A PROJECT REPORT ON

MASK DETECTION SYSTEM
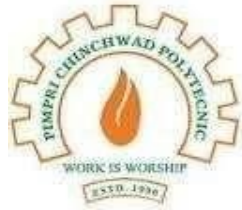
SUBMITTED BY

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UNDER THE
GUIDANCE OF
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CHINCHWAD POLYTECHNIC AKURDI, PUNE-411044.
(2020-2021)

Department of Computer Engineering, PC Polytechnic

PIMPRI CHINCHWAD EDUCATION TRUST'S
PIMPRI CHINCHWAD POLYTECHNIC

DEPARTMENT OF COMPUTER ENGINEERING PRADHIKARAN, AKURDI,
PUNE-411044.

C E R T I F I C A T E

This is to certify that the end term
Project report entitled

MASK DETECTION SYSTEM

Has been completed successfully by-

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Shivam Mane

Atharva Newaskar

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Project Guide	H.O.D	Principal

(External Examiner)   Seal of Institute

Maharashtra State Board of Technical Education for Academic Year
2020-2021

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I wish to express thanks to my guide **PROF. S. S. Jogdand**, Professor in Department of Computer Engineering for his support.

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I would like to express my deep sense of gratitude to our esteemed Principal **Prof. V. S. Byakod** for her encouragement.

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Abstract

COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to avail of their services. Therefore, face mask detection has become a crucial task to help global society.

The Main objective of this project is to notify the registered users in the system and notify them to wear a mask. This system will scan each and every person's Face and check whether the person is wearing a mask. If the person is not wearing a mask the system will scan the face and confirm the person's identity and send a notification to that person to wear the mask. And someone without authorization tries the premises to enter without mask it will notify the admin or security in charge.

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CHAPTER 1:

INTRODUCTION AND BACKGROUND OF THE INDUSTRY OR USER BASED PROBLEM

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INTRODUCTION AND BACKGROUND OF THE INDUSTRY OR USER BASED PROBLEM

1.1 Motivation

COVID-19 pandemic has rapidly affected our day-to-day life disrupting the world trade and movements. Wearing a protective face mask has become a new normal. In the near future, many public service providers will ask the customers to wear masks correctly to avail of their services. Therefore, face mask detection has become a crucial task to help global society.

The Main objective of this project is to notify the registered users in the system and notify them to wear a mask. This system will scan each and every person's Face and check whether the person is wearing a mask. If the person is not wearing a mask the system will scan the face and confirm the person's identity and send a notification to that person to wear the mask. And someone without authorization tries the premises to enter without mask it will notify the admin or security in charge. We cannot keep an eye on everyone at a time but this system can. A person entering the premises of hospital or malls will be scanned at the entry only and likewise with schools and colleges.

1.2 Background

The system is designed to detect the faces and to determine whether the person wears a face mask or not. Using the above data, we can decide whether the concerned person can be allowed inside public places such as the market, or a hospital. This project can be used in the hospital, market, bus terminals, restaurants, and other public gatherings where the monitoring has to be done.

This project consists of a camera that will capture the image of the people entering public places and detect whether the person wears a face mask or not using their facial features.

1.3 Need

The Mask Detection System is used to detect whether a person is wearing a mask or not, hence we can use it in social areas such as Malls and Shops also in Government offices, etc. This system is very useful for hospitals whether private or government to see whether a patient or visitors are wearing a mask on properly. We can easily identify people's faces if they are not wearing a mask properly. This system can also be used by companies and organizations to detect whether the employee working in the company is wearing a mask on the gate of the company and if the system is installed inside the company, we can also detect them inside the company. If an organization has installed the system, we

may also make an app for the organization So that whenever a person not wearing a mask is detected then it will be notified to the head of department or manager.

In Short, the system can be used in commercial and socially active areas it cannot be used personally. It's of no use if you bought it personally.

CHAPTER 2:

LITERATURE SURVEY FOR PROBLEM IDENTIFICATION AND SPECIFICATION.

CHAPTER 2
LITERATURE SURVEY FOR PROBLEM IDENTIFICATION AND SPECIFICATION

2.1 Existing Systems

Such types of products are not available in variety in the market and also if available one cannot buy it easily as the available products are much more expensive to buy for a user. Compared to that our product is much cheaper than that and also efficient than the systems available.

Therefore, we came up with an idea and successfully developed a Mask detection system, which could effectively meet this demand. Generally, people wear masks improperly and sometimes forget to wear one. So, this system detects such people and will notify the user and record the image

2.2 Description

The system can be used on the entrance of social places like malls and cafes, etc. The system will send a notification through the app to ask them to wear a mask. In schools and colleges, the system will identify the students and if anyone is not wearing a mask then image will be captured and sent to the admin also. Mask detection system can show live stream, register new user admins and display unknown images. The system can be installed on any machine with connectivity features, a camera module.

Application: 1.The prime purpose is to provide safety measures.

2. It is used for detecting the masks on the face of a person.

3. It can be used in wireless technology on the entrance of crowded places.

2.3 Advantages

- Intelligent and Safe System to detect masks.
- Number of people not wearing a mask can be identified so they wear one.
- Images can be captured and stored in the database.
- Admins get notified when a person not wearing a mask is entered.
- It avoids the need of a person to stand and check each and every person.

2.4 Disadvantages

This system cannot identify too many faces at a time as the system will get slow.

CHAPTER 3:

DETAILED METHODOLOGY OF SOLVING THE IDENTIFIED PROBLEM WITH ACTION PLAN

CHAPTER 3
DETAILED METHODOLOGY OF SOLVING THE IDENTIFIED PROBLEM
WITH ACTION PLAN

3.1 Project Modules

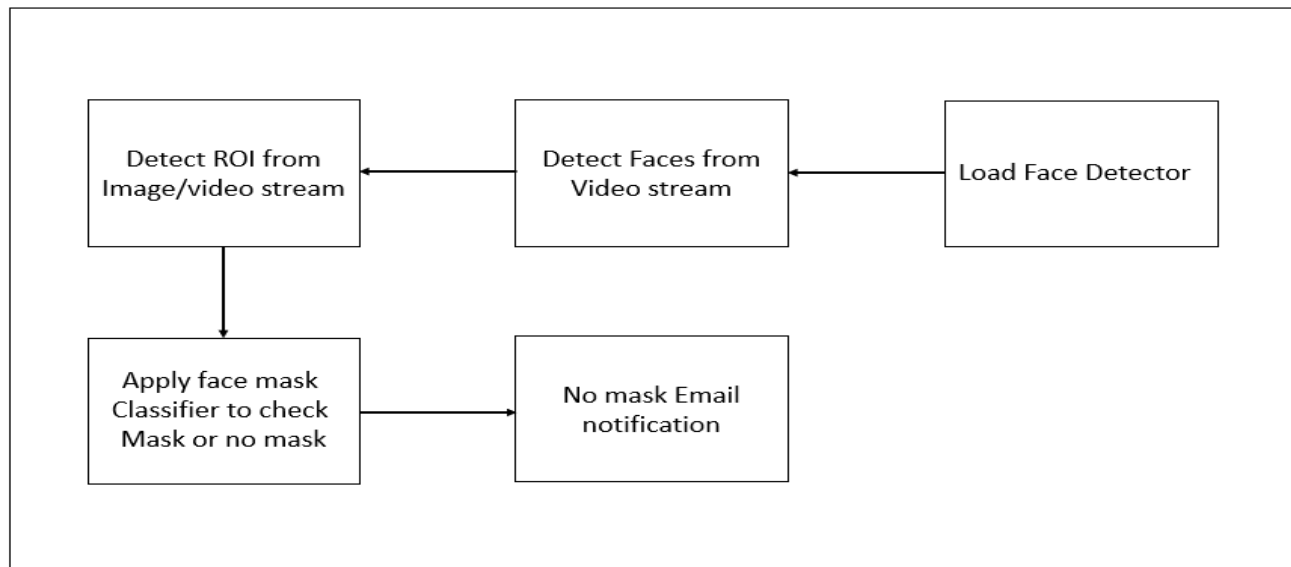**Below are the modules of**

Fig 3.1: - Project Modules

3.2 Input and Output:

Input: Firstly, real time video is given, frames are extracted from the video using face-net. Then extracted faces from face-net are given to masks-classifier.

Output: Output here will the appropriate task getting executed as a result of receiving the command from the user. It can be hardware related or Software related

