Smart Classroom

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Smart Classroom

Mini Project – III

Submitted in partial fulfillment of the requirements

For the degree of

Bachelor of Technology in Information Technology

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CERTIFICATE

This is to certify that the Mini Project -III entitled "Smart Classroom" submitted by Chinmay Mistry(17bit052), Het Shah(17bit103), towards the partial fulfillment of the requirements for the degree of Bachelor of Technology in Information Technology/Computer Engineering of Nirma University is the record of work carried out by him/her under my supervision and guidance. In my opinion, the submitted work has reached a level required for being accepted for examination.

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ABSTRACT/ Outline

The aim of our project was to improve upon the current classroom learning experience in place. We intended to incorporate automatization for some activities for both students and teachers alike. We developed a smart dustbin system to maintain hygiene and cleanliness, notes taking software which will be used by the faculty members to quickly create the pdf version of the notes taken on the blackboard and be mailed to the students automatically. We also tried to include a system in which the teacher will know if the student is paying attention in class or not. In the future, we intend to extend the system for many other modules as well.

CONTENTS

Chapter 1 Introduction

1.1 General

In general, a classroom is a place where the teaching process is incorporated. The teaching methodology hasn't changed since the previous 2 centuries, but in today's tech world, technology is playing a wider role in the learning and the teaching process. Today's world is more about getting more efficiency and not about the cost in achieving it, and technology has made it possible with the help of animations, e-quiz, smart boards, etc to get the maximum efficiency in teaching.

1.2 Literature Reviewed

For the creation of our smart classroom system, we used the reference of various research papers in esteemed journals such as Springer, ACM, IEEE, etc. We also used the youtube platform to get some inspiration about designs and then used Arduino tutorials on the Arduino webpage to get the errors fixed.

1.3 Scope of Work

In the system that we have created, it is being modified to suit any classroom of Nirma University. The biggest challenge was to do the modifications with little extra cost and use as much in-house hardware as possible.

In the Smart dustbin module, we automated the dustbin to maintain hygiene and prevent its overflow. The smart dustbin can be used in various places where people don't touch or don't use dustbins, for example- classrooms, Public Restrooms, Hotels, or at Business places. During this covid19 pandemic, every individual should wash their hands on a regular basis, not to touch anything, so smart dustbins can be used to overcome this situation as we don't need to touch the dustbin while using it. So, we can diminish the spread of the virus.

Chapter 3 Smart Dustbin

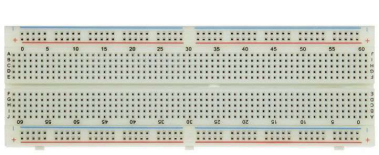
3.1 Objective

The main objective of smart dustbin is to keep our surroundings clean without touching or checking whether the dustbin is full or empty. So if someone comes near the range of the sensor in the dustbin, the lid opens and the person can use the dustbin. Also, the dustbin is connected to Wi-Fi, so we can check the garbage level in the dustbin. So, if the garbage level is above the threshold set by the user(here Municipal Corporation), it sends a message to them that the dustbin has crossed the limit.

3.2 Hardware Used

The hardware used is shown in the table below.

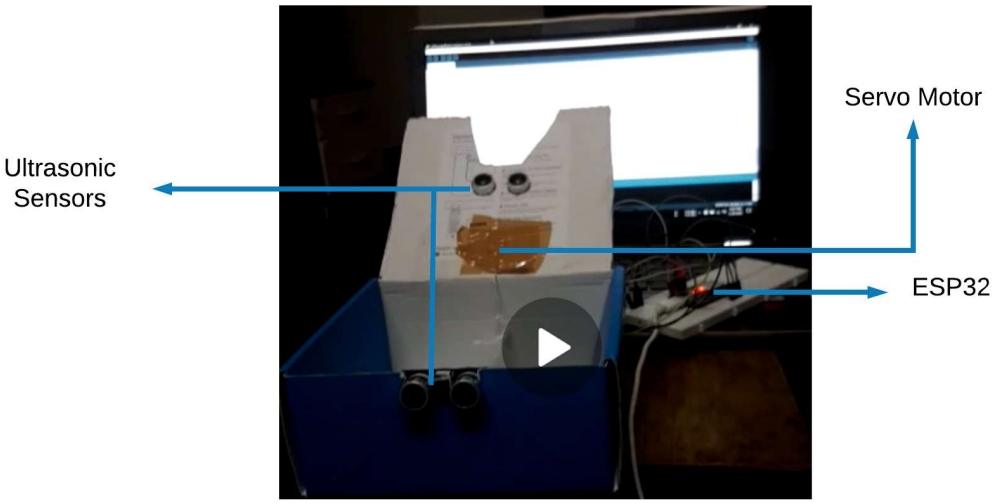
ESP32 x1	
Stepper Motor x1	
Ultrasonic Sensor x2	
Jumper Wires	

