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Smart Exam Paper Protection System

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***Abstract*—** Education is the driving factor behind our nation's progress. Examination is the heart of the education framework. The examinations are conducted online as well as offline. In offline mode of examinations, the question paper leakage occurs very often and it occurs during transportation. It leads to a serious problem. To overcome this, we came up with an advanced protection system for question papers. The system was designed and implemented by fingerprint and face detection technology. Biometric authentication ensures the security of the documents. The features we used here are inseparable from a person's body. So it significantly decreases the possibility of fraud. Fingerprint and face scanner are connected to the box containing question papers. To open the box, the face and fingerprint of the authorized person must be scanned properly. Also, the feedback will be sent to the controlling authority via email using UBIDOTS cloud storage. The system is built with Arduino Nano, fingerprint scanner, ESP32-CAM, NodeMCU, etc. This system overcomes the economic loss of conducting re-examinations or the risk of postponing exams. The valuable candidates can be efficiently chosen for a job and the candidates prepare truly for the examinations. The main objective of our project is to prevent question paper leakage as well as to protect the confidential documents.

Keywords— Question paper leak, fingerprint scanner, Arduino Nano, ESP32-CAM, NodeMCU, UBIDOTS.

I. INTRODUCTION

Examination is an important part of education. The principal reason for conducting the examinations is to measure the student's ability, the level of understanding of the concepts by students and to select the skilled candidates for various job roles. In offline mode of examinations, question paper leakage is a serious problem. The future of thousands of students has been impacted by more than 70 incidences of question paper leaks throughout the nation during the past seven years, according to data. Face and fingerprint based exam paper protection system is an advanced method that prevents exam question paper leakage during offline examinations. The Exam paper leakages occur very often now-a-days. During offline examinations, the question paper leakage happens during transportation. To secure this, the smart system is designed to prevent the leakage of exam papers with the face and fingerprint detection. With this smart system, authorized users will be able to access the exam papers. This will be a solution for the exam paper leakages. “Face and Fingerprint based Exam paper Protection System” has been proposed keeping in mind, the drawbacks of the available systems. It has been developed, focusing on protecting the exam question papers as well as important documents with an excellent feedback system that will give immediate response to the authority in case of any issues.

II. RELATED WORKS

Smart System Integration of Question Paper Security System is made with a memory module, ultrasonic sensor, fingerprint security, RFID (Radio Frequency Identification) module, RTC (Real Time Clock) module, GPS (Global Positioning System) and GSM (Global System for Mobile communication) module. The question paper box can be opened only by an authorized person in specific places and in a specific time. The location is checked using GPS module. Once the location is correct, the time of opening is checked by RTC module. Then the RFID swipe is done. Finally the fingerprint of the person is checked. If everything matches the box will be opened. The result is communicated to the controlling authority via the GSM module.

A Review on Smart Question Paper Leakage Detection System is designed on the embedded system. The components of this system include GPS module, NodeMCU, RFID tag and reader, biometric sensor. RFID reader

is attached to the question paper box and the tag is given to the authorized person. When the RFID card is swiped, the location of the box is tracked via the GPS module. If the location matches the desired location, and the fingerprint of the person opening the box matches with the authorized fingerprint, the box will be opened. It provides a high level of security at low cost.

RFID Based Security for Exam paper Leakage System uses an RFID module, ARM processor, GSM modem, Keypad and electromagnetic lock. RFID is swiped first. When this is done, a secret key is sent to the registered mobile number. Once the key is entered correctly in the box, it will be opened. If the entered key does not match, an SMS (Short Message Service) will be sent to the controlling authority via the GSM module. For opening and closing the box, electromagnetic key is used. The system is compact and cost-effective as it uses ARM processor controller.

The previous systems primarily use RFID module as basic authentication. RFID module consists of an RFID tag and reader. RFID reader is attached to the box containing question papers. The person with RFID tag can open the box. Secret keys are also used for two step authentication. Also some of the previous systems use GPS module for tracking the location, RTC module for verifying the time of opening and GSM module for communicating with the controlling authority.

Limitations:

- Secret keys can be forgotten or overheard.
- RFID cards can be stolen or lost.
- GPS module requires improved memory module for data storage and the decision making is poor.
- RFID systems may malfunction during power outages.

III. THE PROPOSED MECHANISM

This system has been implemented to stop the malpractice of leakage of question papers. The system uses biometric features that are inseparable from one's body. Additionally, biometric replaces cards, keys, and codes, so it gives user ease in a variety of circumstances. One of the useful biometric techniques is face and fingerprint-based authentication. Fingerprints are readily available, take no effort from the users to recognize them, and only the bare minimum of information is collected.