3.3 Architectural Design
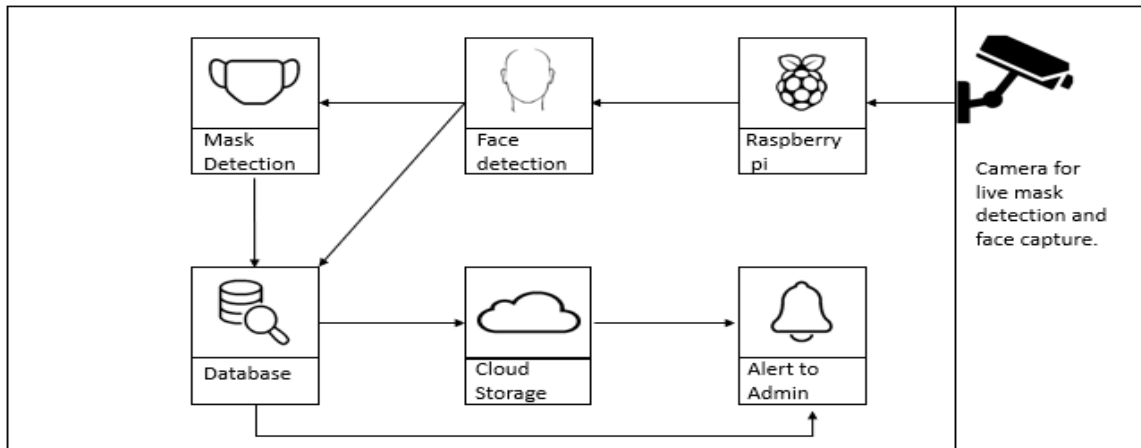
Fig 3.2: - Architectural Design

3.4 UML DESIGN
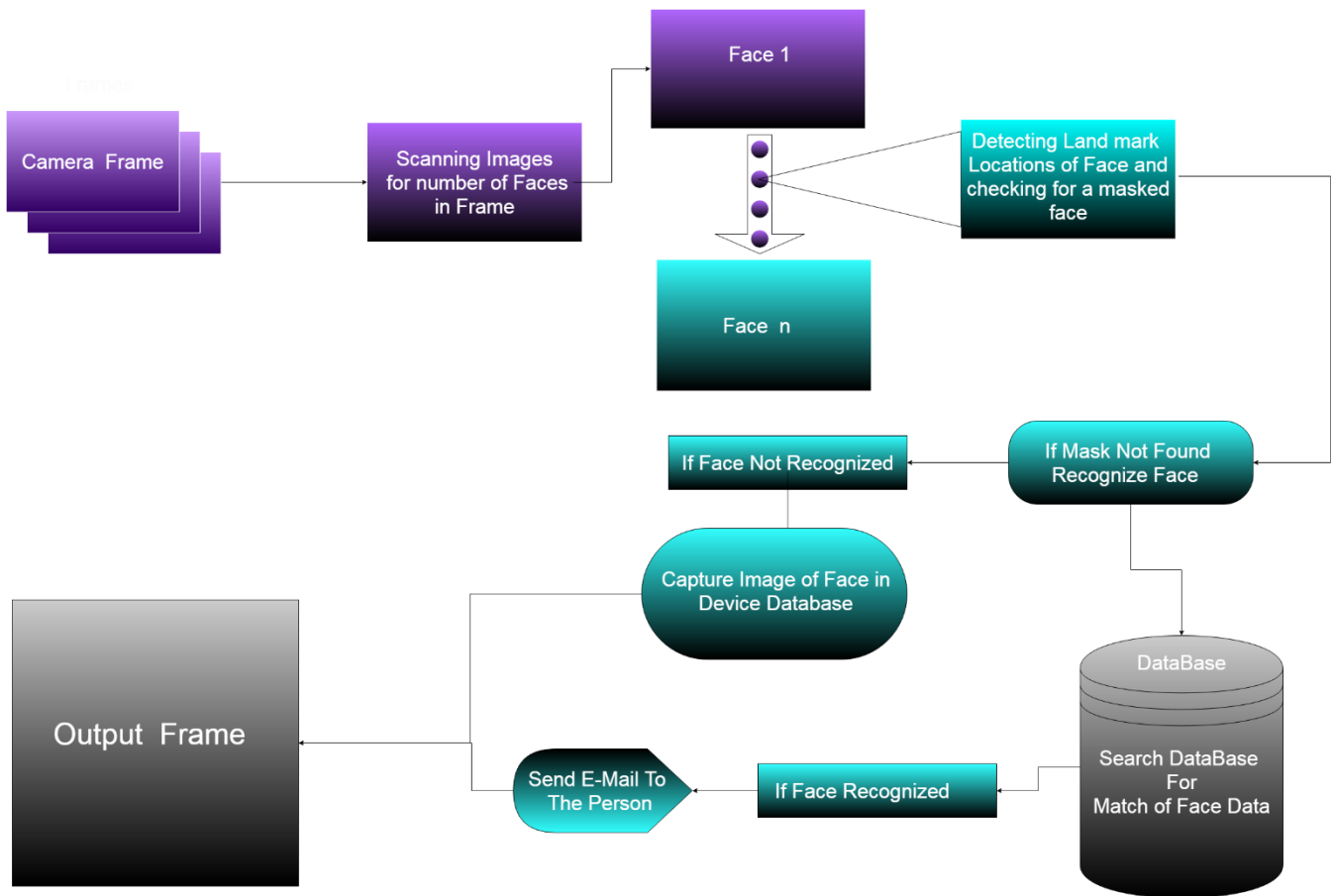
Data Flow Diagram

3.4.1 DFD 0
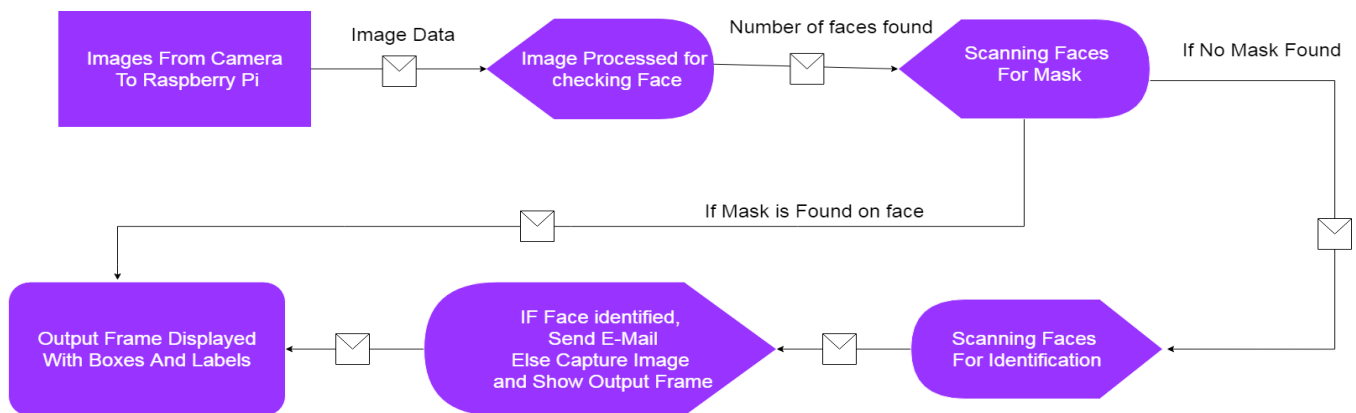
Fig 3.3: - DFD 0

3.4.2 DFD 1

Fig 3.4: - DFD 1

3.4.3 Use case
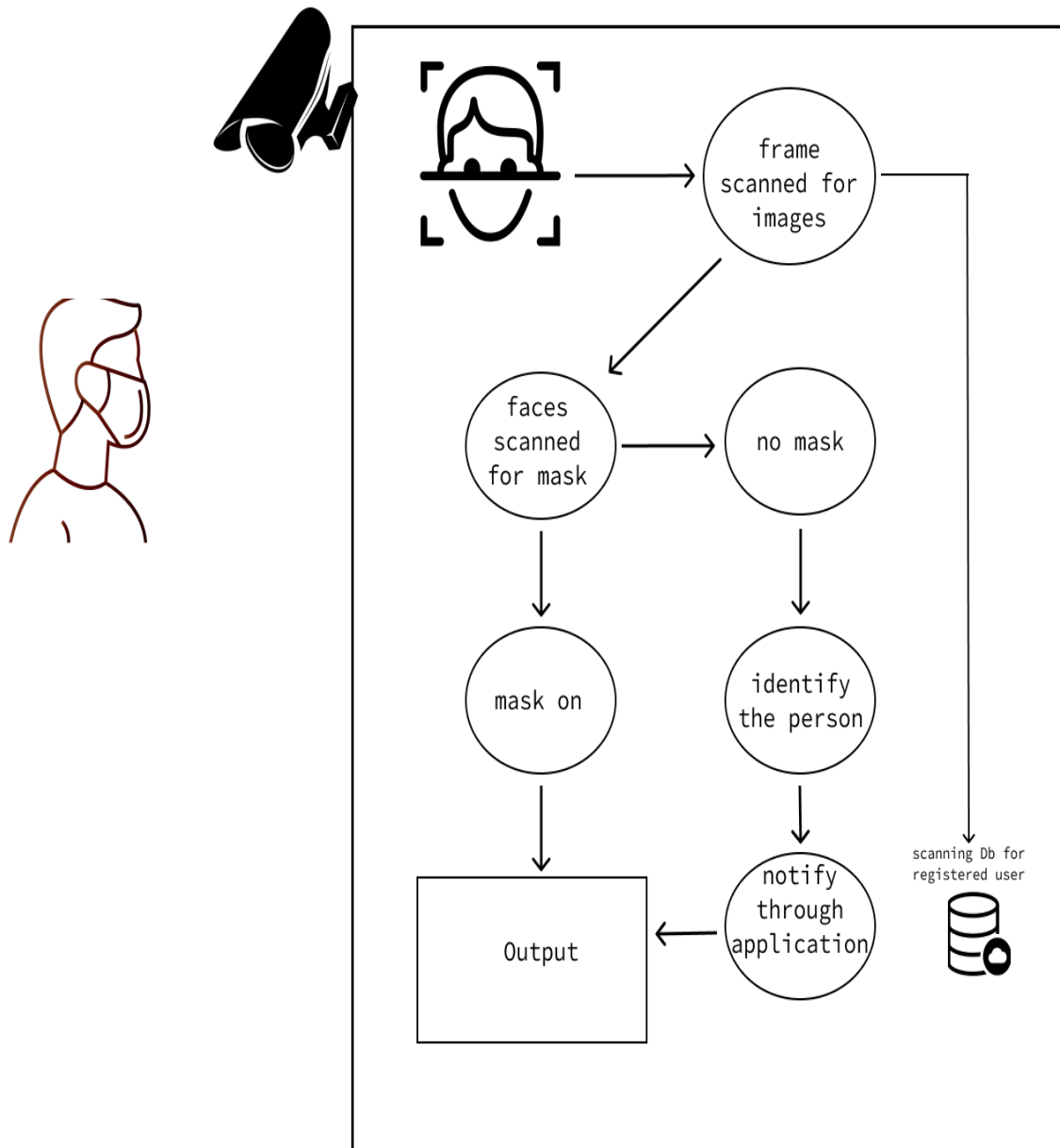
Fig 3.5: - use case

3.4.4 Class
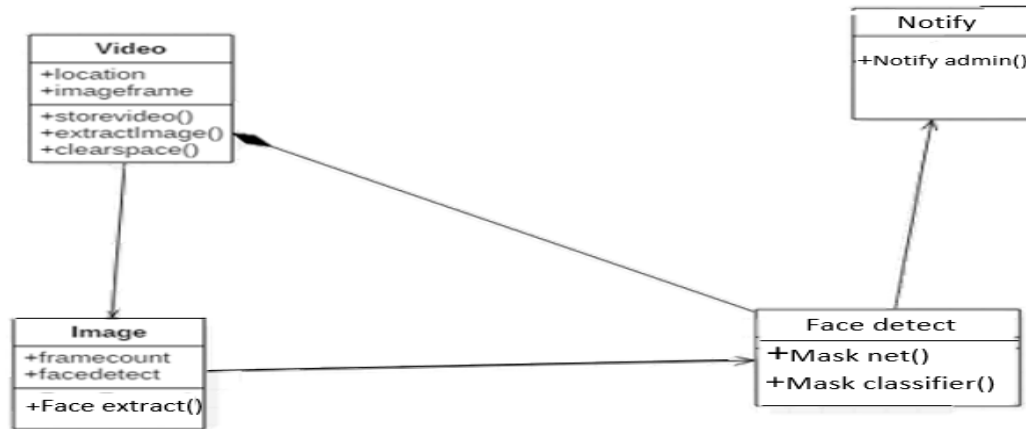
Fig 3.6: - Class

3.4.5 Activity
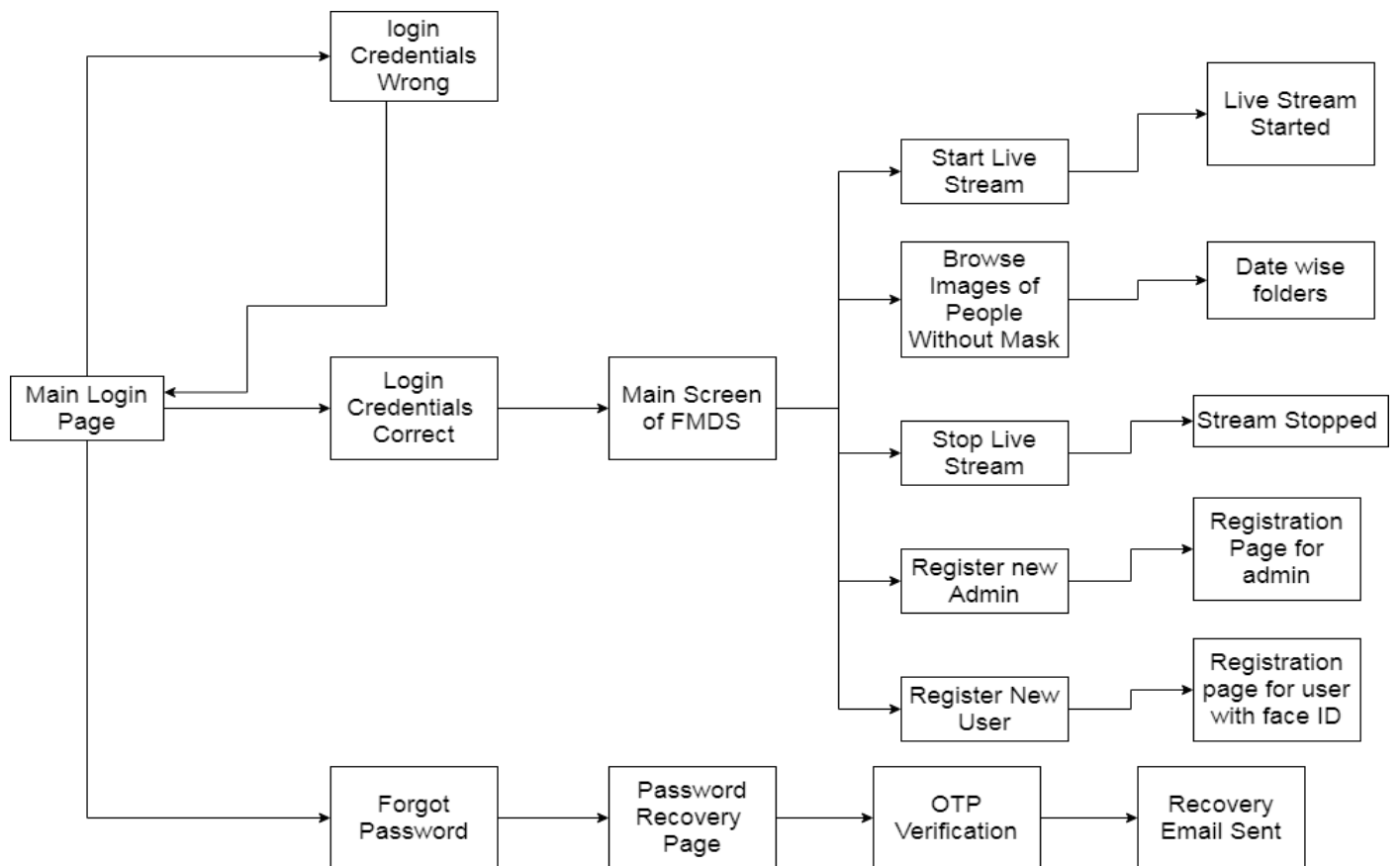
Fig 3.7: - Activity

3.4.6 Sequence
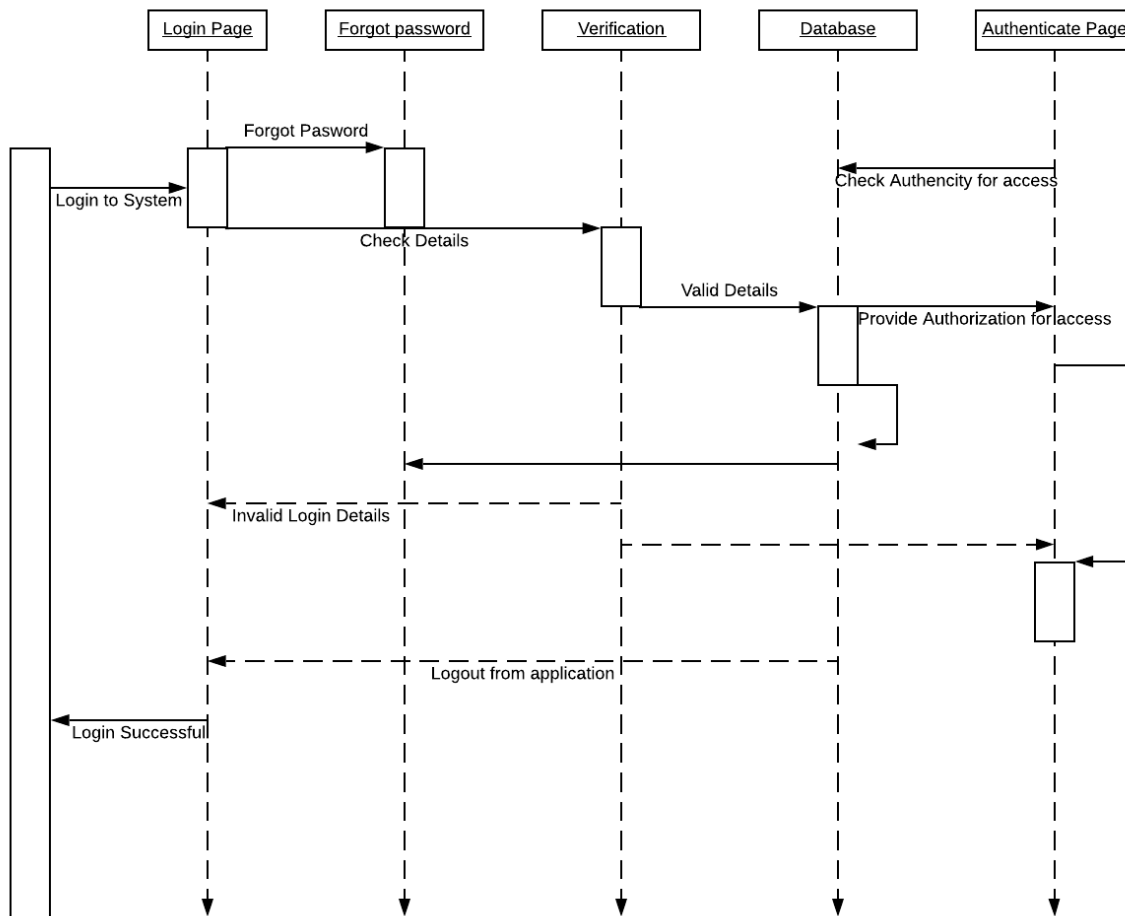
Fig 3.8: - Sequence

3.4.7 Project Schedule:

Task Name	September	October	November	December	January	February	March	April	May	June	July	August
Project Topic Finalizing	■											
Literature Survey		■										
Problem Identification and Modules finaliztion			■									
Distribution of Tasks				■								
Coding Of MDS Software					■	■						
Coding of Android App								■				
Finalizing Documentation									■			
Testing Whole Sytem									■			

Fig 3.9: - project Schedule

CHAPTER 4:

METHODOLOGY

Chapter 4

METHODOLOGY

Practically, the normal approach of software development will not work to complete the whole concept project in just 6 months as it has 2 major components that is the hardware and software side of the software side which are all full-fledged projects. So, we managed to adopt the pre-defined proper SDLC and with appropriate risk management we were able to complete our project. Following is the explanation of the methods we used.

Software Development Life Cycle, SDLC for short, is a well-defined, structured sequence of stages in software engineering to develop the intended software product.

4.1 SDLC Activities

SDLC provides a series of steps to be followed to design and develop a

Software product efficiently. SDLC framework includes the following step:

Our proposed system consists of 5 modules. The software in this project has an important role it has some advance features and functionality. Software is used to register new user and train the program by capturing images at the time of registration. It is capable of detecting faces and mask at runtime simultaneously, the software categorizes the images according to time and registered users.

The second important part of this project is application from which user can log in and receive updates and notification.

Fig 4.1: - SDLC Activities

1. Requirement Gathering

This step onwards the software development team works to carry on the project. The team holds discussions with various stakeholders from problem domain and tries to bring out as much information as possible on their requirements. The requirements are contemplated and segregated into user requirements, system requirements and functional requirements.

2. Feasibility Study

After requirement gathering, the team comes up with a rough plan of software process. At this step the team analyses if a software can be made to fulfil all requirements of the user and if there is any possibility of software being no more useful. It is found out, if the project is financially, practically and technologically feasible for the organization to take up. There are many algorithms available, which help the developers to conclude the feasibility of a software project.

3. Architectural design

Architectural design is a concept that focuses on components or elements of a structure. An architect is generally the one in charge of the architectural design. They work with space and elements to create a coherent and functional structure

4. Software development

