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**Vellore Institute of Technology**  
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## **ONLINE EXAM MONITORING SYSTEM**

Technical Answers for Real World Problems (TARP) - CSE3999

Slot-TG2

**Professor**

**Dr. ARUN KUMAR S**

### **ASSESSMENT 5**

Team Members:

Utkarsh Malik ( 17BCE2406)

Pulkit Moolchandani (17BCE2414)

Manish.R.Reddy (17BCE0098)

Shivarachappa (17BCE0539)

Shashank Y (17BCB0105)

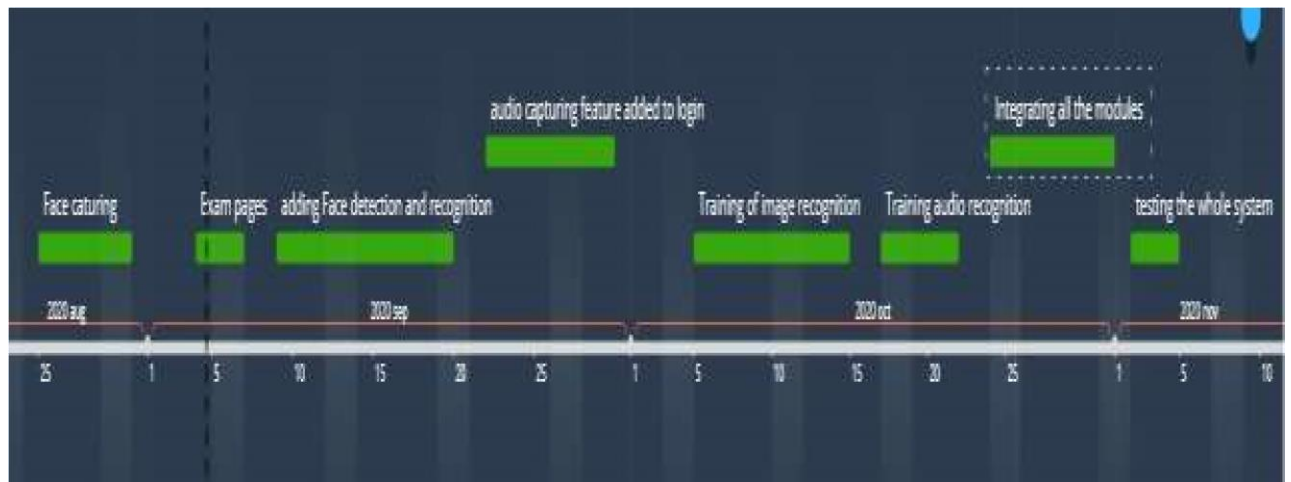
## **1. ABSTRACT**

In online exams, there are lot of instances where one person can give the test on behalf of others with or without his/her knowledge by knowing the login credentials of the victim or, there is a group of people trying to crack the examination. This may not be a desirable thing in many cases. In this project we have planned to reduce the cheatings done on the online portals. So we have decided to make a Online Exam Monitoring System. Our system consists of 4 modules. First module consists of a website which will be created using Django, HTML and Bootstrap for the login purpose to the online exam portal. Second module consists of Facial recognition while the student enters their credentials to login to the portal, if the facial details matches the Name of the student then only the students is allowed to login. The third module consists of the total number of faces that are being detected during the exam with the help of system webcam. The fourth module consists of total voice inputs acquired from the inbuilt microphone which will help to judge that if the student is trying to communicate with others while giving the exam or not.

## **2. MOTIVATION**

In this pandemic situation that the world is facing right now, students in particular are having much difficulties while getting education and also in online classes for giving quizzes and online exams. Moreover online exams and quizzes are being conducted for the evaluation purpose of the student but students are taking advantage of this online examination and are performing malpractice while giving their online exams. To overcome that problem we came up with an Online Exam Monitoring System which will help tackle this issue.