The main function of this system is unlocking the question paper box when certain conditions are satisfied. The fingerprint and face of the person opening the box must match with the authorized fingerprint and face, which is stored beforehand in the module. Arduino Nano is used for fingerprint verification and authorized fingerprint storage. A fingerprint sensor module R305 is connected to Arduino Nano through which the fingerprint input is collected. Arduino Nano contains a microcontroller ATmega328, 14 digital input pins, 6 analog input pins, reset pin and power input pins. When the received fingerprint input matches, then the face can be scanned. The camera module used for face recognition is ESP32-CAM. This module is first connected to a Wi-Fi network such as mobile phone. The camera IP is then opened in the mobile phone through which the image of the face can be collected as input. In the same way, face enrolment can be done. Once the face is scanned and if it matches with the authorized input, the box is opened using servo motor which rotates by 180 degrees. When one of the authentications fails, the box is not opened. Also, IR sensor is used to detect if someone tries to break or tries to open the box without scanning fingerprint. It is connected to a buzzer which produces sound when the lock in the box is interrupted.

Additional security is implemented in this system via the NodeMCU. NodeMCU is an open-source IOT platform. Here it is used to send an email to the controlling authority. In case of unsuccessful attempt, a warning message "UNAUTHORIZED TRIAL" and the timings will be sent to the controlling authority via email. NodeMCU receives input from Arduino Nano and ESP32-CAM module. The module is also connected to a Wi-Fi network through which the ubidots cloud storage is accessed. Email notification is sent via the cloud storage. Ubidots cloud receives the signal from NodeMCU and if it is unauthorized, the widget in the ubidots dashboard will turn into green and also email notification will be sent to all the registered email addresses. Initially, the

widget in the ubidots dashboard appears white, it turns green if unauthorized input is detected. LCD is used to view the result. A buzzer is connected in the system which produces sound when the authentication fails. The power supply to the system is provided by a series of components such as transformer, bridge rectifier, and filter and voltage regulator. The proposed mechanism is constructed as per the following block diagram.

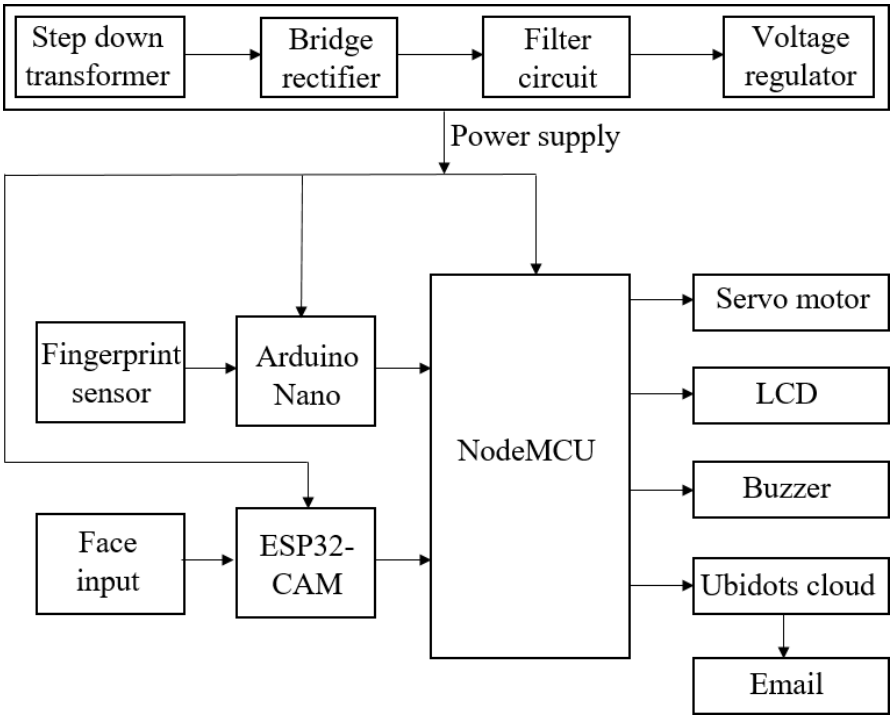

Figure. 1 Block diagram of proposed mechanism

IV. PERFORMANCE EVALUATION

The result of the project mainly aims to lock and unlock the box which contains the question papers. When the prototype was made, the locking and unlocking mechanism worked without a problem. Locking and Unlocking mechanism followed the system flow chart based on the working procedure mentioned above in the proposed system. Experimentation showed that the device will not open even when one of the biometric features i.e., fingerprint or face fails. It relies on two step authentication. Both the face and fingerprint should be authenticated in a successful manner. Since the system is in experimentation stage, we used a cost-free cloud account for feedback through mail. So it provides limited access. If the cloud account is paid, then the access can be unlimited and continuous monitoring of the system can be done. Here, alert email with timing is sent to the controlling authority when an unauthorized person tries to open the box. Based on the results obtained, it can be said that the system satisfies the purpose of this project. The security system implemented here properly covers the problems that were mentioned in the existing systems. This security system is capable enough to handle all the adversaries to properly protect the box which carries the question papers or confidential documents.