Next step is to bring down whole knowledge of requirements and analysis on the desk and design the software product. The inputs from users and information gathered in requirement gathering phase are the inputs of this step. The output of this step comes in the form of two designs; logical design and physical design. Engineers produce meta-data and data dictionaries, logical diagrams, data-flow diagrams and in some cases pseudo codes.

5. Testing

An estimate says that 50% of whole software development process should be tested. Errors may ruin the software from critical level to its own removal. Software testing is done while coding by the developers and thorough testing is conducted by testing experts at various levels of code such as module testing, program testing, product testing, in-house testing and testing the product at user's end. Early discovery of errors and their remedy is the key to reliable software.

6. Software deployment

Software deployment is all of the activities that make a software system available for use. The general deployment process consists of several interrelated activities with possible transitions between them. These activities can occur at the producer side or at the consumer side or both.

4.2 Risk management

What is Risk?

Risk is future uncertain events with a probability of occurrence and a potential for loss" Risk identification and management are the main concerns in every software project. Effective analysis of software risks will help to effective planning and assignments of work.

Categories of risks:

1) Schedule Risk:

Schedule get slip when project tasks and schedule release risks are not addressed properly. Schedule risks mainly effect on project and finally on company economy and may lead to project failure. Schedules often slip due to following reasons:

Wrong time estimation

- Resources are not tracked properly.
- All resources like staff, systems, skills of individuals etc.
- Failure to identify complex functionalities and time required to develop those functionalities.
- Unexpected project scope expansions
2) Budget Risk:

- Wrong budget estimation.
- Cost overruns
- Project scope expansion

3) Operational Risks:

Risks of loss due to improper process implementation, failed system or some external events risks.

Causes of Operational risks:

- Failure to address priority conflicts
- Failure to resolve the responsibilities
- Insufficient resources
- No proper subject training
- No resource planning

4) Technical risks:

Technical risks generally lead to failure of functionality and performance.

Causes of technical risks are:

- Continuous changing requirements
- No advanced technology available or the existing technology is in initial stages.
- Product is complex to implement.
- Difficult project modules integration.

5) Programmatic Risks:

These are the external risks beyond the operational limits. These are all uncertain risks are outside the control of the program.

- Running out of fund.
- Market development
- Changing customer product strategy and priority.

CHAPTER 5:
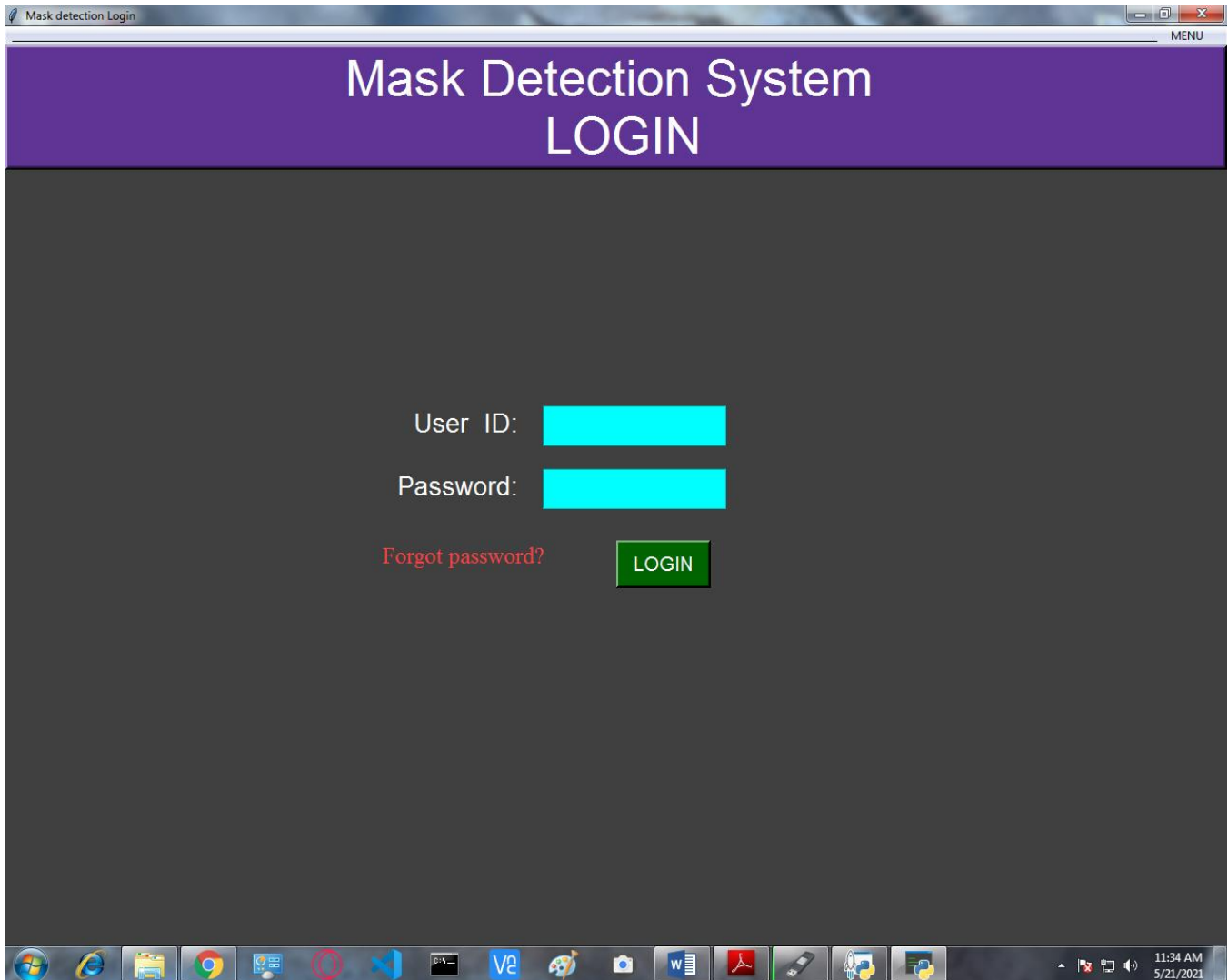
DETAILS OF DESIGNS WORKING AND PROCESSES

CHAPTER 5
DETAILS OF DESIGNS WORKING AND PROCESSES

5.1 Login Page

The Login Page of Mask Detection System is designed for Admin Login and admin side work. So, the login page can only take login details for Admin. You move to next page if Login Credentials are correct that is registered with database. We get an option of login and forgot password over here login is for logging in function.

The Page Heading is given as Mask detection system Login, on the upper right corner of the application we have an menu option which contains information like about us, contact us and exit function.

