IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 5, June 2023

# Online Exam Proctoring System using ML

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**Abstract:** *Importance of online education can be seen especially during the ongoing Covid-19 when going to schools or colleges is not possible. So validity of online exams should also be maintained with respect to traditional pen-paper examinations. However, absence of invigilator makes it easy for the examinees to cheat during the exam. Though there are already many systems for online proctoring, not all educational institutes can afford them as the systems are very expensive. In this paper, we have used eye gaze and head pose estimation as the main features to design our online proctoring system. Therefore, the purpose of this paper is to use these features to create an online proctoring system using computer vision and machine learning and stop cheating attempts in exams. Artificial Intelligence based Proctoring Systems also called as AIPS have taken the market by storm. Online Proctoring Systems also called as OPS, in general, makes use of various online tools to maintain the goodness of the assessment. During COVID-19 pandemic many exams were discontinued. Remote Proctored Theory and Objective Online Examination is a case study for providing a solution for conducting online examination instead of manual examination. This will be a web application that allows examinees to conduct the exam for examinees by colleges/universities/ organizations. This application will allow your theory as well as objective type's examinations for professional and non-professional courses. Based on our analysis we pointed-out that the security issues that are associated with the AI-based Online Proctoring Systems are multiplying. Major issues that can be considered while developing AIPS and OPS include Security concerns, Privacy concerns, Ethical concerns, Cost, Usage of technology and many more. The most reasonable conclusion we can reach in the present is that the usage of the AIPS and OPS is mainly based on the trust on the tool or software. To the best of our knowledge, we can say that there is no proof of analysis on how to make online proctoring more secure. Our research moreover, addresses the issues in AIPS in human and technological aspect. It also lists out various key points and new technologies that have been recently introduced while making significant impact on online education and Online Proctoring Systems in the mere future.*

**Keywords:** Artificial Intelligence, Online Proctoring, Online assessment

## I. INTRODUCTION

Since AlexNet has stormed the research world in 2012 ImageNet on a large scale visual recognition challenge, for detection in-depth learning, far exceeding the most traditional methods of artificial vision used in literature. In artificial vision, the neural convolution networks are distinguished in the classification of images. Object detection and location in digital images has become one of the most important applications for industries to ease user, save time and to achieve parallelism. This is not a new technique but improvement in object detection is still required in order to achieve the targeted objective more efficiently and accurately. The main aim of studying and researching computer vision is to simulate the behavior and manner of human eyes directly by using a computer and later on develop a system that reduces human efforts shows the basic block diagram of detection and tracking. In this paper, an SSD and MobileNets based algorithms are implemented for detection and tracking in python environment. Object detection involves detecting region of interest of object from given class of image. Different methods are –Frame differencing, Optical flow, Background subtraction. This is a method of detecting and locating an object which is in motion with the help of a camera. Detection and tracking algorithms are described by extracting the features of image and video for security applications. Features are extracted using CNN and deep learning. Classifiers are used for image classification and

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counting. YOLO based algorithm with GMM model by using the concepts of deep learning will give good accuracy for feature extraction and classification. Section II describes SSD and MobileNets algorithm, section III explains method of implementation, and section IV describes simulation results and analysis.

## II. LITERATURE SURVEY

The web-based swindling climate of distance training has acquired foothold in the previous decade. With a couple of basic keystrokes, understudies can understand a wide cluster of online administrations for recruit to compose research papers, complete schoolwork tasks, or induct for the benefit of the understudy on record to take the whole online course. While foundations in advanced education have considered online to be as a vehicle to expand understudy enrolments adding to their primary concern, the quantity of Internet swindling organizations to help scholarly immorality has additionally expanded quickly. Difficulties managing scholarly deceit in the online region have gotten more widespread, leaving personnel and school overseers in conflict, how to forestall such conduct in both conventional and online classes.

**[1]** The author proposed a method to continuous user verification based on face verifications by implementing an incremental training process using images captured from m-learning online lecture sessions as training data set in order to increase the robustness against variations of pose and lighting. The algorithm is trained each time a user finished his lecture

**[2]**The authors have introduced a new approach for exam proctoring using 360-degree security camera. the usage of the 360-degree security camera over the traditional webcam was investigated in order to enhance the exam security and to minimize the stressful restrictions. The machine learning algorithms is exploited to enrich the proposed system. A secure frame work using the biometric is applied in order to ensure authentication and running the online exam smoothly. Similar to a tradition proctoring scenario where a proctor moves his/her eyes around and even walk around students from time to time, the 360-degree camera would provide him/her with such ability.

