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DEVELOPMENT AND IMPLEMENTATION OF A FACIAL RECOGNITION-BASED ATTENDANCE MANAGEMENT SYSTEM FOR FACULTY AT PHINMA SAINT JUDE COLLEGE MANILA

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ABSTRACT

The attendance of faculty is important to educational standards, yet many schools still rely on outdated techniques that are mostly subjected to errors and proxy attendance. Hence, this research provides a facial recognition-based attendance management system designed specifically for PHINMA Saint Jude College Manila. This system provides an innovative, contactless, real-time, and automated attendance management system that enhances accuracy, security, and efficiency. It is based on biometric facial recognition, which eliminates manual processes and guarantees dependable identification. Evaluated by the HR and Academics Secretary of the College in a Likert scale across the key metrics of accuracy, efficiency, ease of use, security, and performance, the system merited high ratings from them, especially for accuracy and automated features, significantly reducing administrative workload for enhanced data accessibility for institutional decision-making.

Keywords: Facial Recognition, Attendance Management System, Administrative Efficiency

1. INTRODUCTION

One of the concerns that need to be addressed to keep the teaching standard as well as the management efficiency in check is the faculty attendance in educational institutions. Most of the instructional organizations still employ very old-fashioned and primitive methods of capturing and monitoring attendance such as by use of sign sheets or punching clocks. These methods are really hard to implement as they consume a lot of time and are also likely to be messed up as there is human involvement. Such unproductive workings, however, are responsible for false attendance figures, poor data handling, and reporting complications (Wong & Lo, 2019). Owing to the recent technological advancements, especially in technology and engineering, there has been a considerable move towards the digitalization of the processes, which is aimed at easing the work of tracking attendance. Paragraph

Catering attendance management systems with biometric innovations, especially facial recognition is another major advancement. Background attendance systems which employ facial recognition technology can be done contactlessly and in an extremely precise way without errors. Studies have shown that recognition systems can be used in attendance with reliability as high as 99.9% efficiency in a given environment. Such an accuracy level renders these systems as cost-effective tools for attendance management systems (Zhao

et al, 2020). Furthermore, these systems improve security by ensuring that no one but the correct person is scanned in, thus lessening any risk of cheating by way of ‘sitting’ in for someone else (Ajibola et al, 2022).

This paper puts forth the notion of designing an automated attendance management system for the faculty members of Saint Jude College. The system shall incorporate facial recognition technologies in the attendance system to identify members in a very efficient way without time delays and allowing on the spot data collection and monitoring. The system will minimize the administrative work in manual tracking thereby allowing better and more timely records to be kept. In addition, system-generated automatic reports will facilitate better management of faculty attendance data, the relevance of which will be evident in institutional strategies and resource allocation (Sharma & Gupta, 2021).

Implementing such a system is in partial fulfillment of the transition of institutions from ‘normal’ in-person agenda to wholly ‘virtual environments’ that is the prevailing order of today’s educational institutions. Additionally, such a system responds directly to issues that almost every educational institution faces relating to monitoring attendance of its academics. For this technology Saint Jude College has further operational efficiency, effective data quality and increased responsibility among its lecturers. This paper will focus on the outpatient system, assess the administrative impact of its implementation, and improve understanding of the attendance management process in education institutions.

Type Article

According to Lateef, A. S., & Kamil, M. Y. (2023). Traditional attendance recording methods can be effectively replaced by artificial intelligence (AI) solutions. Their project introduces an automatic attendance system with an Arabic-language graphical interface to improve user involvement. The Python-based system uses object identification and feature extraction methods to interpret live video feeds from an IP camera in the classroom. It detects faces in video and matches the retrieved features to those recorded in a database. The authors conclude that the system is capable of automating attendance registration with up to 100% accuracy. Furthermore, their technology exceeds earlier research by managing real-time assessments with larger groups of students and accurately detecting individuals at varied distances from the camera, demonstrating the system's ability to automate attendance.

According to ElSaid, W. (2017). Recent improvements in several areas have resulted in substantial organizational changes, particularly at academic institutions. Recognizing their relevance to real-world changes, these organizations are implementing initiatives to improve their activities and services. A primary focus is on enhancing academic staff skills through certified development programs. Currently, attendance for these programs is based on traditional manual methods, which have significant limitations. To overcome these challenges, this paper presents an automatic attendance system based on facial recognition technology. The system has five steps: it captures the member's image, detects the face, extracts features, compares them, and generates attendance reports. Its efficiency is proved by its high accuracy

under both ideal and hard settings, as well as its low cost and lack of expensive setups, making it suited for a wide range of educational institutions.