If we put a wrong password or password length is less than 8 characters it will prompt for an error message as wrong password or password length should be greater than 8.
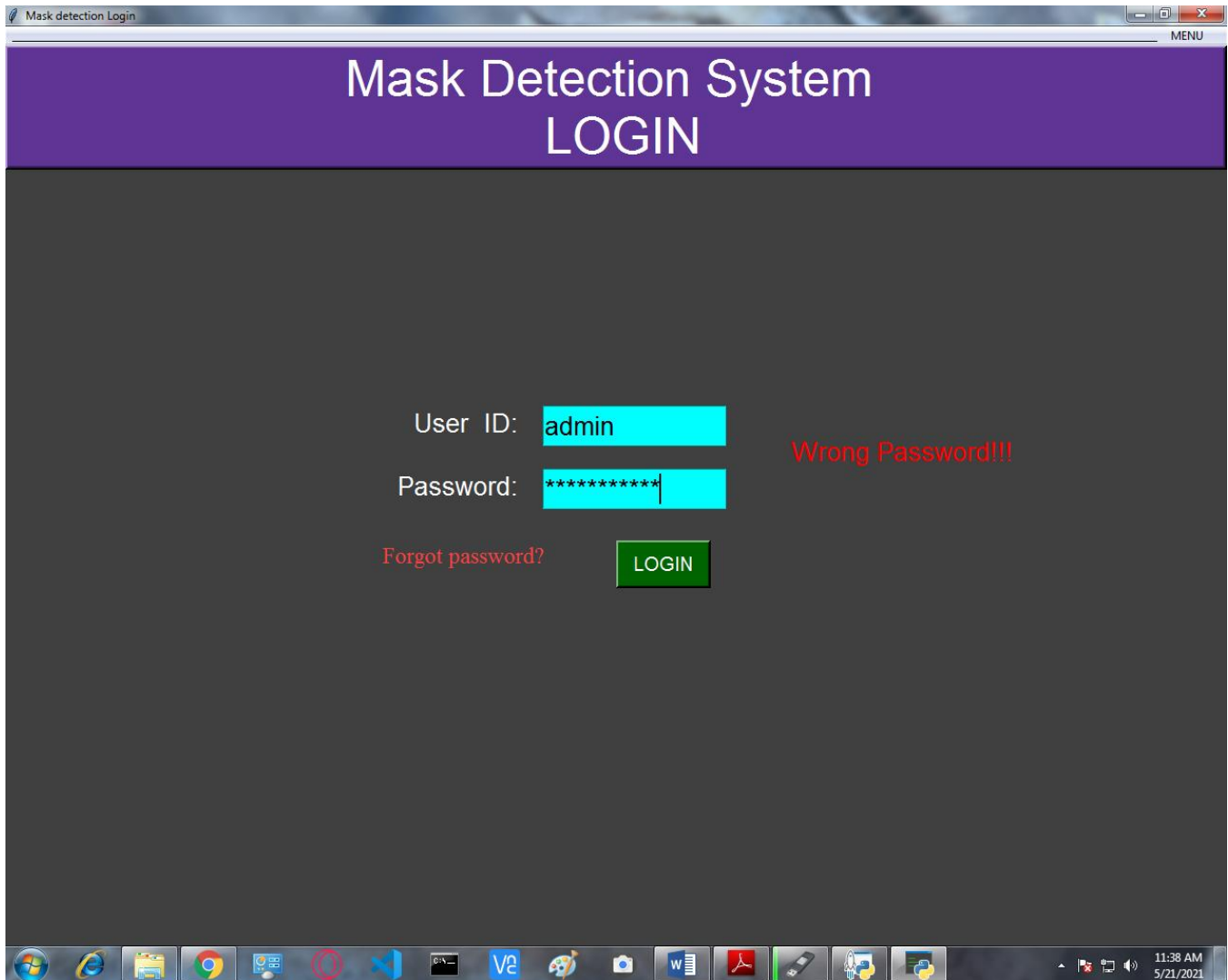
This function can identify that Id is correct but the password is wrong that means that the id is present in the Database but password doesn't match with given id. And if the Login details are empty and then you click login button this will end up with a prompt that "No empty fields allowed" if we clicked on that button again and again the prompt will be displayed as list. Every prompt will be added to the list and destroy after some time.

All the prompts that occur due to some error will be destroyed in about 3 seconds.

Below is the figure for empty fields prompt example.
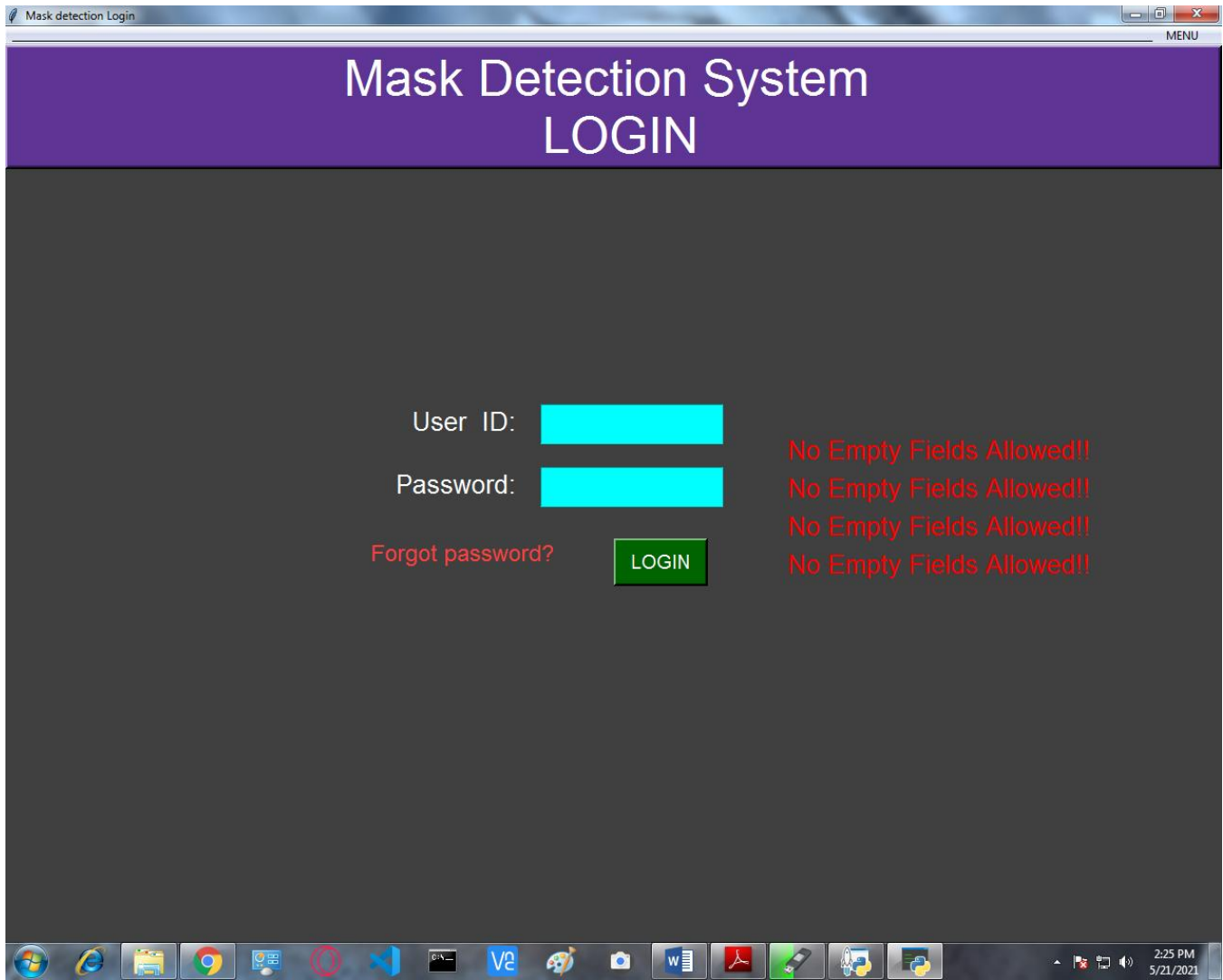
The number of prompts generated depends upon how many time you click on login button without any information.

If you click login button with less than 5 characters of login Id and less than 8 characters of password them it will again prompt a message for the same.