**[3]**The proposed method in this work is by applying incremental training on the deep learning face recognition training process. The images used for training are acquired from the lecture sessions where the user attends. The method is expected to keep the invariant on pose and light variations while reducing the training time and disk space dataset size which can reduce the computation load on the server. To acquired high accuracy authors have analysed four different face detectors, which are Haar-cascade, LBP, MTCNN, and Yolo-face, as in face recognition a Facenet model was tested.

**[4]**The system that authors present in this work aims to provide a practical cyber-security solution for both continuous online user identification using biometric technology and monitoring using automatic signal processing and a computer monitoring system. The authentication process is based on automatic authentication of facial images, audio clips, and keystroke dynamics, checking that it is the person that it really should be during the entire online interaction. The monitoring process is supported by webcams and microphones too, checking continuously that the student is not making any inappropriate behaviour. It also locks down the computers.

**[5]**This paper systematically reviews existing AI and non-AI-based proctoring systems. We addressed 4 primary research questions which were focusing on existing architecture of AIPS, Parameters to be considered for AIPS, trends and Issues in AIPS and Future of AIPS. The analysis on OPS and AIPS reveals that security issues associated with AIPS are multiplying and are a cause of legitimate concern.

**[6]**Remote Proctored Theory and Objective Online Examination is a general idea and proposed system for establishes a network for providing a service to the examinees as well as professors. Remote Proctored Theory and Objective Online Examination's purpose is to accomplish the requirement of the institute/organizations to conduct the exam online.

**[7]**To mitigate the limitations of UIT, a relatively new approach, referred to as online proctoring, has been developed to mirror in-person proctoring remotely by capitalizing on technology to create verifiable and secure testing conditions. This study evaluated the comparability of online proctored and un proctored test administration in a low-stakes testing context on user-friendliness, examinee behaviour, and mean scores.

**[8]**According to this paper the authors present a method to avoid the physical presence of a proctorthroughout the exam by creating a comprehensive multi modal system. Authors have used hardware such as web-cam to

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captureaudioandvideoalongwithactivewindowcapture.Thiscombinationformstheinputstoanintelligentrule-basedinference system which has the capability to decide whether any malpractices have happened.

## III. EXISTING SYSTEM

Object tracking plays a vital role in the field of computer vision. Object tracking algorithms have acquired priority due to the availability of highly sophisticated computers, good quality and inexpensive cameras. In the object tracking, the video analysis involves, moving object detection, object classification, frame to frame object tracking. Object detection deals with the identification of objects from video frame and to cluster pixels of these objects. In object classification, the objects are classified as birds, humans, vehicles and other moving objects. While object tracking involves the selection of Region of Interest (ROI) and keep tracking of motion and its positions from the video frames.
There is no object detection in existing system by using Opencv.

### 3.1 DISADVANTAGES OF EXISTING SYSTEM:

- It is difficult to classify the moving object tracking.
- The accuracy of object detection is very low.

## IV. PROPOSED SYSTEM

Moving object detection is the initial step for the process of analysing a video. This is done either in each and every frame or when the object first appears in the video. The classification of objects is done based on their shape features of the motion region. Object tracking is the next step followed by the object detection. It is a technique used to track and also

## V. SOFTWARE DISCRIPTION

There are four models used in the project:

- Object Detection Model
- Head Pose Model
- Lip Movement Model
- Eye Tracker Model

### 5.1 Object Detection Model

Given an image or a video stream, an object detection model can identify which of a known set of objects might be present and provide information about their positions within the image. An object detection model is trained to detect the presence and location of multiple classes of objects. For example, a model might be trained with images that contain various pieces of fruit, along with a *label* that specifies the class of fruit they represent (e.g. an apple, a banana, or a strawberry), and data specifying where each object appears in the image.
When an image is subsequently provided to the model, it will output a list of the objects it detects, the location of a bounding box that contains each object, and a score that indicates the confidence that detection was correct.
**Object Detection** is a computer vision task in which the goal is to detect and locate objects of interest in an image or video. The task involves identifying the position and boundaries of objects in an image, and classifying the objects into different categories.