According to Abbijananee, M., et al.,(2023, October). Regular attendance at educational institutions is critical for assessing student quality and performance. Traditional techniques, like as roll calls and paper sign-ins, are frequently wasteful and unreliable, particularly considering the dramatic growth in student enrollment during the last two decades. Duplicate sign-ins and proxy attendance add to the complexity of attendance management. This article describes a prototype for a smart attendance system designed to overcome these difficulties. The system uses face recognition technology to automate attendance monitoring, allowing instructors to capture class photographs individually or panoramically. An administrator manages the attendance data, which is submitted daily, allowing instructors to compile lists of students who are frequently absent. This system is intended to improve the efficiency and accuracy of attendance management across many academic departments.

According to Chen, Y., & Li, X. (2021, March). Attendance sign-in is one of the integral components of performing daily activities within organizations or institutions, but the current methods have a few challenges, such as fraudulent sign-ins and inefficient processing of attendance data. This work presents the design and development of new attendance systems integrating RFID with facial recognition capabilities. This authenticates users using a hybrid authentication approach coupled with improved recognition capabilities thus enhancing reliability and accuracy of dependability of attendance management systems in terms of verification. This integrated system allows for the intelligent administration of attendance information of employees in different organizations. It also significantly enhances data statistics efficiency so that the attendance requirements of organizations and institutions can be easily met daily. Overall, this method showcases considerable improvement in techniques of attendance management.

According to Aravindh, S., et al. Facial traits define a person's uniqueness and are employed for automatic attendance monitoring in this project. Traditional approaches, such as calling out names, can take 5 to 10 minutes during a one-hour class, resulting in inefficiencies. To remedy this, an automatic attendance system that employs image processing techniques is presented. The technology uses face detection to find people and face recognition to record attendance from a database of students' facial photos. Previous systems had issues with lighting and head positions, which were addressed using techniques like illumination invariance and the Viola-Jones algorithm. This automated solution simplifies attendance tracking in big classrooms, offering a more efficient alternative to human recording.

2. IMPLEMENTATION METHOD

Use purposive sampling, where participants are chosen based on specific roles that are directly associated with attendance and system functionality. Participants are not selected at random but are chosen based on experience or expertise in the use of attendance processes and biometric technology.

This purposive sampling will help identify the unique challenges and benefits for each role of the participants, thereby providing

meaningful insight into how the system might affect different stakeholders and ensuring focused feedback in refining the attendance management system.

Statistical Treatment of Data

Statistical Methods for Handling the Collected Data

This section presents the statistical approaches used to analyze the data collected through interviews for the study on Attendance Management System.

Frequency Distribution: This technique was applied to present the results by first grouping responses into functional themes such as attendance rating, user satisfaction, and system usability among others. In this way, the frequency distribution made it possible for the study to show tendencies in response with regard to the most common opinions in an efficient way.

Percentage Analysis: The analysis involved calculation of percentages to assess the level of responses in each of the categories. This helped in giving a better picture of some key themes, for example, efficiency and usability of the system dispensed by the system especially, the distribution of each category.

Descriptive Statistics (Mean, Median, Mode): Measures of Mean, Median and Mode were obtained where quantifiable responses such as user satisfaction rating using a Likert Scale were given. These were helpful in putting into view the distribution of responses to common practices. Thus, these measures came in handy in objective representation of user experience.

Qualitative Content Analysis: Employed qualitative content analysis, responses received from interviews were organized into major themes that emerged. The number of responses was determined for each theme providing both biases as well as objective measures of the participants enhancing the comprehension of their views.

Cross-tabulation: This exploratory analysis was carried out to explore the differences in feedback on the system among different participants, for example, cross-tabulation of students and faculty. Cross-tabulation helped bring out the similarities and differences in perceptions with regards to the system, thus enhancing its external relevance.

3. RESULTS AND DISCUSSION

The Facial Recognition-Based Attendance Management System was evaluated by the HR and Academics Secretary of PHINMA Saint Jude College Manila. The evaluation was performed using the Likert Scale, with ratings being categorized as Excellent, Very Good, Good, Fair, and Poor. Each of these success indicators was rated, which were identified by the proponents as being representative of the effectiveness and performance of the system.