We can refer to the below image for the error reference.
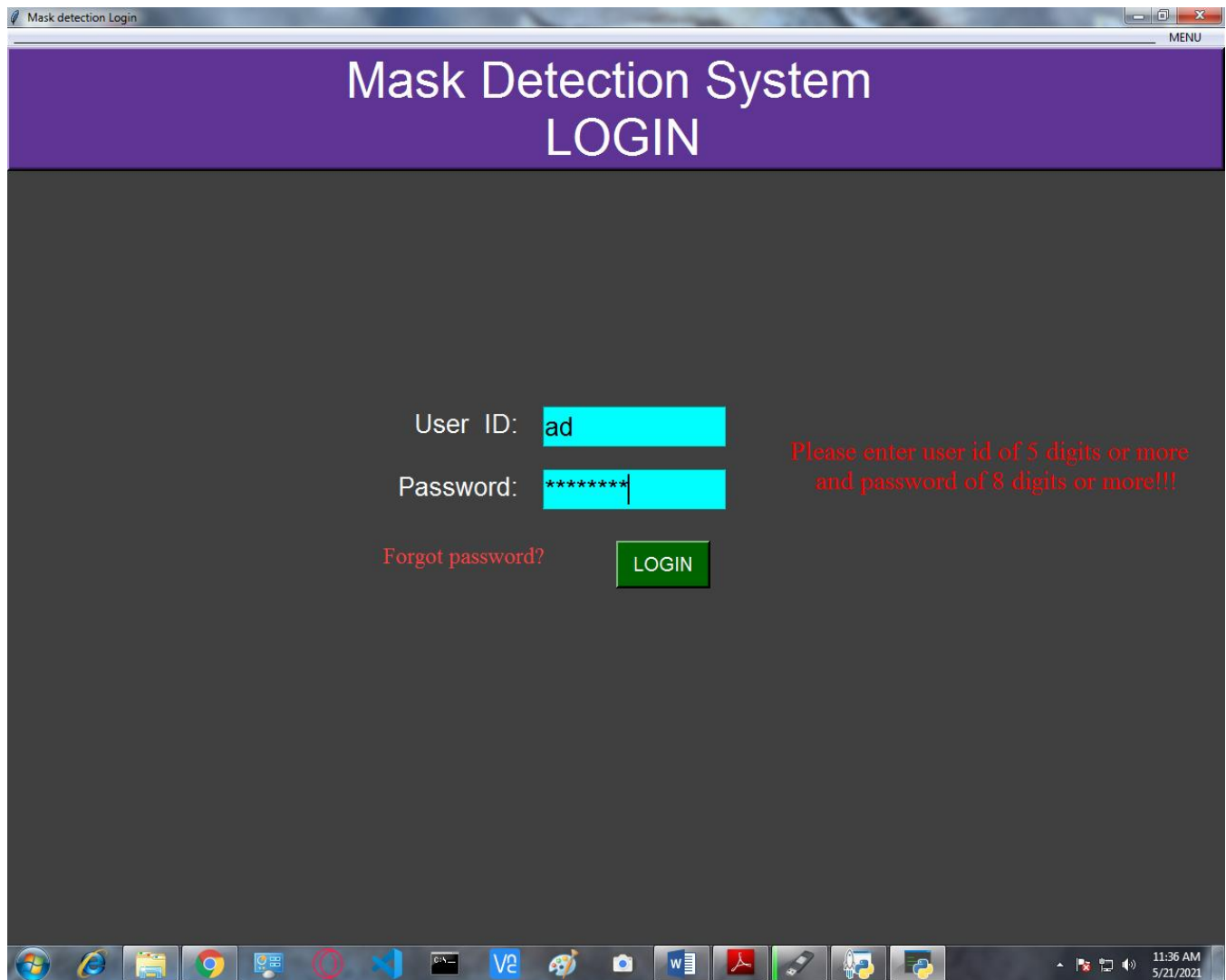
The User Id must be at least 5 character long and the password must be at least 8 characters long. The length of your used id and password are ensured at the time of registration on admin side.
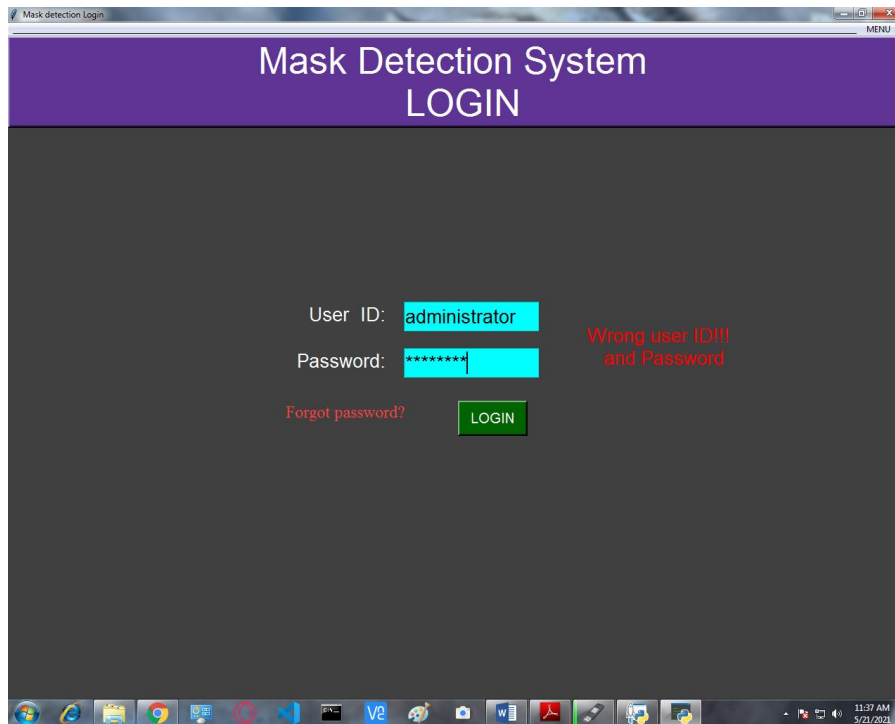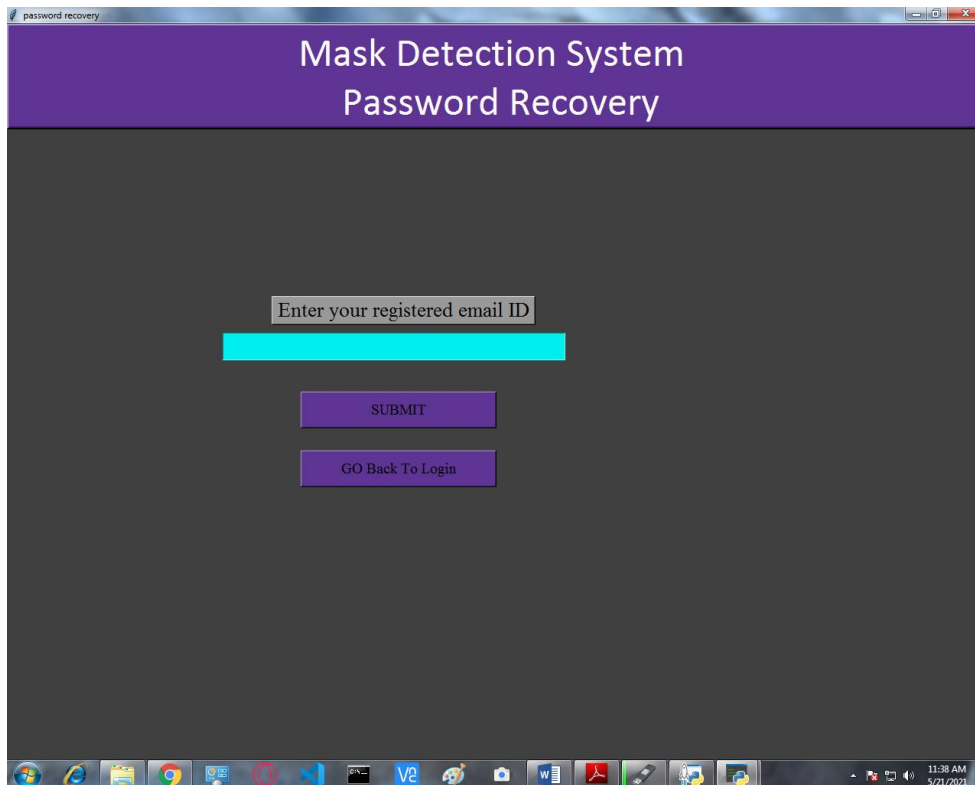
If wrong information is provided then the system will of course prompt for an error message Like "Wrong user id and password".
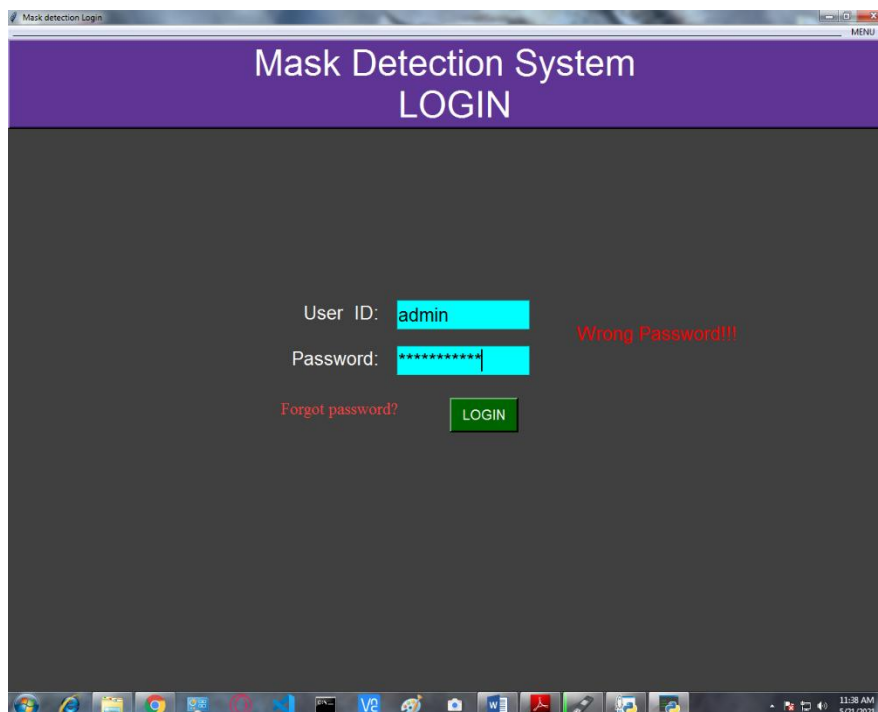
5.2 Forgot Password

If the admin has forgotten the password the password one can click on the link given as forgot password. When clicked the link will open a page Named Mask Detection system password recovery and ask for an email over there.

We can refer to the image given above

The image above tells us that the input taken by the page does not allows invalid email id format to be used. Else an error message will be prompted as Invalid email id format.