### 3. GANTT CHART



 Login Page	Description	18 aug 2020	21 aug 2020
 Face capturing	Description	25 aug 2020	31 aug 2020
 Exam pages	Description	4 sep 2020	7 sep 2020
 adding Face detection and	Description	9 sep 2020	20 sep 2020
 audio capturing feature added to	Description	22 sep 2020	30 sep 2020
 Training of image recognition	Description	5 oct 2020	15 oct 2020
 Training audio recognition	Description	17 oct 2020	22 oct 2020
 Integrating all the modules	Description	24 oct 2020	1 nov 2020
 testing the whole system	Description	2 nov 2020	5 nov 2020

## 4. LITERATURE SURVEY

TITLE	AUTHORS & YEAR	METHODOLOGY / TECHNIQUES USED	ADVANTAGES	ISSUES	METRICS USED
<b>Development Of Voice Recognition: Parallel With Face Recognition</b>	V.A.Mann, R.Diamond , S. Carey (2019)	Initially the procedure was demonstrated for each child with a visual task. Here they used both face and voice recognition parallelly.	Here advantage is by using biometric traits provides more security elimination of remembering passwords and many.	Due to variations in age both face and voice will be changed. Again new inputs should be taken after certain period of time.	Accuracy
<b>Biometrics and Face Recognition Techniques</b>	Renu Bhatia (2013)	In this paper different biometrics techniques such as Iris scan, retina scan and face recognition	Face recognition technique is used to identify terrorists, criminals, and	Recognition is affected by change in lighting, the person's hair,	NA

		techniques are discussed. Face recognition records the spatial geometry of unique features of the face.	other types of persons for law enforcement purposes. Face recognition technology are more reliable, non-intrusive, inexpensive and extremely accurate.	age, and if the people wear glasses, low resolution images	
<b>Intelligent face recognition and navigation system using neural learning for smart security in Internet of Things</b>	Priyan Malarvizhi Kumar, Ushadevi Gandhi, R. Varatharajan, Gunasekaran Manogaran, Jidhesh R. Thanjai Vadivel (2017)	This paper proposed a system for blind people to navigate freely in the environment by avoiding obstacles and also provide a method to find the person in front of them. Face Recognition and obstacle detection systems are implemented. Genetic algorithm, SIFT algorithms are used.	The highlight of the proposed system is that an intelligent, portable, less expensive, self-contained navigation with face recognition which is inexpensive. The system is applicable for both outdoor and indoor environments.	The limitation of this paper is focuses only on static face recognition.	ROC Curve, Accuracy
<b>Detection Of Accurate Facial Detection Using Hybrid Deep Convolutional Recurrent Neural Network</b>	M. Sivaram, V. Porkodi, Amin Salih Mohammed and V. Manikandan (2019)	In this paper, we propose a technique which uses RNN and Deep Neural Network (DNN) to take in the face shape. To start with, we design a system utilizing Convolutional Neural Network (CNN) to get the underlying Landmark estimation of appearances. At that point, we utilize feed-forward neural systems for neighborhood look where a segment based seeking	This method obtains impressive results when dealing with face images in videos through the full use of the time series. Moreover, this method also achieves good results on still images by using more images from RGB channels or enhanced images.	The anticipated area can be more confident by using past or accompanying data by utilizing CNN-RNN in facial landmark issues in video successions. Second, expectations can be made more stable. The sound of landmark spots is critical for the visual impact in the	Precision, Recall, F1 Score, Accuracy and AUC/ROC

		technique is investigated. By utilizing LSTM-CNN-RNN, the underlying estimation is more dependable which makes the accompanying segment based pursuit doable and exact.		preparation of recordings.	
<b>Improving face recognition by elman neural network using curvelet transform and HSI color space</b>	Ahmed S. Abdullah, Majida Ali Abed, Israa Al_Barazanchi (2019)	In this paper presented a proposed method to face recognition using curvelet transform, Elman neural network and saturation layer in HSI color space.	Based on results obtained it indicates that adoption of curvelet transformation is better in terms of overall performance.	Face recognition using Elman neural network. The rate of face recognition 84%.	Accuracy
<b>Web Content Monitoring System Development</b>	Lyubomyr Chyrun, Aleksandr Gozhyj, Maryana Zakharchuk (2019)	The system is named as intellectual information system, which is aimed at gathering information about concerts, festivals and other musical events on the territory of Ukraine. The server part of this web service is written in the Java programming language version 8 using the Spring framework, including Spring Boot, Spring Data, and Spring Security. The client part, that is, the user interface, is developed on the basis of the Bootstrap framework.	The system can be used by people regardless of age, gender, musical preferences and will be useful for all concert and festival lovers. Here based on enrolled interests it gathers information from web and collectively shown in one particular page. Reduces time of searching.	System may collect charges from users for maintenance and updates. Possibility of cyber attacks on the site which leads to leak of personal information of users.	Accuracy and correctness.