Breadboard x1	

3.3 Methodology

In this project, ESP32 is used as a process or sensor management and Wi-Fi management system. Using ESP32 we can use both Wi-Fi and Bluetooth at the same time. Two ultrasonic sensors are used- first for detecting the presence of a person nearby and second for the garbage level in the dustbin. Using a servo motor the lid can be manipulated(open or close). An android app was developed which can be used when our phone connects to an Access point created by ESP32. The user gets notified when the garbage level reaches above threshold through Wi-Fi.

3.4 Smart Dustbin Prototype



Chapter 4 Document Maker System

4.1 Objective

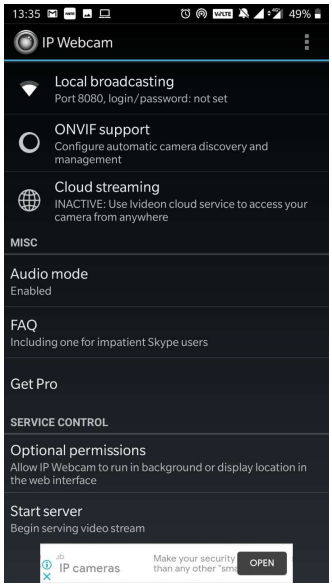
The main objective of the document system is too keep a digital record of everything that was written on the blackboard/whiteboard during the lecture, so it can be referred by the students for further understanding. This will allow the lectures to go in fast pace, as time won't be wasted while the students copy the notes. We designed the module in such a way that the hardware is already available with everyone.

4.2 Software/HardWare Requirements

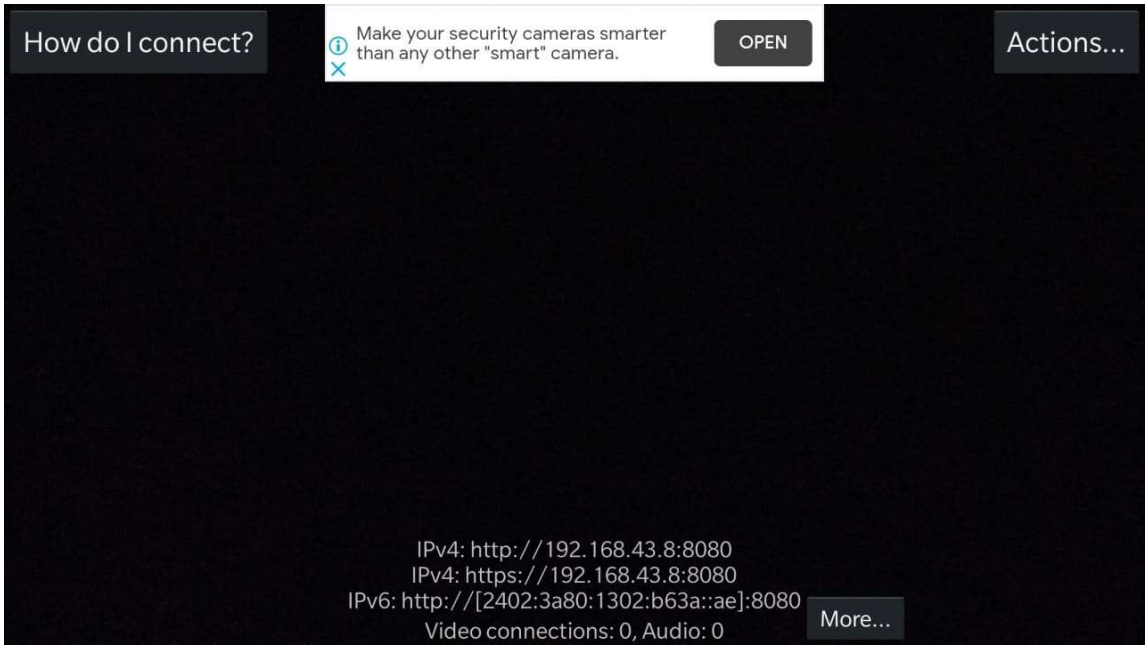
Serial Number	Name	Photo
1	Mobile phone with camera and WiFi	
2	DroidCam app installed in the phone	
3	stream.py application	