Also button is provided to go back to login page, this will destroy the page of password recovery.
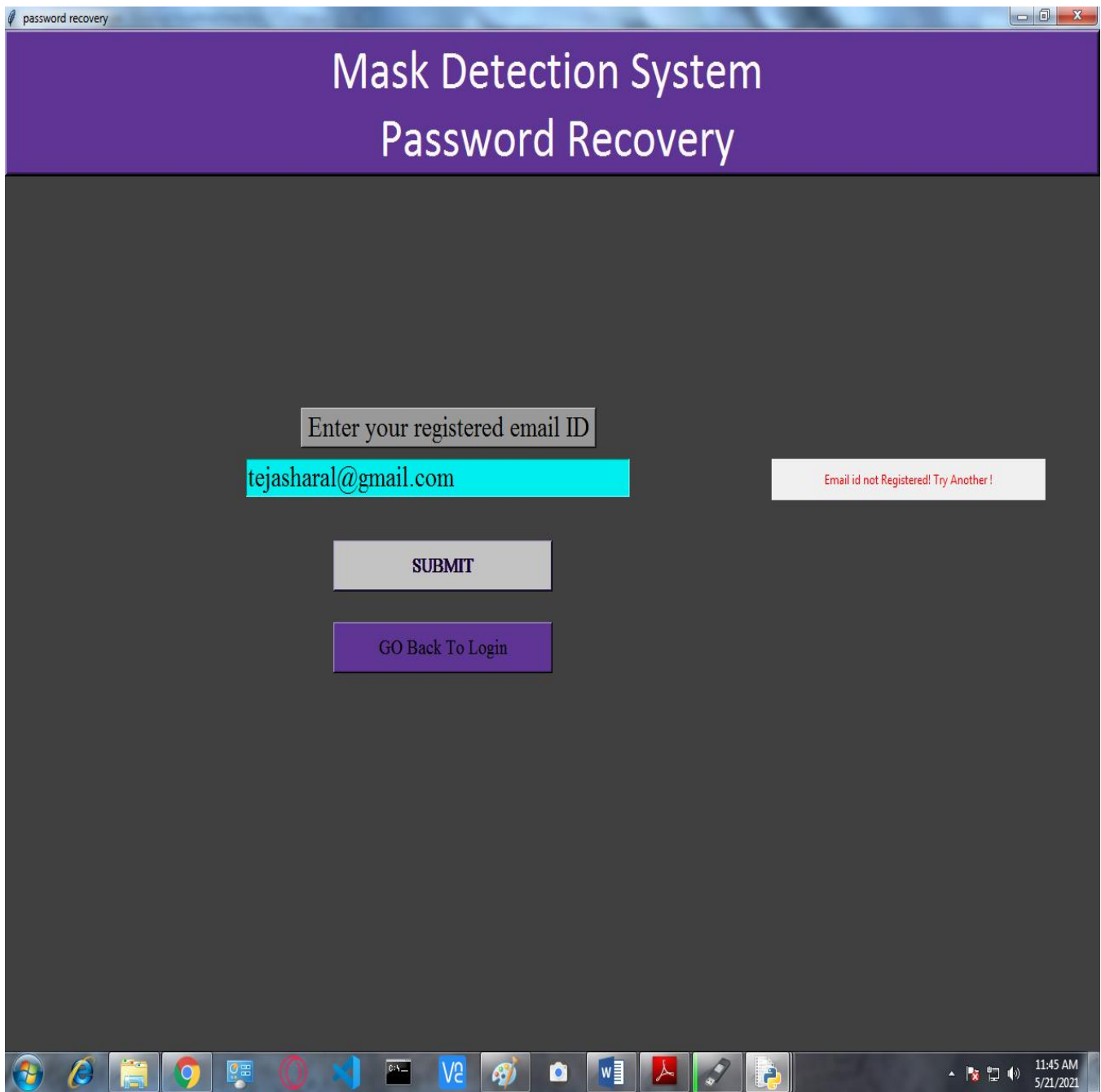
If the email id provided is in correct format but not registered with the system that is the email id is not present in the database so even if you provide an email that does not exists it will provide same prompt as it too difficult to check if an email id exists or not.
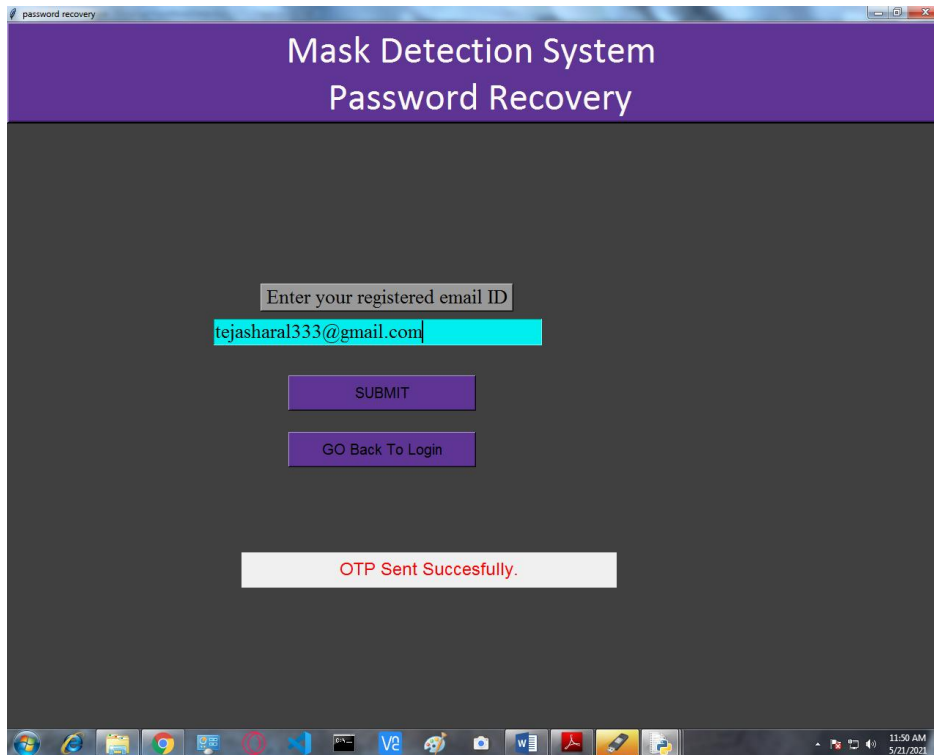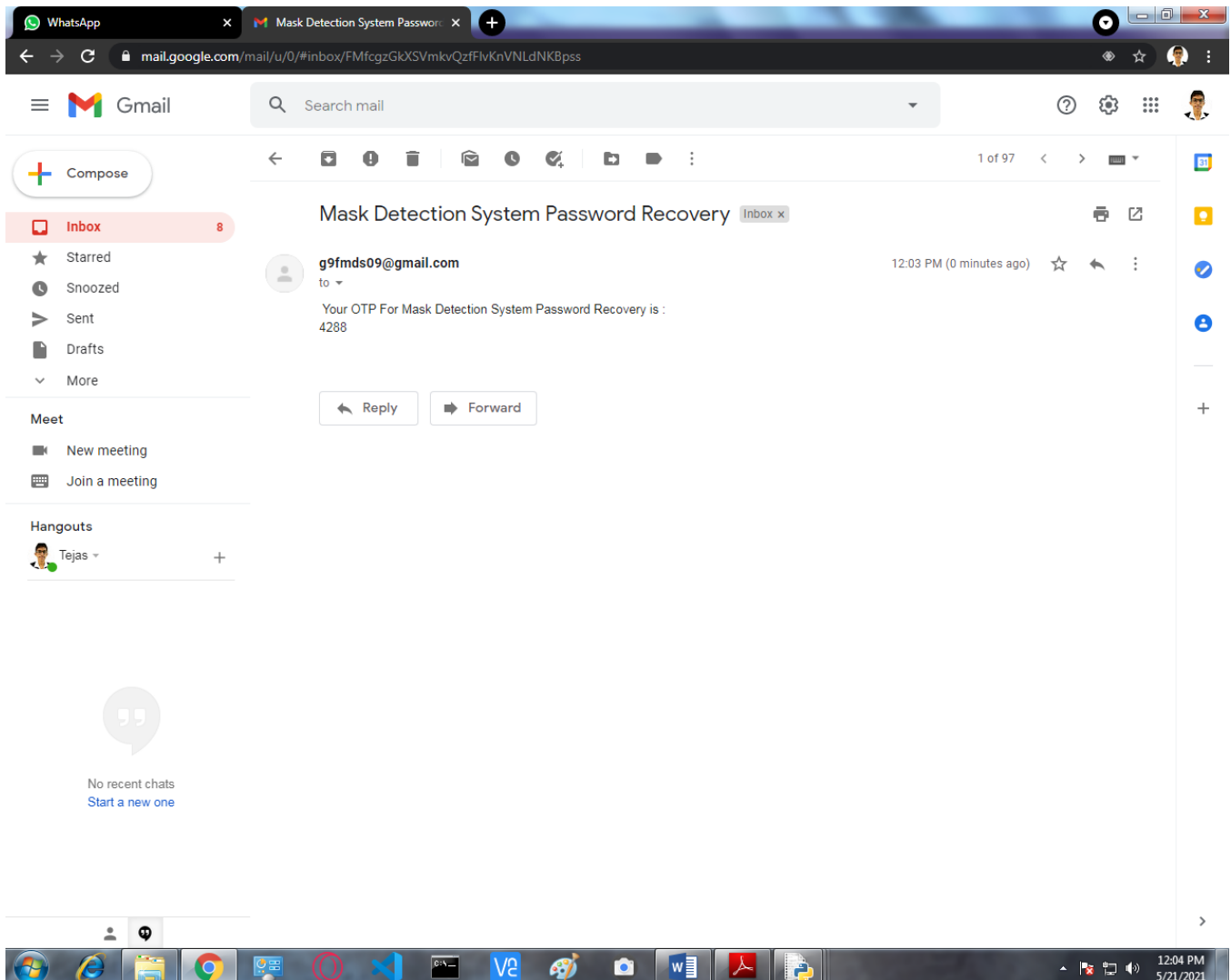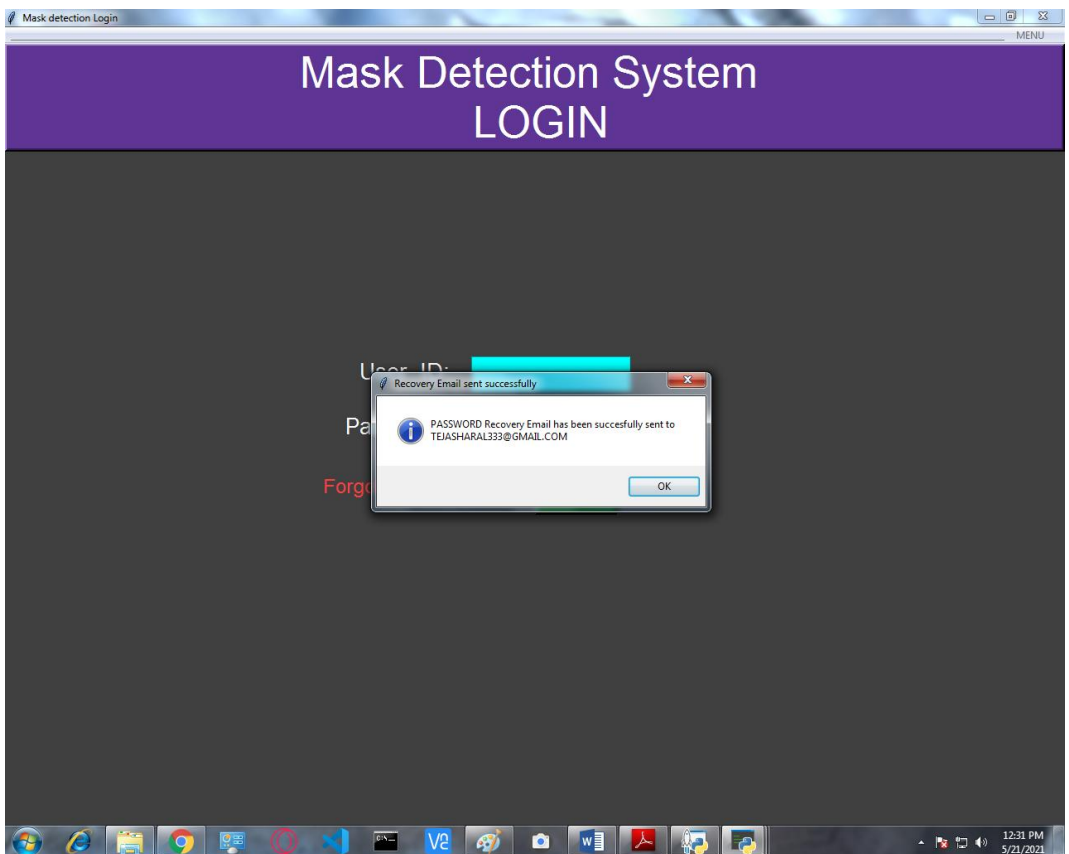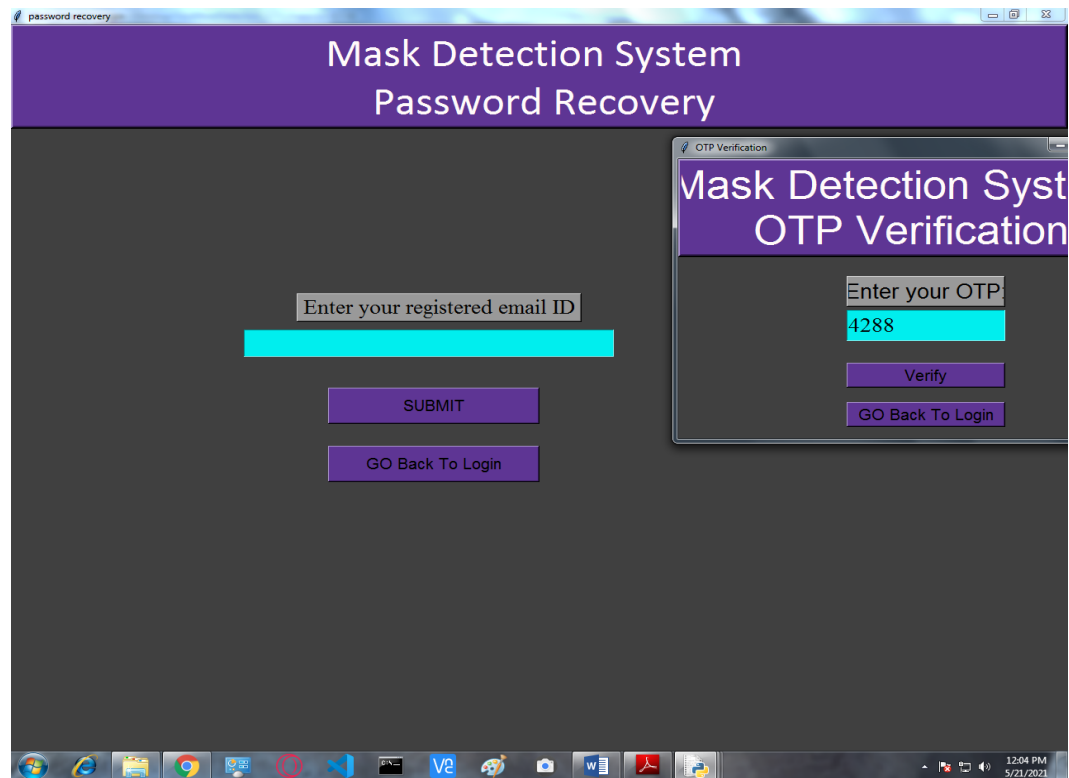
If the Email-id Exists and is registered with the system that means if it is present in the database it will then connect to the email server and then send the OTP with mail to the person for password recovery.
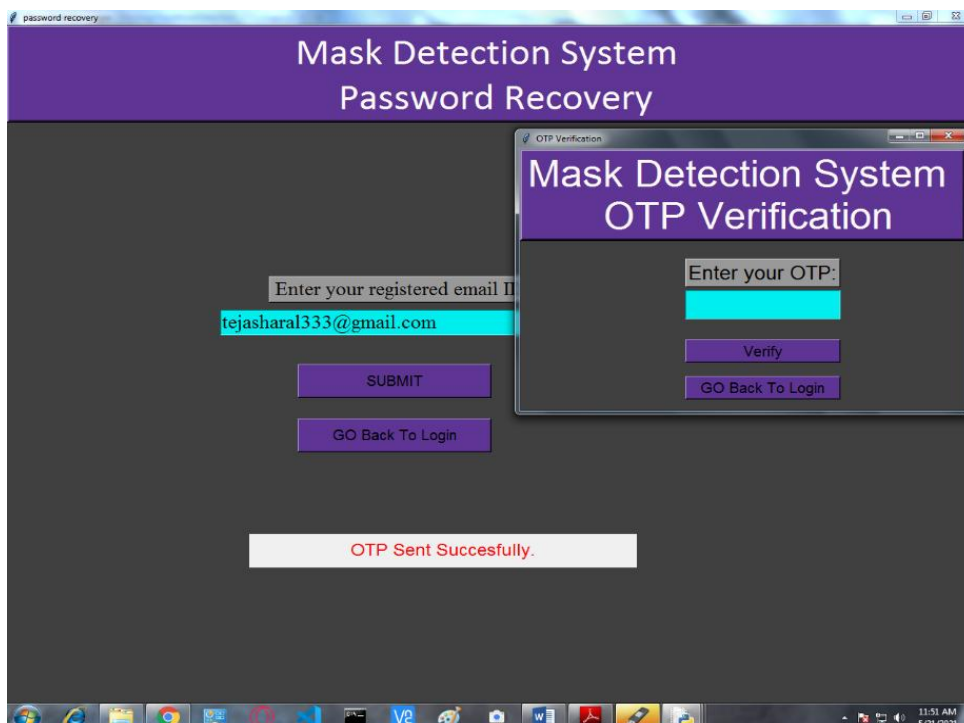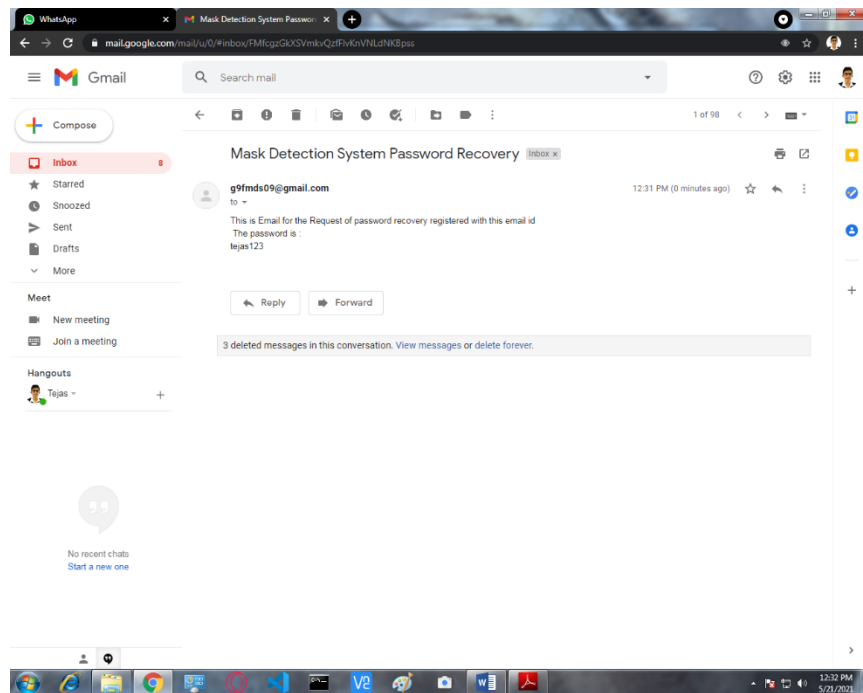
When the Email is sent successfully you will get an prompt that OTP successfully sent to email with email id details provided the person will get an email with an OTP.