<b>Facial Recognition under Expression Variation</b>	Mutasem Alsmadi (2016)	This study introduces a novel and automatic approach to recognize human facial expression and emotions using ILSGA-BP algorithm. BP algorithm was used to train and test the extracted feature. The face expressions are classified using Support Vector Machine (SVM) classifier and exponential chi-square weighted merging kernel.	Here the expression or mood of the person is identified which can be further used for many purposes by embedding this module to hardware like if person is sad it recognises and play some comedy genres.	In future improve the facial recognition accuracy under expressions, occlusions and pose variation using statistical shape analysis of facial surfaces.	Accuracy
<b>Voice recognition in monolingual and bilingual listeners</b>	Rachel M. Theodore and Erin G. Flanagan	This paper proposed system is to examine whether a bilingual advantage for voice processing is observed in adults and, if so, if it reflects enhanced pitch perception or inhibitory control. Voice processing was assessed for monolingual and bilingual adults using an associative learning identification task and a discrimination task in English and other diff languages.	The main advantage of this paper is they conducted various experiments among diff group of people to know the exact difference in parameters.	No bilingual advantage was observed for either voice task, suggesting that the bilingual advantage for voice processing becomes attenuated during maturation, with performance in adulthood reflecting knowledge of linguistic structure in addition to general auditory and inhibitory control abilities.	Logarithmic RT
<b>A novel automatic</b>	Motaz Hamza, Touraj	The proposed system enabled the	Here the proposed system	The most challenging	Accuracy

<b>voice recognition system based on text-independent in a noisy environment</b>	Khodadadi, Sellappan Palaniappan (2020)	user to speak into the microphone then it will match unknown voice with other human voices existing in the database using a statistical model, in order to grant or deny access to the system. The voice recognition was done in two steps: training and testing. During the training a Universal Background Model as well as a Gaussian Mixtures Model: GMM-UBM models are calculated based on different sentences pronounced by the human voice (s) used to record the training data. Then we will pass the testing voice in a noisy environment.	increased the accuracy of the voice recognition in noisy environment of the Microsoft Research (MSR) identity toolbox.	task in this paper is to extract the required feature means voice from the noisy environment.	
<b>Raspberry Pi assisted face recognition framework for enhanced law-enforcement services in smart cities</b>	Touraj Khodadadi	The proposed framework consists of: (1) real-time video streaming from a wireless camera to the Pi (2) Raspberry-Pi-Cloud with a reliable communication gateway to access faces database (3) face detection and recognition through offloading from Raspberry Pi to the cloud, and (4) the use of the cloud for	Although other biometric techniques such as fingerprint scanning are generally more accurate than face recognition, face recognition methods are advantageous due to the fact that they do not require the cooperation of the suspect. A number of techniques exist in the literature that can be used	However, due to the limited resources provided by Raspberry Pi in terms of computational power and storage, the implementation of fully independent Raspberry Pi based face detection and recognition is not feasible	Accuracy



		classification of different types of criminals, assigning them to their respective classes based on pre-defined criminal classes	for face recognition		
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## 5. PROPOSED METHODOLOGY

We are using facial recognition and voice recognition techniques to proctor and validate any real time online examination. This can be implemented in five steps.

1. Applying facial recognition in the login page
2. Applying face detection in the exam page
3. Adding voice recognition to the existing structure
4. Integrating all the modules.
5. Implementing on a website.

### 5.1 Applying Facial Recognition

The facial recognition module requires the facial data of the candidates. This data will be cross verified with the real-time data, which comes as an input from the candidate's camera. Moreover, this verification process will check if the user trying to login is a genuine user and not someone else having the username and password.

### 5.2 Applying Face Detection

This Program runs throughout the exam and checks if the number of faces occurring in the camera is only one. This will help in reducing the manual workload done by administrators, as they have to go through every video, which they feel, is not legit. Also, storing all the videos poses the space issues, therefore the video recorded will be removed automatically if there is only one face throughout the video.

