 people and 100 people 20% of the people who were not wearing a mask and left 80% of the people 30% not wearing a mask properly. They wear a mask under the nose or simply apply a mask to the face without covering the nose and mouth. It means that only 50% to 60% of people wear a mask properly without 100% on campus.

VII. APPLICATIONS
1. You can monitor hundreds and thousands of people having the previous data of previous dates which cannot done by manually or through human interface.
2. This is more manageable for head of the campus.
3. The project or the process can hundred percent done by automatically without any Single interface of humans.
4. It's helps to detect the signs of coved before that person get into the campus.

VIII. CONCLUSION
In this project we introduce the Design System For Face Mask Detection and Body Temperature Analyzer on whether educational institutions can use this project to maintain their safety from corona symptoms by checking whether the student or user is wearing the mask properly and not with their normal body temperature or no. This program is practical, effective, and easy to work for college staff, this program will improve the negligent behavior of people and provide a good practice of following WHO guidelines to fight corona virus. The program also improves the new standard of living not only in our city but also in our country. You can use this program in your company, industry, housing community and your home and at a low cost.

IX. REFERENCES