And a screen will be displayed to verify OTP and if the OTP is correct the person will get an email of password recovery that means you get your password fetched from the database.

Mask Detection System
Password Recovery

Enter your registered email ID

SUBMIT

GO Back To Login

OTP Verification

Mask Detection Syst
OTP Verification

Enter your OTP:

4288

Verify

GO Back To Login

Mask Detection System
LOGIN

User ID:

Pa

Recovery Email sent successfully

PASSWORD Recovery Email has been succesfully sent to
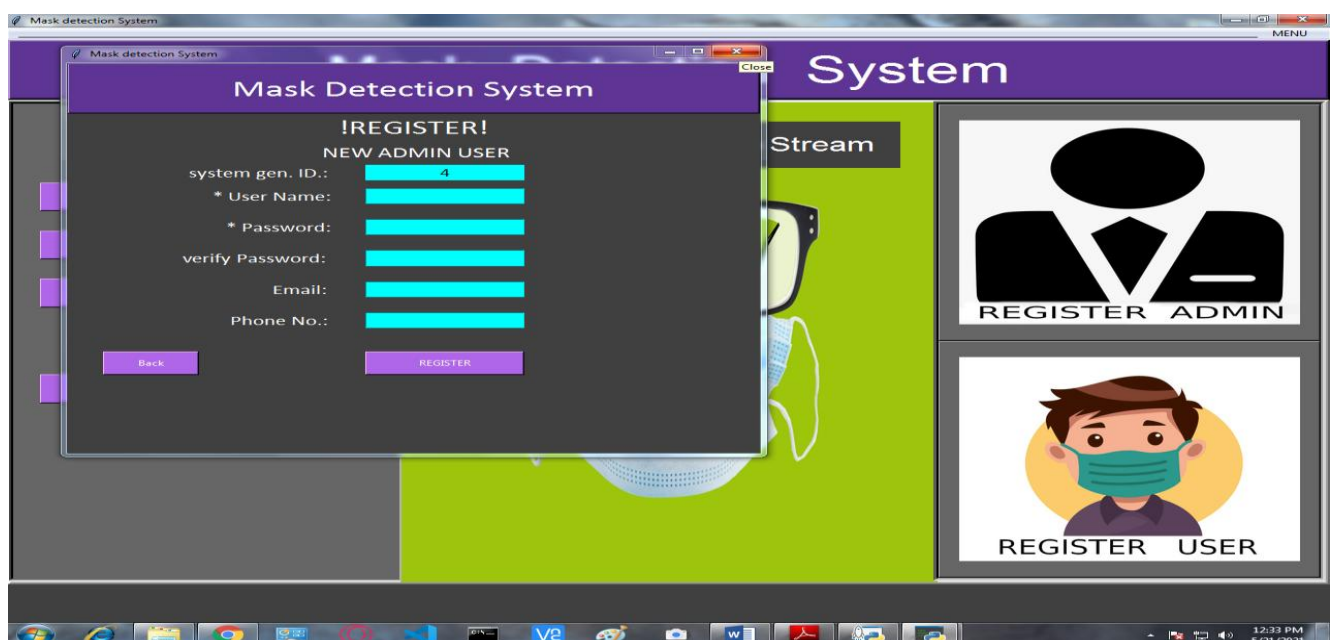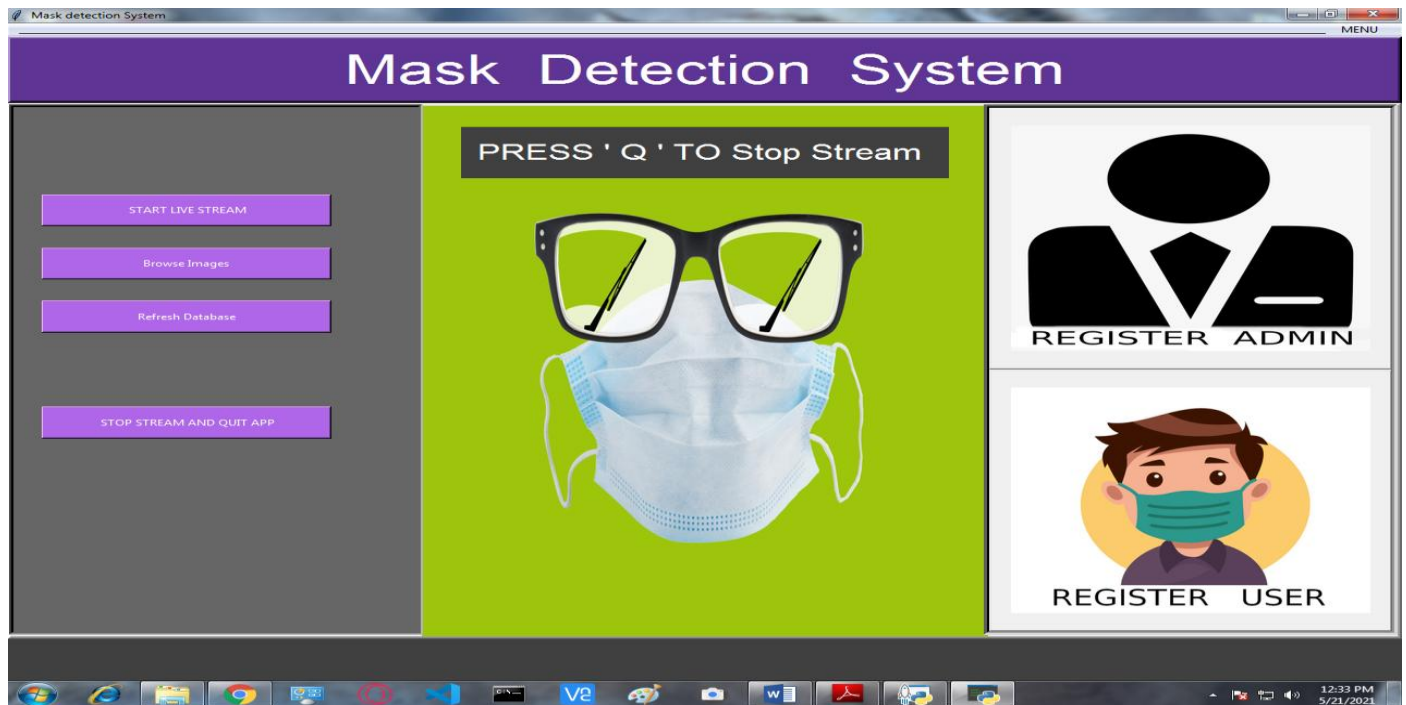TEJASHARAL333@GMAIL.COM

OK

At last when you get your password or if you know your password then you can successfully log into the system with correct credentials provided to the system as shown below in the fig.
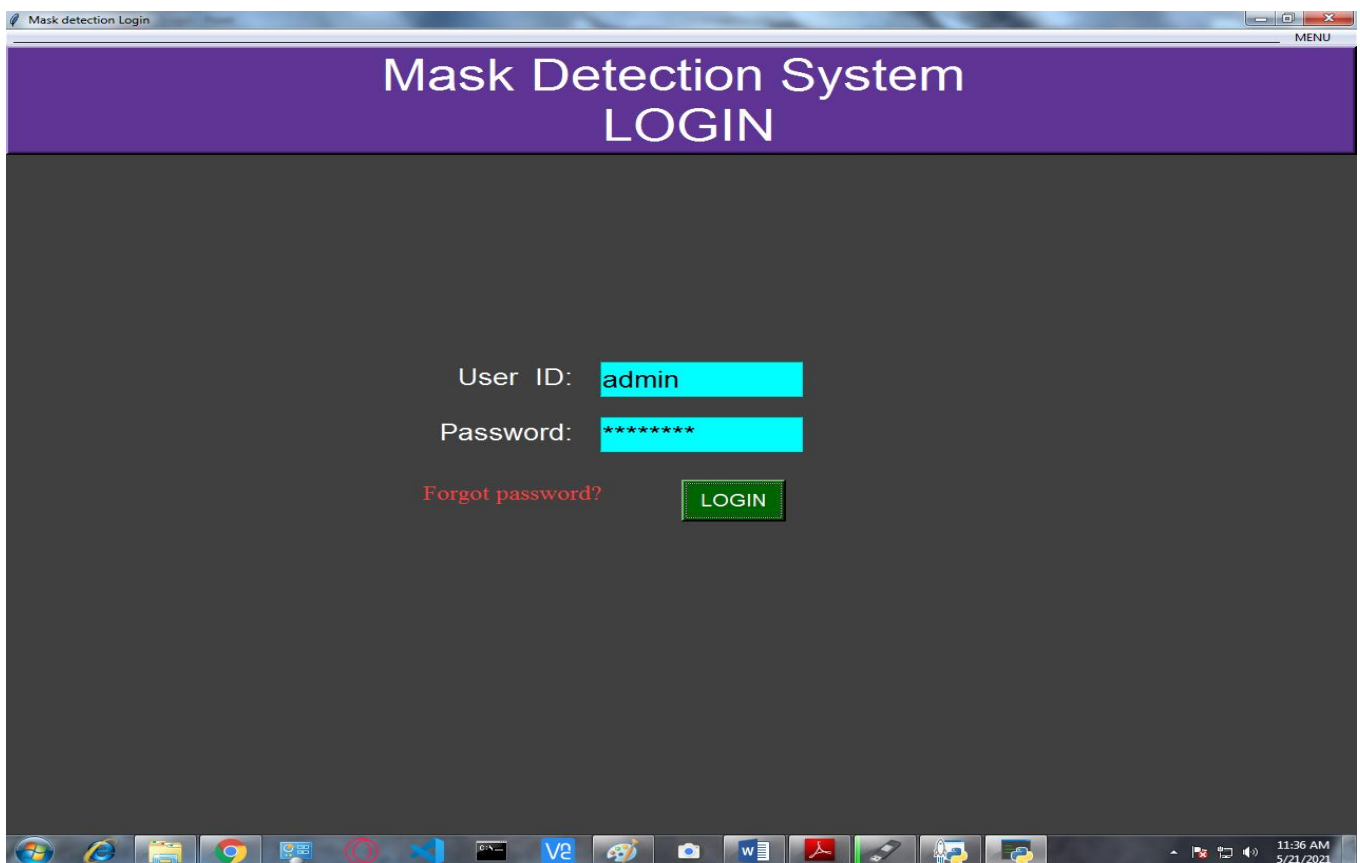
5.3 Mask Detection System Main Page