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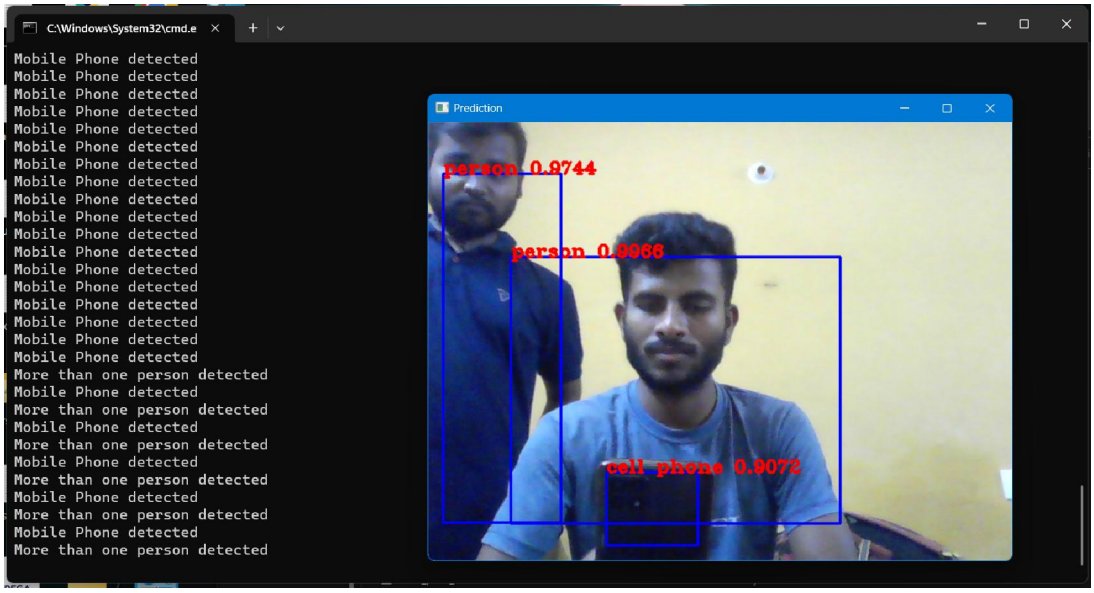
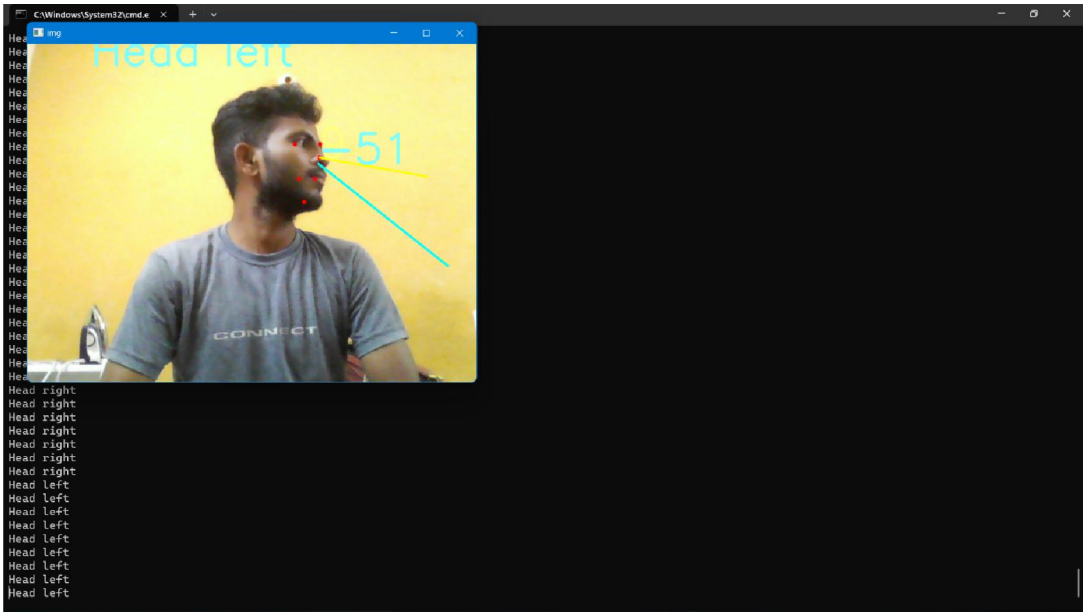



### 5.2 Head Pose Model

Head pose estimation is a specific task in computer vision that involves determining the orientation of a person's head in 3D space, typically relative to the camera or other reference frame. This can be done using a variety of techniques, such as tracking facial landmarks or using deep learning algorithms to predict a subject's head pose directly from an image or video.