4.3 Working

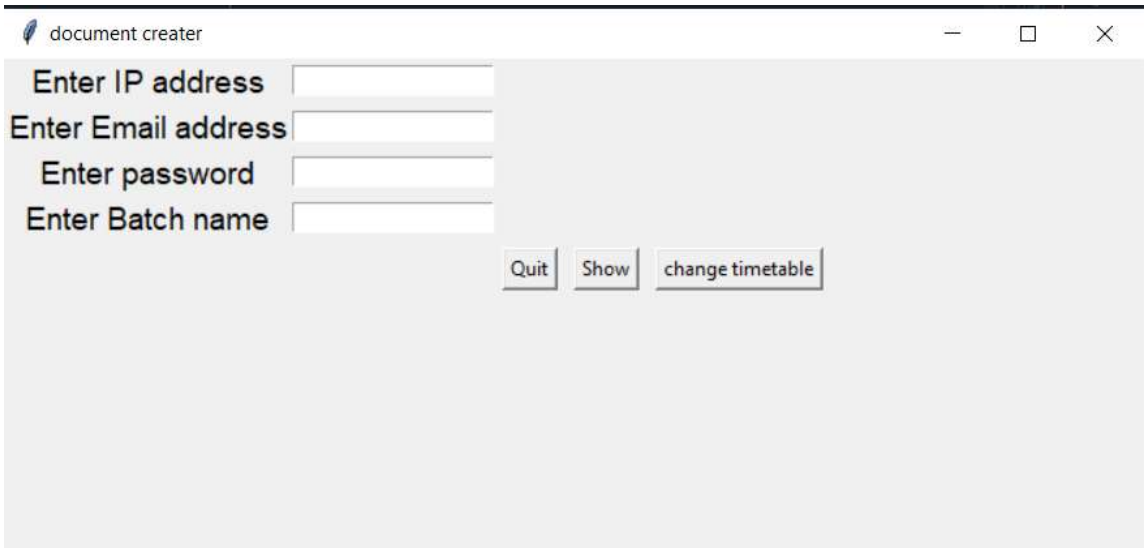
1) Open the droidcam app and start streaming