When you login with correct information you will be landed on a fresh new page with full admin controls, we can register a new admin user over here if you want that someone else should be able to use the MDS Software. Also we can register new users that is students in our case so whenever the user is detected without mask the person will get notified through our android app called "Notify ME".\
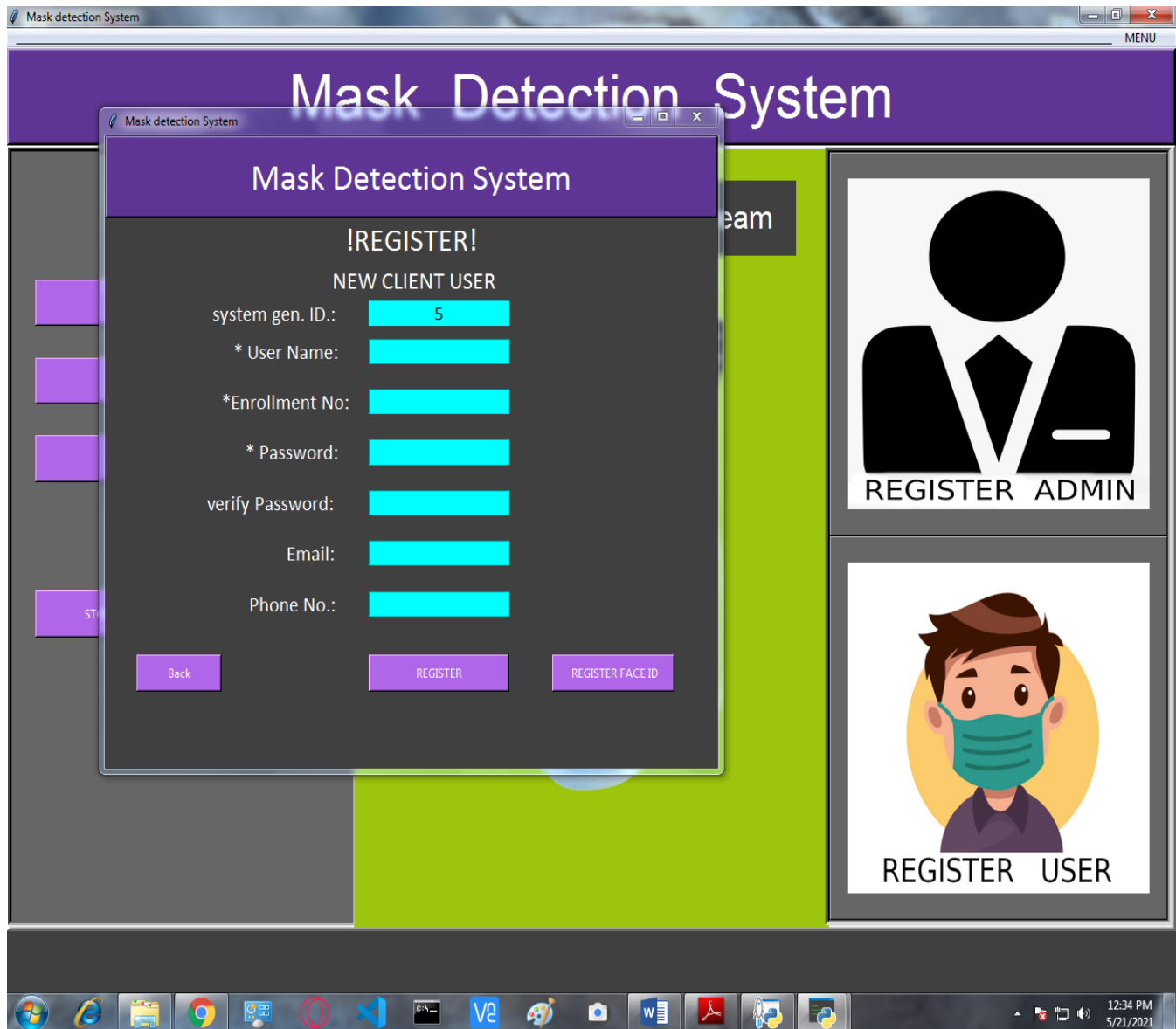
Various Options like start live stream will start a new stream for the system and start detecting people and recognize them.

We can also Browse Images from our PC for viewing old images or view images date wise from folder dedicated to the MDS software.
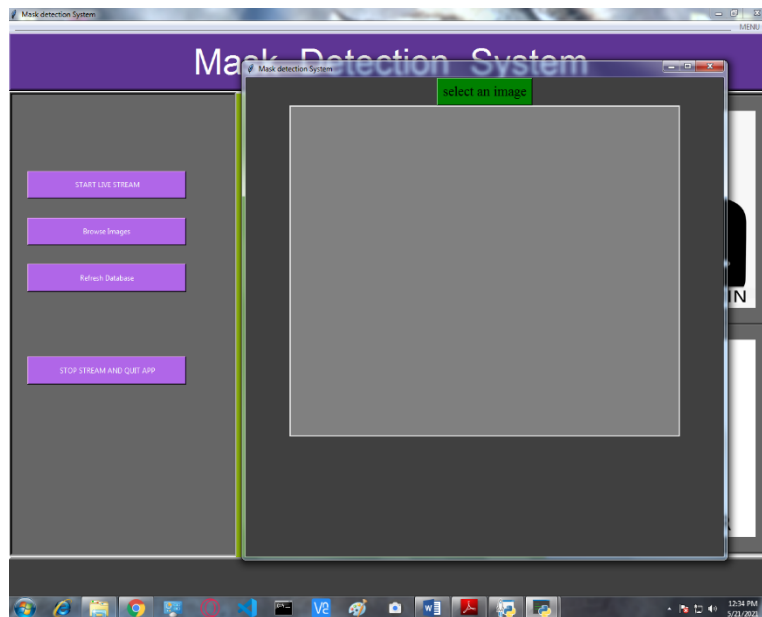
A button Names refresh database is provided to so whenever a new user is registered you can refresh database and that person will be added to database and its images will get trained by our algorithm.

Image below is referenced for new user Registration with Face Identification Registration of user in real-time, all the details are provided to the software. The program takes up to thirty images for training the model.

When you successfully register a user with all valid information then you get a prompt message as shown below.
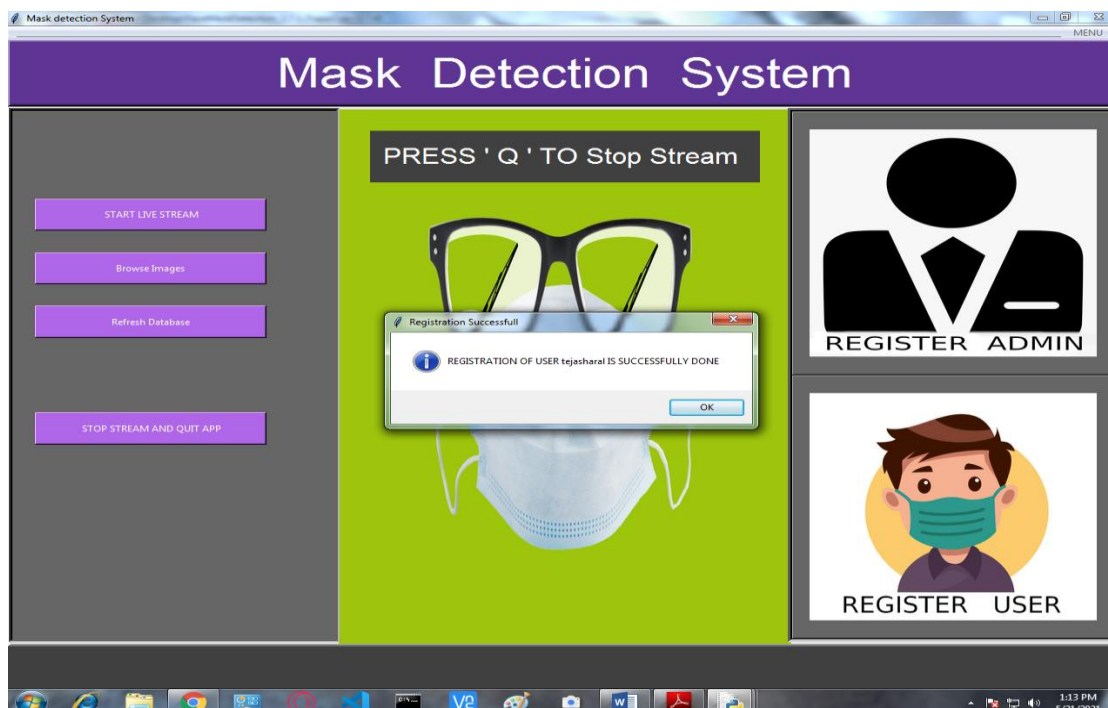
5.4 Live Stream

If you pressed the start live stream button a frame will be prompted and if you wish that the frame should continue displaying you should not close the app running in the background.

The frame will show the feed provided by the camera and detect no. of faces from the image and detect them all for a mask if wearing a mask it will show a green box around and if not wearing a mask red box is displayed around and the person will be recognized and if found in database will be notified through android app and if not found in database will save an image of the person as unknown.

5.2 RASPBERRY PI 4
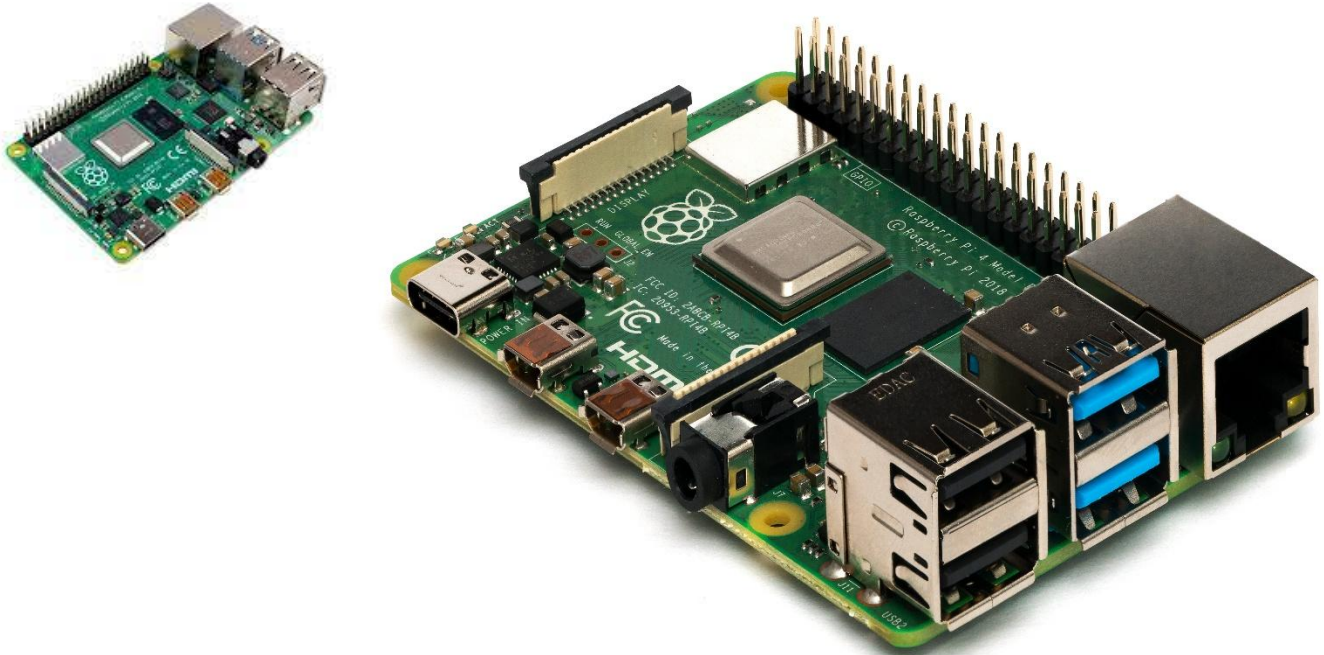
The **Raspberry Pi** is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

What's more, the Raspberry Pi has the ability to interact with the outside world, and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. We want to see the Raspberry Pi being used by kids all over the world to learn to program and understand how computers work.

This Whole Face Mask Detection System is running on a Raspberry pi 4 with 2 GB Ram. The raspberry pi 4 is programmed to run this software and capable of running it successfully and this can be applied anywhere just you need to install it the place you want with a camera or can access an IPCam that is within the network.

Raspberry pi 4 has all the capabilities to run our mask detection system without any problem.

And hence No One in the surrounding will dare to remove a mask.

CHAPTER 6:

RESULTS AND APPLICATIONS

6.1 Result

The system works as it was designed to work along with all the hardware and software. The software is ready to be deployed in the real time application.
It can run on various platforms as it is developed using python and python is widely used by many operating systems.
Also we have programmed our raspberry pi to startup in our Mask Detection System.

6.2 Applications

1. This Mask Detection System can be improved in the future and many more features can be added and updates can be provided

2. This System can be widely used in various types of organizations, like Companies and colleges, etc.

3. We can also use it with CCTV's Where ever there is CCTV installed and in same network.

4. This System can Work More Faster If some up gradations are done with software updates.

CHAPTER 7:

CONCLUSIONS AD FUTURE SCOPE

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7.1 Conclusions

a. Advantages

i. Only authorized access: - If any unauthorized person enters premises will be captured.

ii. Reduces the Staff requirement: - As the efforts are reduced the staff requirements are also reduced.

iii. Mask Restriction: -When the system finds a person without mask and recognizes it the person gets notified and can get annoyed by the notification and wear a mask.

iv. Ensuring Safety: - As everybody wears a mask we have ensured that the surroundings are safe from the pandemic point of view.

b. Limitation
i. This System is a bit slower as image processing is a very big task and consumes time, CPU and Ram.

ii. Hardware Resources are not up-to the mark.

iii. We don't have a server for cloud implementation of software.

iv. System cannot handle too many faces at a time like more than 6.

7.2 Future Scope

1. This Mask Detection System can be improved in the future and many more features can be added and updates can be provided

2. This System can be widely used in various types of organizations, like Companies and colleges, etc.

3. We can also use it with CCTV's Where ever there is CCTV installed and in same network.

4. This System can Work More Faster If some up gradations are done with software updates.

CHAPTER 8:

REFERENCES AND BIBLOGRAPHY

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