Head pose estimation is used in a wide range of applications, including virtual reality, human-machine interaction, and surveillance. Additionally, it is used in areas like driver drowsiness detection, face recognition, and more.Pose estimation is a computer vision task that enables machines to detect human figures and understand their body pose in videos and images. It helps machines determine, for example, where the human knee is located in an image. Pose estimation focuses on estimating the location of key body joints and cannot recognize the individual's identity in a video or image. The head pose estimation is a wide problem explored from different inputs and application scenarios. In this survey we introduced the problem related to the HPE, starting from the definition of the rotations that a human head can perform in its mathematical form, in pitch, yaw and roll



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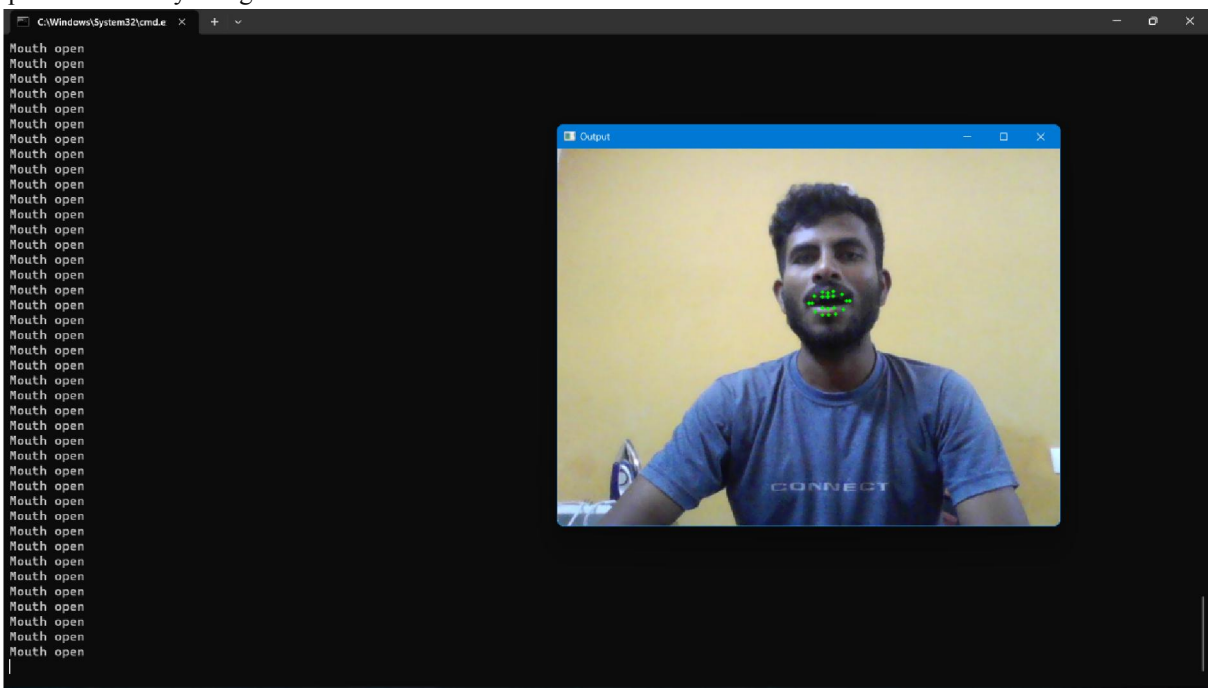
### 5.3 Lip Movement Model

Lip movement recognition is a speaker recognition technique, where the identity of a speaker is determined/verified by exploiting information contained in dynamics of changes of visual features extracted from the mouth region. The visual features usually consist of appropriate representations of the mouth appearance and/or shape. This dynamic visual information can also be used in addition to the acoustic information in order to improve the performance of audio-only speaker recognition systems and increase their resilience to spoofing, therefore giving rise to audio–visual-dynamic speaker recognition systems.

Facial feature extraction has been attracting considerable attention over the past decade. Among the key facial features, the mouth is of particular importance, as its shape and shape dynamics convey the content of a communicated message, biometric information about the speaker, as well as the subject's emotion. For this reason, the problem of detecting, modeling and tracking lips has been studied intensively in the context of different applications. These include lip reading to enhance automatic speech recognition, lip modeling for speaking face synthesis in low bit rate communication systems and for communicating speech to people hard of hearing, expression recognition for affective computing, facial feature extraction for face retrieval from image and video databases, face modeling for photo fit kits and personal identity recognition and verification.