2)Note the Ipv4 address from the menu

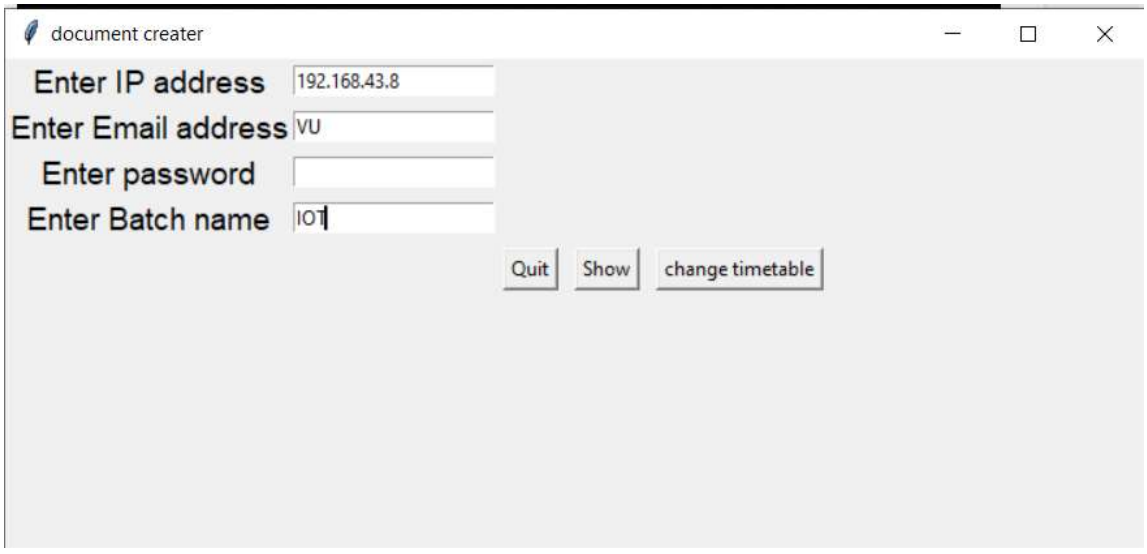


3)Open stream.exe application



4) Enter the details

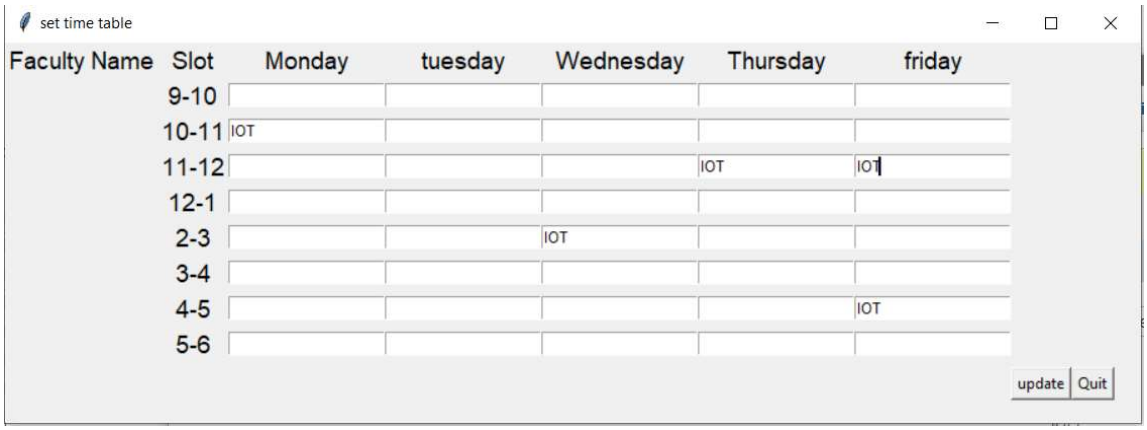
The batch details will be auto fetched from the time table



	name	slot	monday	tuesday	wednesday	thrusday	friday
Edit Copy Delete	VU	1	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete	VU	2	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete	VU	3	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete	VU	4	NULL	IOT	NULL	NULL	NULL
Edit Copy Delete	VU	5	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete	VU	6	NULL	NULL	NULL	IOT	NULL
Edit Copy Delete	VU	7	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete	VU	8	NULL	NULL	NULL	NULL	NULL

According to the data in the database, on thursday slot 6, their is an IOT lecture which gets auto fetched and displayed

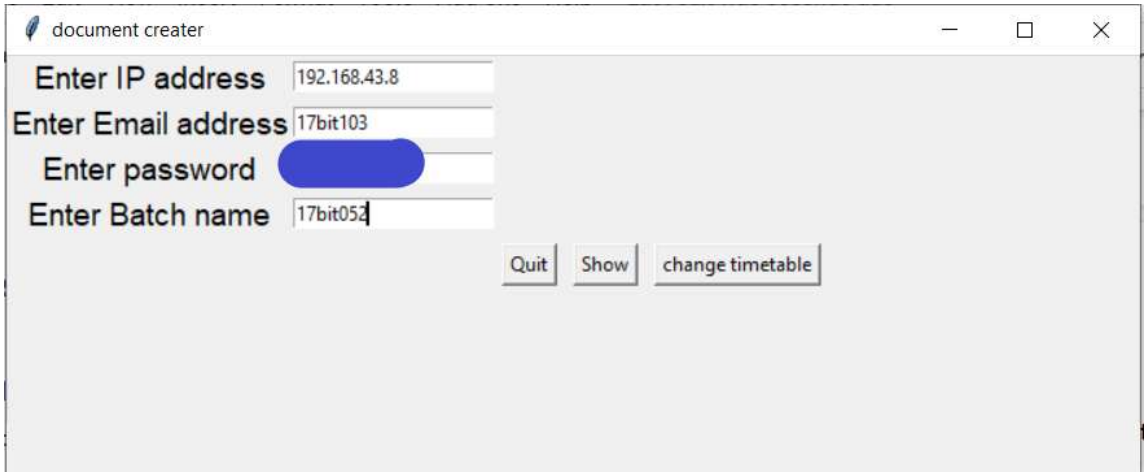
5) There is also an option to change the time table from the gui itself