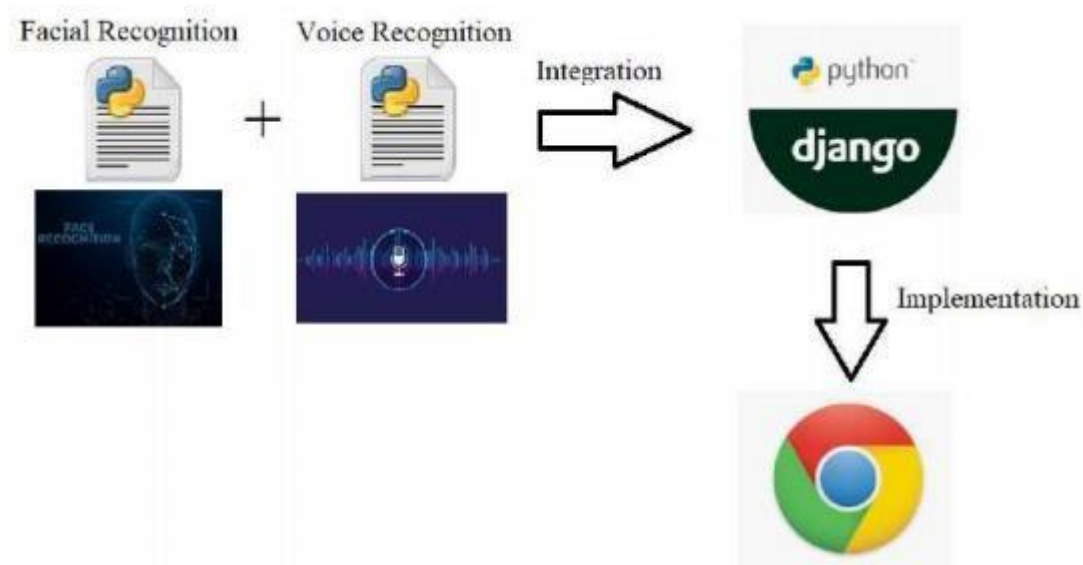
### 5.3 Adding voice recognition

The voice recognition works similar to the facial recognition module. The voice data of the applicants is a pre-requisite for this module. When the script detects a voice, which differs from the candidate's voice it will raise a warning and if the applicant surpasses the warning threshold it will automatically terminate the test session.

## 5.4 Integrating and Implementing

These two module scripts can be integrated as two different functions in the backend of the examination website and can be instantiated whenever a test session is planned.

## 5.5 Workflow



## 5.6 DISCUSSION ON IMPLEMENTATION

### 5.6.1 Face Recognition

The Face Recognition system basically has three parts:

- Dataset Creation
- Training the dataset
- Face Detection

For now, we have done a system where the user first registers himself in the database folder. Then the database folder which consists of various images is trained and stored in a .yaml file. Then using the trained data, the faces are detected in the current frame. For Face recognition, there is no any dataset for this application. The user should themselves make the dataset by having 50 photo instances of themselves and adding it to the folder from which a face detection model will be used to identify any face image it recognizes by referring the images.