### 5.4 Eye Tracker Model

**Eye tracking** is the process of measuring either the point of gaze (where one is looking) or the motion of an eye relative to the head. An **eye tracker** is a device for measuring eye positions and eye movement. Eye trackers are used in research on the visual system, in psychology, in psycholinguistics, marketing, as an input device for human-computer interaction, and in product design. Real-time gaze tracking provides crucial input to psychophysics studies and neuromarketing applications. Many of the modern eye-tracking solutions are expensive mainly due to the high-end processing hardware specialized for processing infrared-camera pictures.

Here, we introduce a deep learning-based approach which uses the video frames of low-cost web cameras. Using DeepLabCut (DLC), an open-source toolbox for extracting points of interest from videos, we obtained facial landmarks critical to gaze location and estimated the point of gaze on a computer screen via a shallow neural network. Tested for three extreme poses, this architecture reached a median error of about one degree of visual angle. Our results contribute to the growing field of deep-learning approaches to eye-tracking, laying the foundation for further investigation by researchers in psychophysics or neuromarketing.

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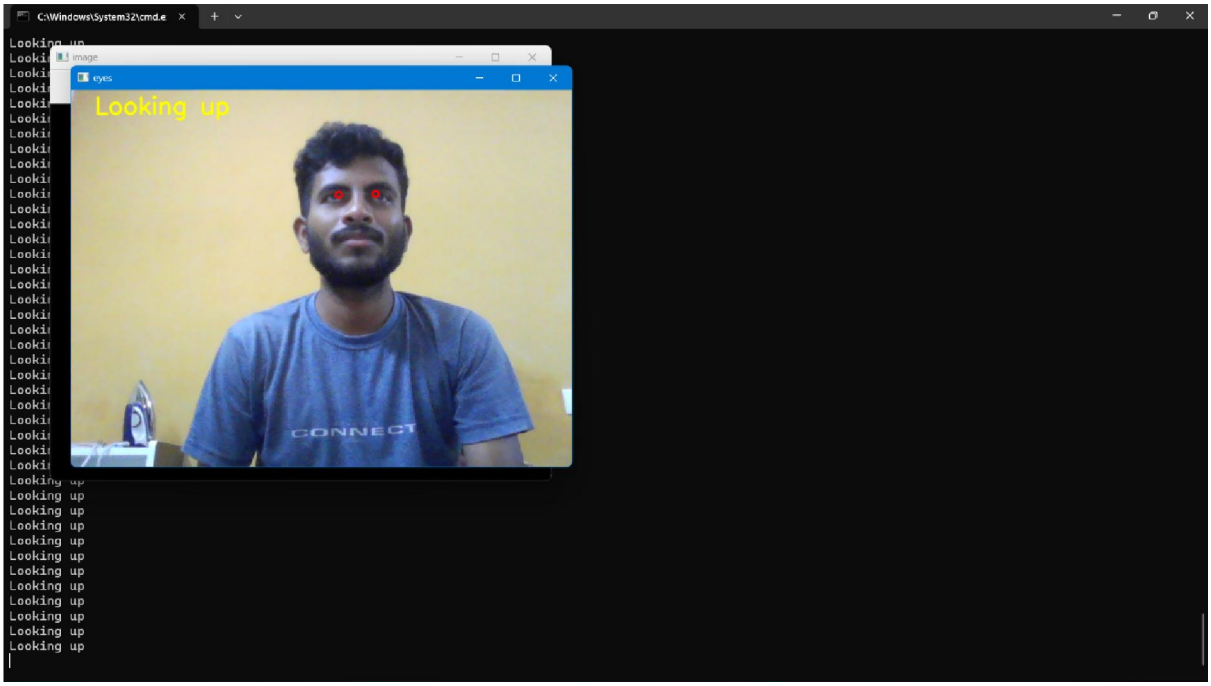
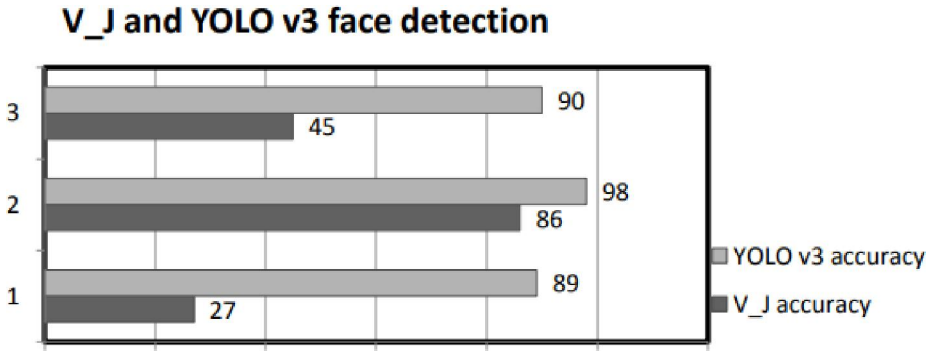