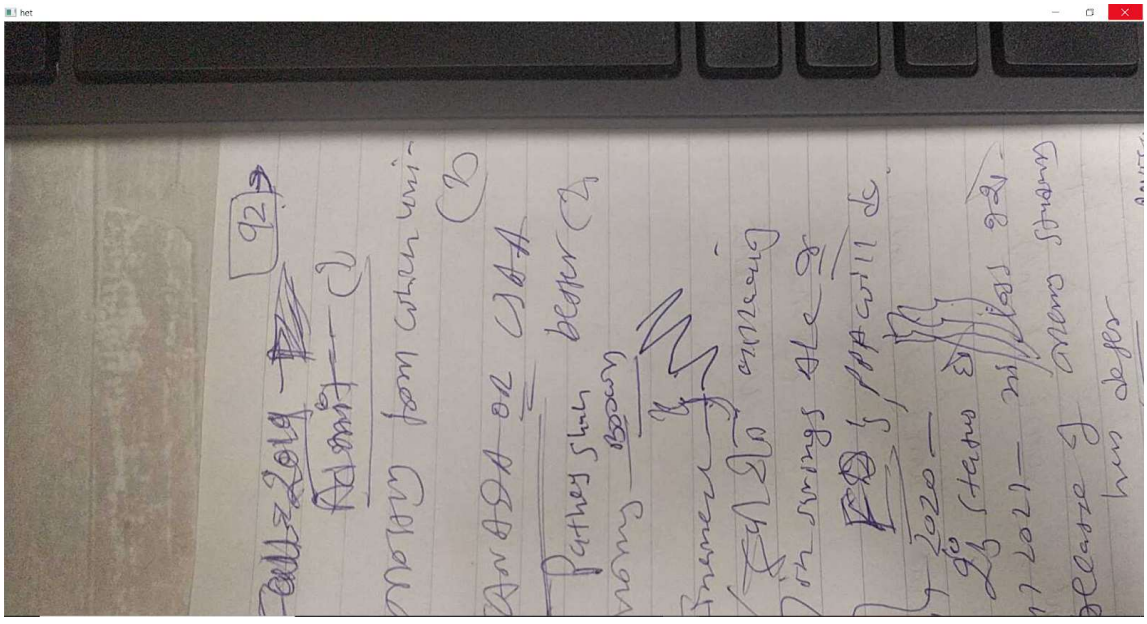


	name	slot	monday	tuesday	wednesday	thrusday	friday
Edit Copy Delete		1	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete		2	IOT	NULL	NULL	NULL	NULL
Edit Copy Delete		3	NULL	NULL	NULL	IOT	NULL
Edit Copy Delete		4	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete		5	NULL	NULL	IOT	NULL	NULL
Edit Copy Delete		6	NULL	NULL	NULL	NULL	NULL
Edit Copy Delete		7	NULL	NULL	NULL	NULL	IOT
Edit Copy Delete		8	NULL	NULL	NULL	NULL	NULL

Time table sucessfully updated

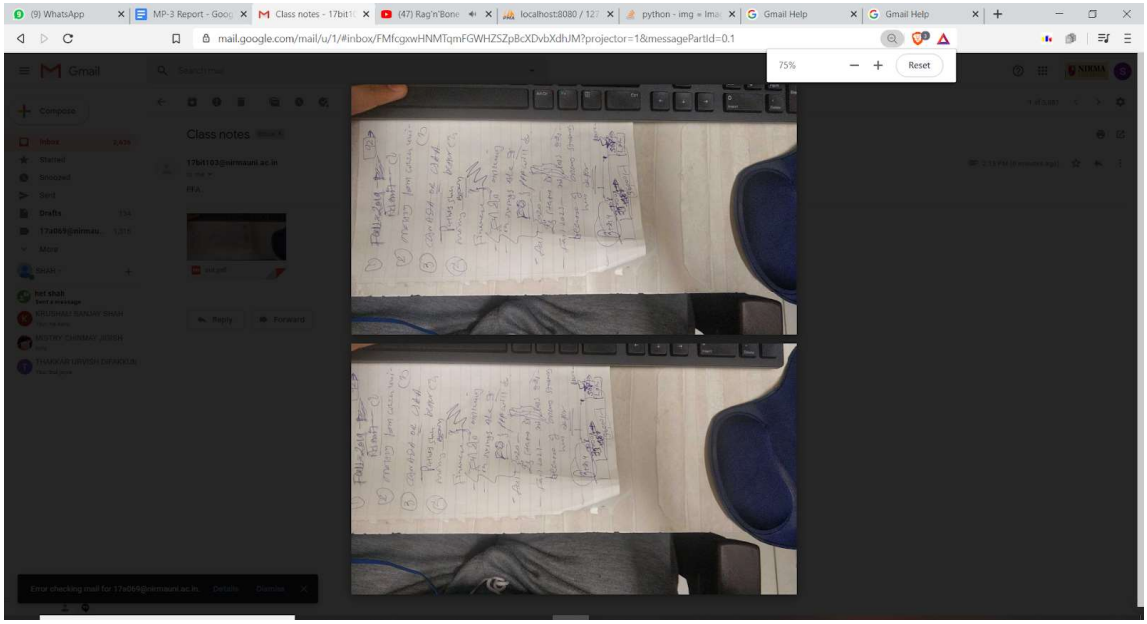
6) Once all the information is entered, click on the show button