**The basic steps involved in the face recognition are**

**Image Acquisition:**

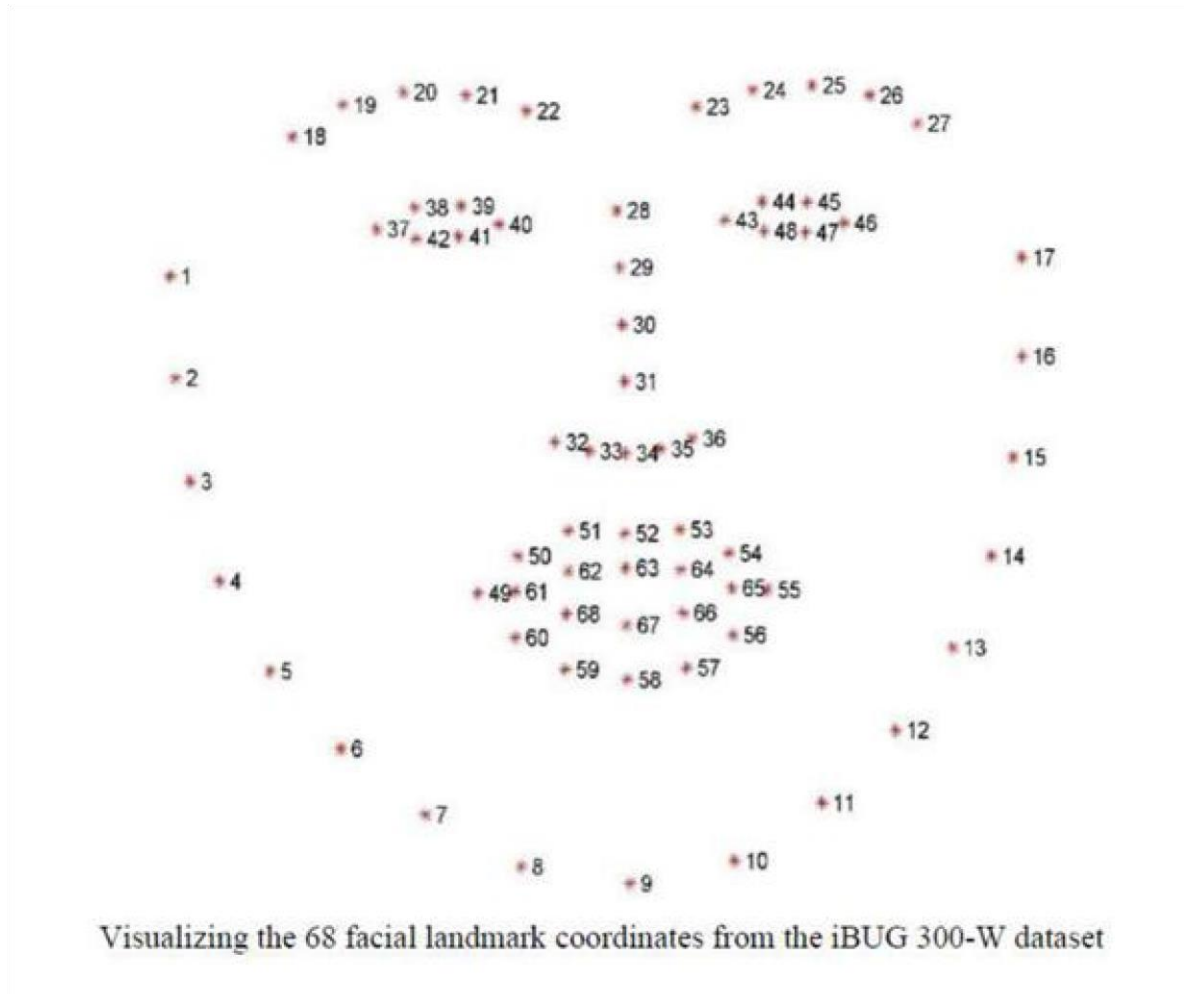
We are using the webcam of our laptops to acquire the images of the user's face for simulation purpose. The web camera captures the frames until it has 50 images of the person. Every person is assigned with a unique id and the person is identified by his/her id. If an id is identified then the corresponding name of the person will be printed on the current frame.

**Image Enhancement:**

Since we are using Web-camera we get an RGB format image which is converted to grayscale with pixel values in the range [0-255]. This is done to improve performance as it saves computational power. We will further reduce this range to [0-1] by dividing each pixel by 255 as it gives better prediction values with our training and helps in feature Scaling.

**Image Segmentation / Face Detection:**

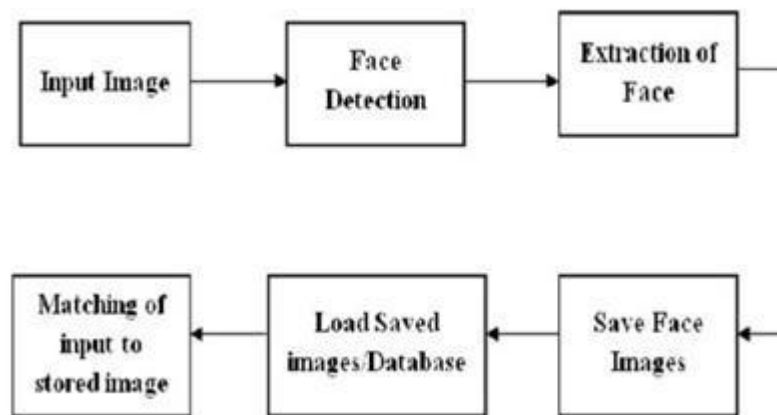
We are using haar cascade files to detect faces, eyes, lips etc in the image which in its background has a pretrained neural network processing and giving out the outputs. The output of the image segmentation is an array of pixels marking the region of their detection. The haar cascade classifier have a pre-trained facial recognition model which has distinct points in our face. The following figure shows it.