## VI. PERFORMANCE EVALUATION

**YOLO vs Viola Jones**




- The comparison is focused on cases of head movement in many angles.
- Based on the results V_J algorithm obtained an accuracy rate of 45% while the Yolov3 deep learning algorithm obtained an accuracy of 90%.
- The V_J algorithm that can achieve good results in detecting the front and close faces of the camera, as well as in expressions, but its results is low in the case of occlusion.
- The YOLO v3, it achieved good results in the case of head movement at different angles, as well as in expression and occlusion.
- Additionally, from practical view, it has been found that the V_J is faster, but its accuracy rate is less, unlike YOLO v3, it is slower but has more accuracy rate.

The results of testing the two algorithms showed that each algorithm has advantages and disadvantages in terms of speed and accuracy.

## VII. CONCLUSION

There is a high demand for AI proctored systems as online proctoring has a lot of demand these days. It is possible to create an AI proctoring system with high accuracy. Logging fraudulent activity is important to handle disputes. Making

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a proctoring system that is mobile compatible is the need of the hour as most students don't have computers. Through this project, we will try to show that online proctoring is the future, and using online proctoring cheating in exams can be reduced drastically.

## VII. ACKNOWLEDGEMENT

We would like to thank our guide Mrs. P. Yamuna and Mrs. Soppari Kavitha for dedicating their valuable time and guidance. Also, we are extremely grateful to Dr. M. V. VIJAYA SARADHI, Head of Computer Science and Engineering Department for his invaluable time, support, Ace Engineering College.

## REFERENCES

**[1]**"A Design of Continuous User Verification for Online Exam Proctoring on M-Learning" Hadian S. G. Asep;Yoanes Bandung 2019 International Conference on Electrical Engineering and Informatics (ICEEI) Year: 2019 DOI :10.1109/ICEEI47359.2019.8988786

**[2]**"Students Online Exam Proctoring: A Case Study Using 360 Degree Security Cameras" Aiman A Turani;Jawad H Alkhateeb;AbdulRahman A. Alsewari 2020 Emerging Technology in Computing, Communication and Electronics (ETCCE) Year: 2020 DOI : 10.1109/ETCCE51779.2020.9350872

**[3]**"An Incremental Training on Deep Learning Face Recognition for M-Learning Online Exam Proctoring" Asep Hadian Sudrajat Ganidisastra; Yoanes Bandung 2021 IEEE Asia Pacific Conference on Wireless and Mobile (APWiMob) Year: 2021 DOI :10.1109/APWiMob51111.2021.9435232

**[4]**"Online Student Authentication and Proctoring System Based on Multimodal Biometrics Technology" Mikel Labayen; Ricardo Vea; Julián Flórez; Naiara Aginako; Basilio Sierra IEEE Access Year: 2021 DOI :10.1109/ACCESS.2021.3079375

**[5]**"A Systematic Review on AI based Online Proctoring Systems" *EducInfTechnol* 26, 6421–6445 (2021). https://doi.org/10.1007/s10639-021-10597-x Year: 2021 DOI :10.1007/s10639-021-10597-x

[6]"Remote Proctored Theory on Online Exam Proctoring" *Sinha, P., Dileshwari, &Yadav, A. -Remote Proctored Theory And Objective Online Examination. International Journal of Advanced Networking and Applications, 11(06).* Year : 2020 DOI :https://doi.org/10.35444/ijana.2020.11068

[7]"Online Proctored Versus Unproctored Low-Stakes Internet Test Administration: Is There Differential Test-Taking Behaviour and Performance?" Joseph A. Rios & Ou Lydia Liu (2017): Online Proctored Versus UnproctoredLow-Stakes Internet Test Administration: Is There Differential Test-Taking Behaviour and Performance? American Journal of Distance Education Year: 2017 DOI :http://dx.doi.org/10.1080/08923647.2017.1258628

[8] "An intelligent system for online exam monitoring" Swathi Prathish, Athi Narayanan S and Kamal Bijlani (2016): An intelligent system for online exam monitoring. International Conference on Information Science (ICIS) Year: 2016 DOI :http://dx.doi.org/10.1109/INFOSCI.2016.7845315