Press spacebar to select the photo to take the pdf and then press esc key to exit the session

7) Check mail



Chapter 5 Attendance Management System

5.1 Objective

The main objective of the Attendance Management System is to minimize labor work for teachers or faculties while taking attendance. This module ensures 99% accuracy for 1 student as it takes 100 photos and trains it using a python library. We also created a GUI for the same and it will add student into the database, take the photos for the same and train them as well. Then the faculty can take attendance automatically or manually. Automatically means by face-recognizing and manually means entering attendance manually. This application stores the attendance into excel format with date and time of the attendance.

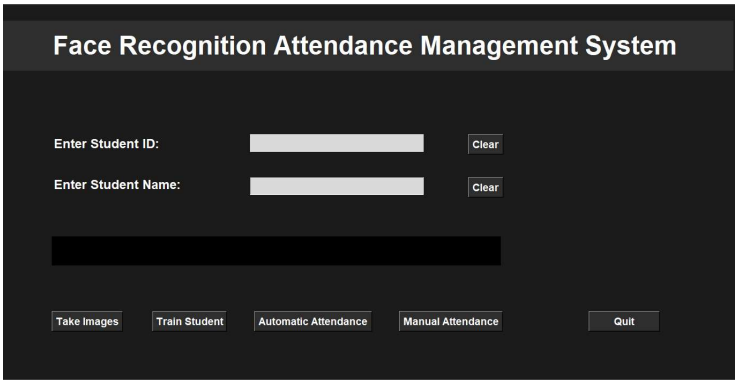
5.2 Software/Hardware Requirements

Python version = 3.5.6	python

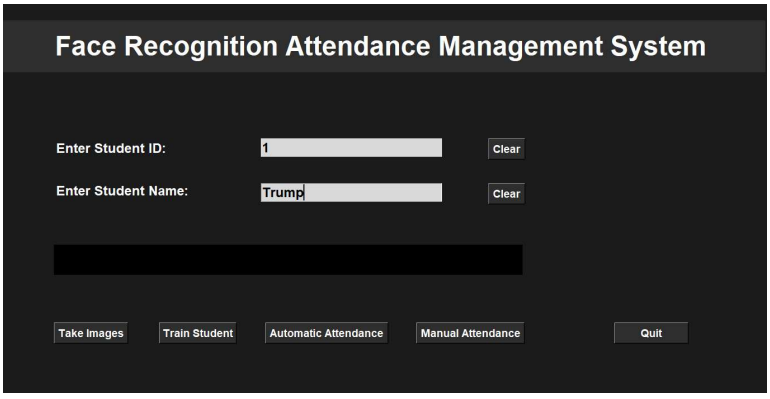
webCam	

5.3 Working

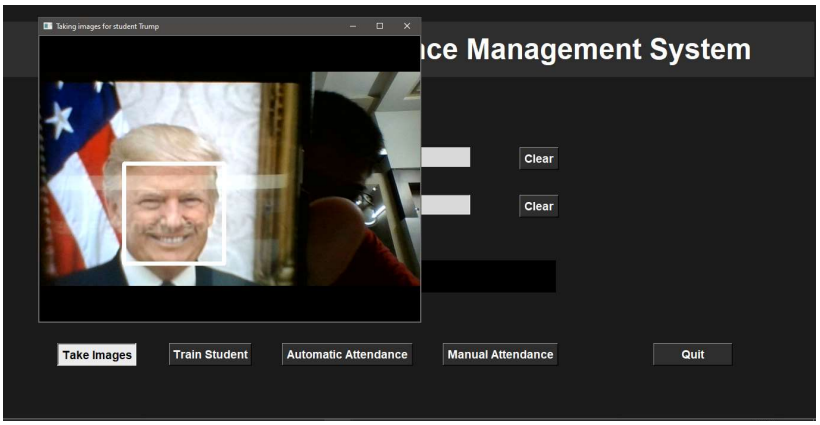
1) Home screen



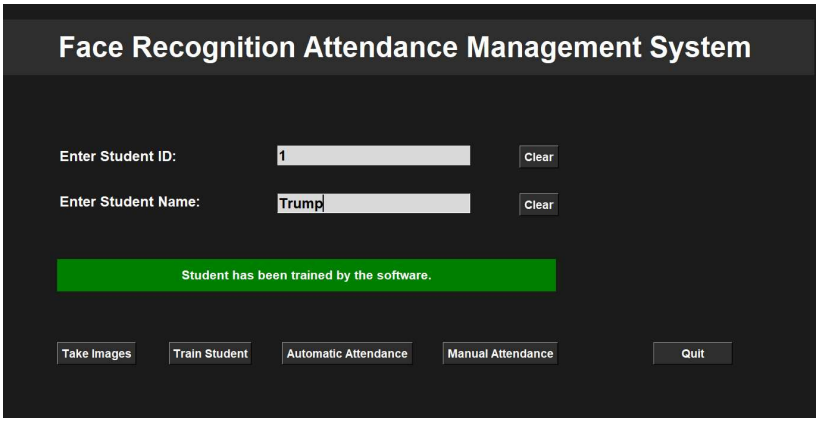
2) Add Student name and roll no.



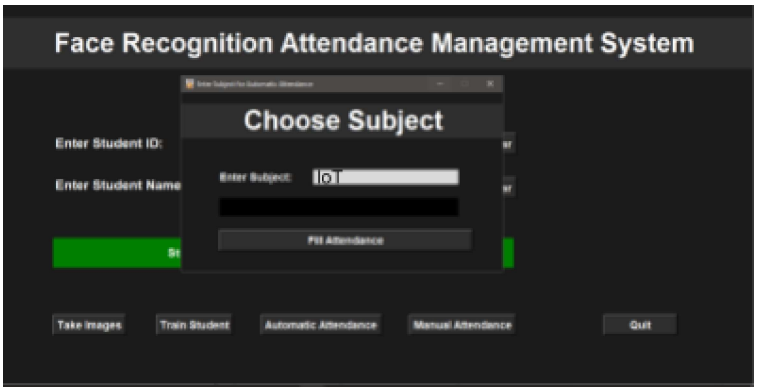
3) Capturing 100 images of student and passing it

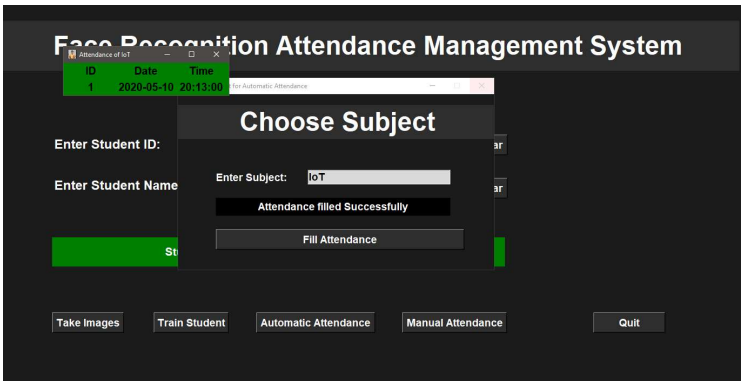


4) Train image by passing it to haarCascade for extracting features and saving the data into .yml extension.