## Feature Extraction

In this we are finding 3 main features of a face. Eyes, nose and lips and using those we will be processing the given data. The eyes data is used to calculate the eye aspect ratio and lips for the facial expression recognition. We are recognizing all of these features by using a pretrained model in haar format

**This is the basic flow of our process of face detection.**



For face recognition we are using the LBPH Algorithm. The facial image is divided into local regions and LBP texture descriptors are extracted from each region independently. This histogram effectively has a description of the face on three different levels of locality: the LBP labels for the histogram contain information about the patterns on a pixel-level, the labels are summed over a small region to produce information on a regional level and the regional histograms are concatenated to build a global description of the face. It should be noted that when using the histogram-based methods the regions do not need to be rectangular. Neither do they need to be of the same size or shape, nor do they not necessarily have to cover the whole image. It is also possible to have partially overlapping regions.

### 5.6.2 Face Detection

This Module uses the haar cascading as discussed in the face recognition part to count the number of faces occurring in the screen. This data is then sent to the code to make decision of storing or discarding the recorder video clip.

### 5.6.3 Website Creation and Libraries to be Used

The Website is made using Django for the development part and HTML, CSS for the frontend.

#### Libraries Used:

- numpy
- keras

- Matplotlib

- PIL

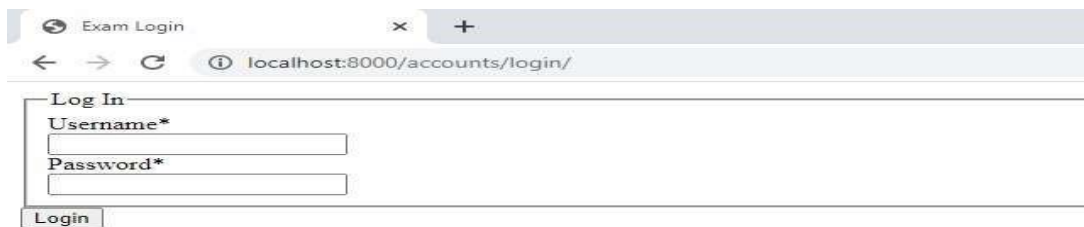
- Scipy

- Dlib

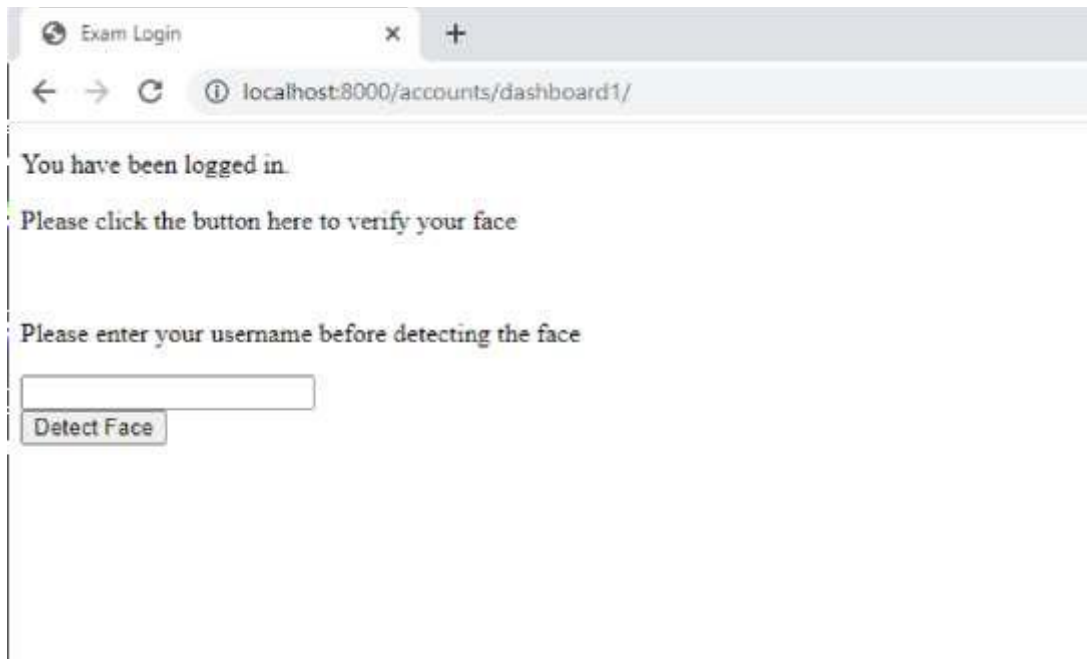
- Cv2

## 6. IMPLEMENTATION AND SCREENSHOTS

### a. Login Page



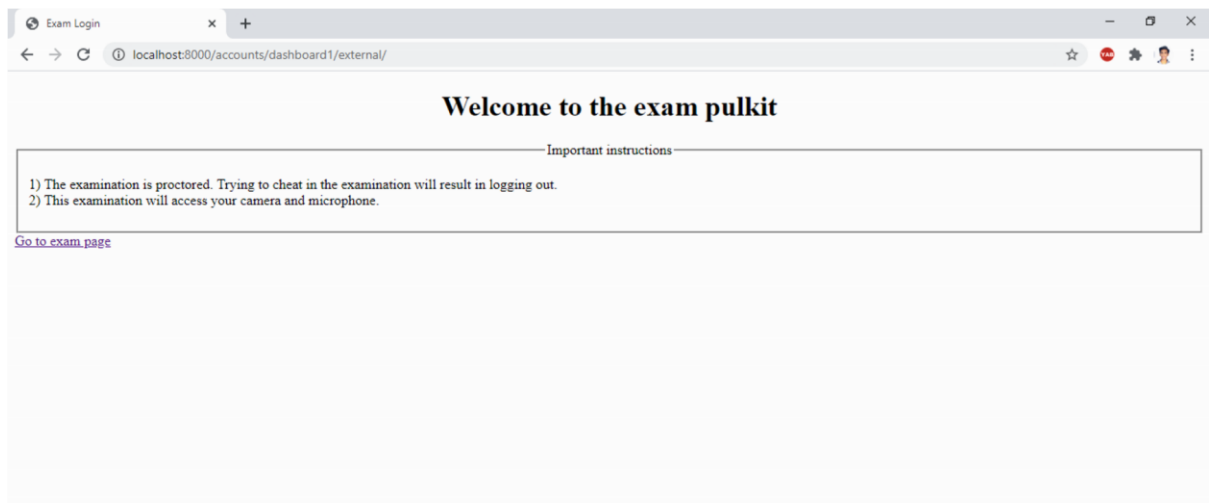
A screenshot of a web browser window titled "Exam Login". The address bar shows "localhost:8000/accounts/login/". The page contains a "Log In" section with two input fields: "Username\*" and "Password\*", each with a red asterisk indicating a required field. Below the input fields is a "Login" button.