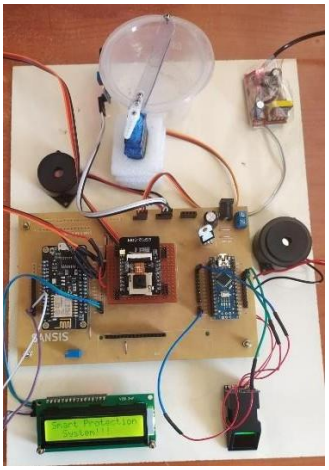

Figure. 2 Prototype of smart exam paper protection system

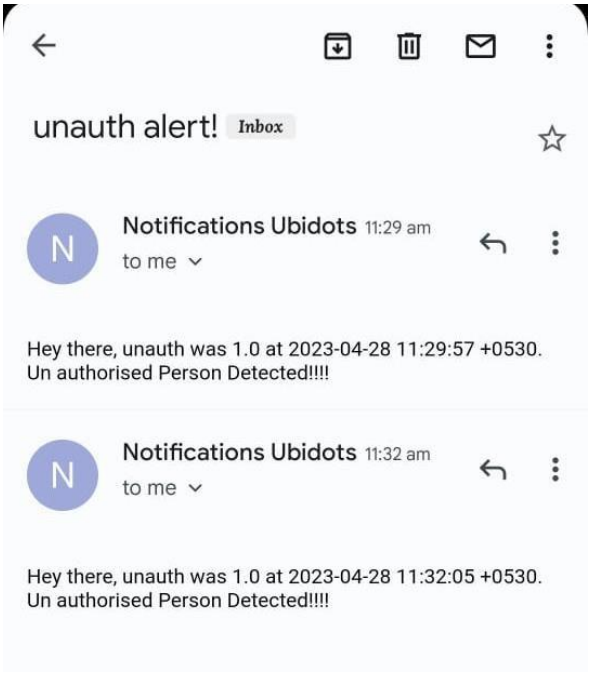

Figure. 3 Unauthorized attempt email notification

V. CONCLUSION

This paper proposes a secure face and fingerprint based user authentication. The cryptographic key that is used to encrypt exam centre data does not need to be kept on file in the proposed scheme. After the user has successfully undergone face-fingerprint biometric authentication, it can be retrieved at runtime. The features we used here are inseparable from a person's body. Unlike the RFID tags and secret keys, the face and fingerprint cannot be duplicated. So the confidential documents or the question papers can be transported safely. The proposed system is more secure compared to other existing systems. As a future scope, iris implementation and palm vein technology can be used to improve security. The proposed system satisfies the purpose of the project. This system will make sure that the exams are conducted effectively and that the goal of evaluating someone's knowledge through education is not compromised by using unethical methods. People will be obliged to apply their skills and expertise as a result, and only the deserving personnel will be able to legitimately claim results that are entirely genuine. The time and money wasted in such an incident won't be a hindrance to the educational system any longer, and the culprit will be appropriately identified and dealt with in the most trustworthy manner

possible. By doing this, we may work towards creating the ideal educational system, in which pupils will no longer be dependent on leaked questions but rather only on their own struggles.

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AUTHORS PROFILE

I'm Latha P, M. E., Assistant Professor and Head of the Department, Department of Electronics and Communication Engineering, VSB College of Engineering Technical Campus. I have 7 years of teaching experience and I have guided many projects. Our students have successfully completed the projects and got placed in well reputed companies by our guidance. I wish all the best for the students' success.

I'm Gayathri G. I am pursuing final year in Department of Electronics and Communication Engineering from VSB College of Engineering Technical Campus. I have completed the mini project during third year of my graduation. I also attended various workshops, webinars related to my field. I have gone through campus interviews in my college and placed in the reputed companies. I have successfully completed my final year project titled "Smart exam paper protection system".

I’m Shiva Keerthana R, pursuing final year in Electronics and Communication Engineering in VSB College of Engineering Technical Campus. I believe in lifelong learning. I have completed many online courses to improve my knowledge. I got placed in well reputed companies and currently attending internship. I have done a mini project during my third year. With that experience I have successfully completed my final year project titled “Smart exam paper protection system”. I wish to continue my learning and explore more.

I’m Sugapriya R, doing Electronics and Communication Engineering in VSB College of Engineering Technical Campus. I have completed many online courses and received certificates. I have performed well in the placement drive in our college and got placed in an MNC company. This satisfied the dream of my family. I have great interest in our project titled “Smart exam paper protection system” and I have successfully completed it.

I'm Vishnupriya A, and I am a final year student, Department of Electronics and Communication Engineering from VSB College of Engineering Technical Campus. I have completed one project during my academic journey. I gone through campus interviews and placed in a good company and have successfully completed my assigned project titled "Smart exam paper protection system".