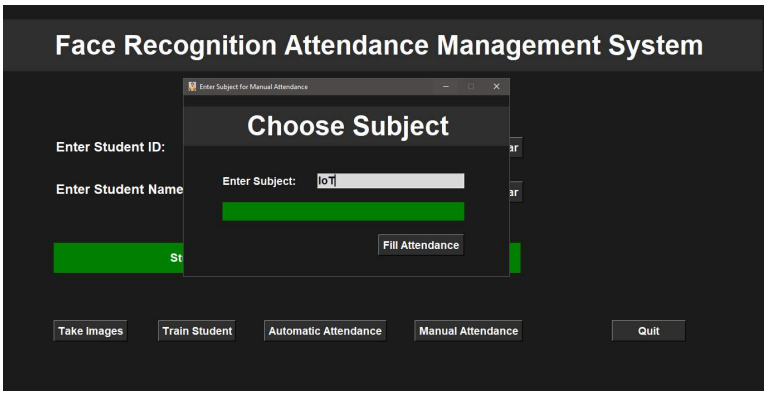


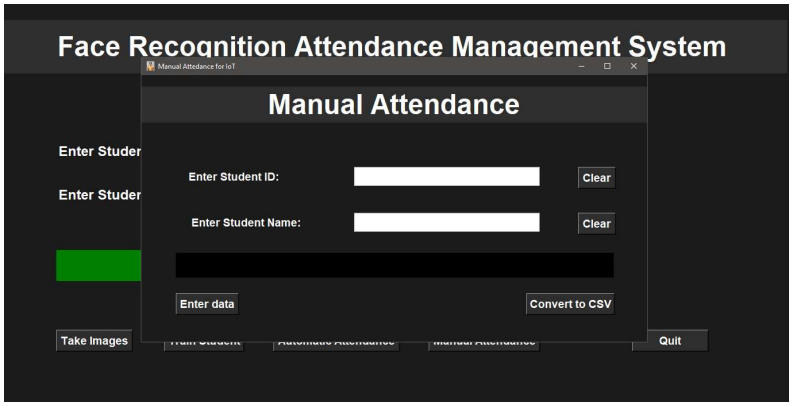
5) Clicking the Automatic Attendance button, it prompts Enter the subject name. Now after entering the name and clicking on fill Attendance webCam start and checks if the student is in the registry, if yes then adds the details to the database. Also it shows the students which were present during the session.



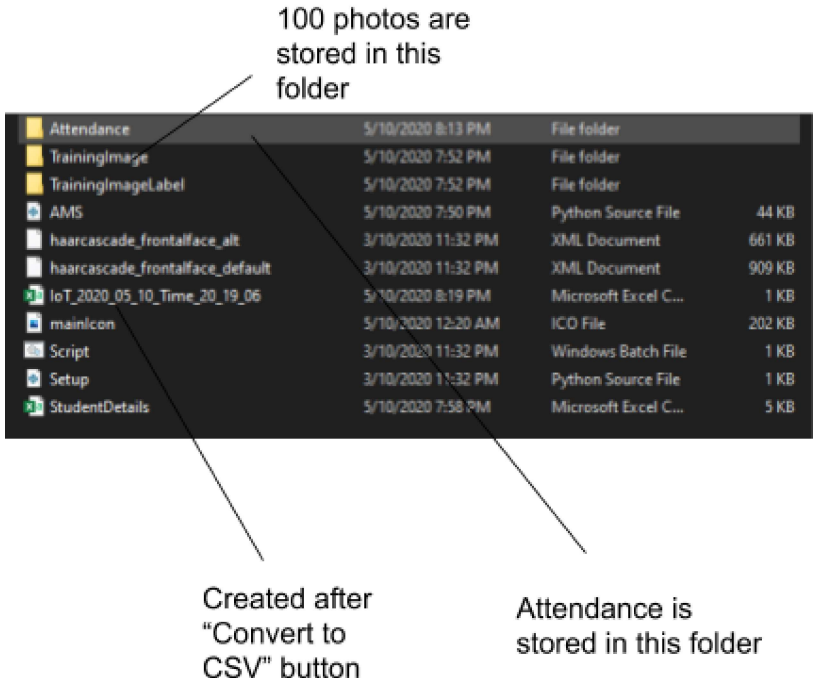


6) Also the faculty can enter the attendance manually by entering the subject name and then clicking the fill button, attendance is stored in the database by entering the name and id of the student.





7) Clicking the quit button, the application closes. The details of the students and the attendance is stored in the following folders.



Appendix – A List of Useful Websites

1) https://docs.python.org/3/library/tkinter.html
2) https://dev.mysql.com/doc/connector-python/en/
3) https://realpython.com/python-send-email/
4) https://stackoverflow.com/questions/27327513/create-pdf-from-a-list-of-images
5) https://docs.opencv.org/2.4/doc/tutorials/tutorials.html

References

1) Saini, M.K. and Goel, N., 2019. How Smart Are Smart Classrooms? A Review of Smart Classroom Technologies. *ACM Computing Surveys (CSUR)*, *52*(6), pp.1-28.
2) Sonawane, N.D., Mandhare Gulab, M., Dixit Shweta, P., Londhe Sonali, P. and Todkar Priyanka, D., 2019. Smart Waste Management Using IOT Powered Dustbin.
3) Damakale, N., Rite, P., Wagh, A. and Ansari, S., 2019. IoT Based Smart Dustbin.