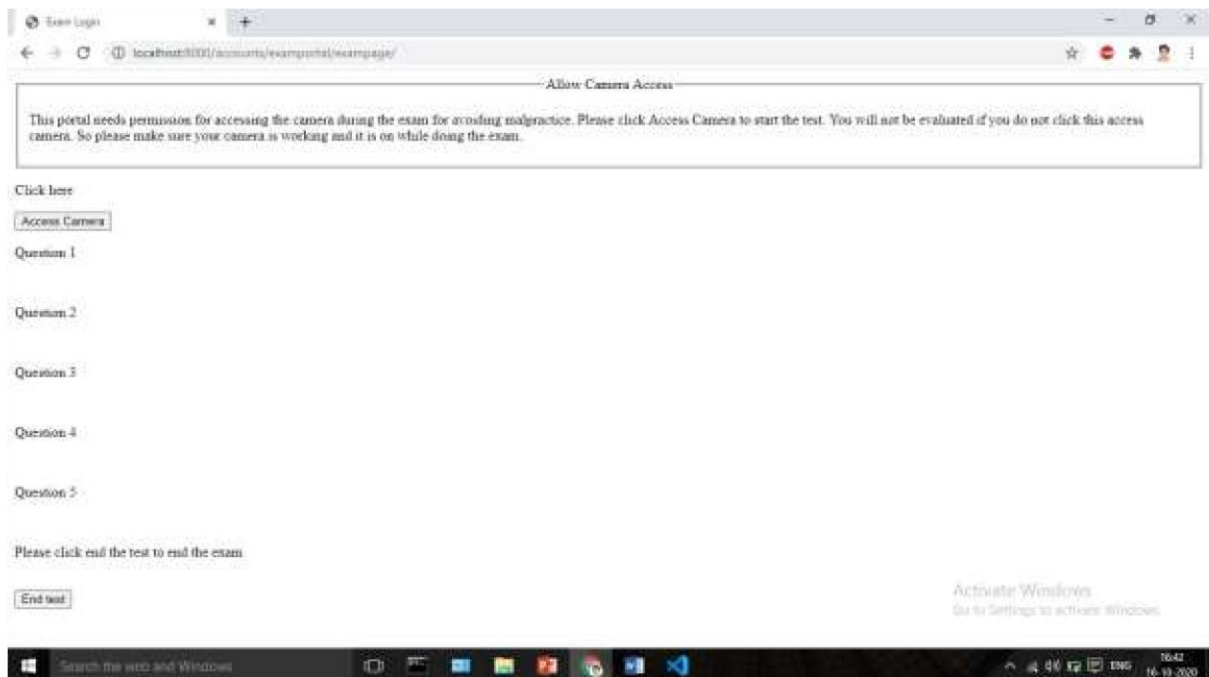
A screenshot of a web browser window titled "Exam Login". The address bar shows "localhost:8000/accounts/dashboard1/". The page displays a message: "You have been logged in." followed by "Please click the button here to verify your face". Below this, there is a prompt: "Please enter your username before detecting the face" with an input field. At the bottom is a "Detect Face" button.

## b. Exam Instructions page- after successful face recognition

CC



## c. Exam Page



## 7. REFERENCES

1. Mann, V. A., Diamond, R., & Carey, S. (1979). Development of voice recognition: Parallels with face recognition. *Journal of experimental child psychology*, 27(1), 153-165.
2. Bhatia, R. (2013). Biometrics and face recognition techniques. *International Journal of Advanced Research in Computer Science and Software Engineering*, 3(5).
3. Kumar, P. M., Gandhi, U., Varatharajan, R., Manogaran, G., Jidhesh, R., & Vadivel, T. (2019). Intelligent face recognition and navigation system using neural learning for smart security in Internet of Things. *Cluster Computing*, 22(4), 7733-7744.
4. Sivaram, M., Porkodi, V., Mohammed, A. S., & Manikandan, V. (2019). DETECTION OF
5. ACCURATE FACIAL DETECTION USING HYBRID DEEP CONVOLUTIONAL RECURRENT NEURAL NETWORK. *ICTACT Journal on Soft Computing*, 9(2).
6. Abdullah, A. S., Abed, M. A., & Al Barazanchi, I. (2019). Improving face recognition by elman neural network using curvelet transform and HSI color space. *Periodicals of Engineering and Natural Sciences*, 7(2), 430-437.
7. Chyrun, L., Gozhyj, A., Yevseyeva, I., Dosyn, D., Tyhonov, V., & Zakharchuk, M. (2019). Web Content Monitoring System Development. In *COLINS* (pp. 126-142).
8. Alsmadi, M. (2016). Facial recognition under expression variations. *Int. Arab J. Inf. Technol.*, 13(1A), 133-141.
9. Theodore, R. M., & Flanagan, E. G. (2020). Determinants of voice recognition in monolingual and bilingual listeners. *Bilingualism: Language and Cognition*, 23(1), 158-170.
10. Hamza, M., Khodadadi, T., & Palaniappan, S. (2020). A Novel automatic voice recognition system based on text-independent in a noisy environment. *International Journal of Electrical and Computer Engineering*, 10(4), 3643.
11. Sajjad, M., Nasir, M., Muhammad, K., Khan, S., Jan, Z., Sangaiah, A. K., ... & Baik, S. W. (2020). Raspberry Pi assisted face recognition framework for enhanced law-enforcement services in smart cities. *Future Generation Computer Systems*, 108, 995-1007.