Below are the findings for each success indicator:

Functionality

FUNCTIONALITY	Excellent	Very Good	Good	Fair	Poor	TOTAL
The organization is clear, logical and effective, making it easy for the user to understand.	3	2	0	0	0	5
The language in the program and in the user's guide is clear to the user.	1	4	0	0	0	5
The individual can operate the program independently, creating his or her own sequence of presentation and review.	2	3	0	0	0	5
Individuals can easily start and exit the program. It is easy to back up, change answers and give commands.	3	2	0	0	0	5
MEDIAN	**2.25**	**2.75**	**0**	**0**	**0**	**5**

The functionality of the program received highly positive ratings, with most responses categorized as excellent or very good. The program's organization was rated highly, with users finding it clear and logical. The language used in the program and user guide was also well received for its clarity.

Users found the program easy to operate independently and appreciated its seamless start, exit, and command functions. The median ratings of 2.25 and 2.75 Very Good indicate strong user satisfaction, with no ratings of Good, Fair, or Poor, affirming the program's effectiveness and ease of use.

Usability

USABILITY	Excellent	Very Good	Good	Fair	Poor	TOTAL
The program provides a copy of summary of its basic information to the user for future reference	2	3	0	0	0	5
Printouts are clear and well organized. The printouts are dated.	2	3	0	0	0	5
MEDIAN	**2**	**3**	**0**	**0**	**0**	**5**

The usability of the Facial Recognition-Based Attendance Management System for Faculty at PHINMA Saint Jude College Manila was assessed based on two main criteria: the capability to present a summary of basic information for future use and the clarity and organization of printed outputs. The results show that the two criteria both had positive scores, with answers within the categories of Excellent and Very Good. Exactly 40% of the participants gave both areas an Excellent rating, while the other 60% gave them a Very Good rating. Interestingly, no answers were recorded within the categories of Good, Fair, and Poor, showing a general positive acceptance in terms of usability. The median usability ratings were two (2) for Excellent and three (3) for Very Good, confirming that the majority of the respondents viewed the system as effective and user-friendly. The findings mentioned above show that the system is very capable of presenting basic information in a clear and readable format, thereby greatly improving the overall usability of faculty attendance management.

Reliability

RELIABILITY	Excellent	Very Good	Good	Fair	Poor	TOTAL
The system is free from errors.	3	2	0	0	0	5
The system uses standard equipment that is reliable, and widely available.	3	2	0	0	0	5
The system outputs accurate, reliable results.	3	2	0	0	0	5
MEDIAN	**3**	**2**	**0**	**0**	**0**	**5**

The reliability of the system was evaluated based on three key aspects: error-free performance, use of standard equipment, and output accuracy. The three respondents provided every single criterion an excellent rating, and two gave it a very good rating, illustrating consistently high ratings. This indicates strong confidence in the system's reliability, as it is free from errors, utilizes widely available and dependable equipment, and produces accurate, reliable results. The system's reliability was further reinforced by the absence of ratings of Good, Fair, or Poor. The system successfully satisfies dependability expectations, as evidenced by the median scores of three (3) Excellent and two (2) Very Good.

Performance

The efficiency of the system was evaluated based on its ability to match process wait times with predicted results. The data show a high positive review, with two respondents ranking it as Excellent and three as Very Good. This suggests that the system works well, meeting performance and throughput requirements. Interestingly, none of the respondents ranked it as good, fair, or poor, proving the system's stability and efficacy. The results demonstrate that consumers rated the system's performance as sufficient, ensuring seamless and timely processing that fulfilled expectations.

Security

SECURITY	Excellent	Very Good	Good	Fair	Poor	Total
The username and password has a multilevel access	3	2	0	0	0	5
The system shows security indicated on the address bar by a padlock or https	1	4	0	0	0	5
MEDIAN	**2**	**3**	**0**	**0**	**0**	**5**

The Facial Recognition-Based Attendance Management System for the Faculty of PHINMA Saint Jude College Manila is a system with multilevel access control; According to the evaluation, three (3) respondents rated the multilevel access of the system as excellent, and two (2) respondents marked it as very good. Similarly, the security indicator (which ensures that you are using a secure connection to access) was rated Excellent by one (1) respondent and Very Good by four (4). The median values for these areas of security, as computed by us, are (2) for excellent and (3) for very good, which shows a high level of trust by the people who use the system and an assurance that it is secure. The data shows that the respondents have come to believe that the system has protected information within this case, sensitive faculty attendance records, password information, etc. The findings also indicate that the system performs well in securing faculty information systems and is able to provide high security and reliability levels for authorized users to safely access their information.

Robustness

ROBUSTNESS	Excellent	Very Good	Good	Fair	Poor	TOTAL
The system allows the user to terminate an invalid API request.	3	2	0	0	0	5
Create username and passsword for different users	1	4	0	0	0	5
Ability to add and delete items from the checklist as per Ched guidelines	2	3	0	0	0	5
Able to store big data.	3	2	0	0	0	5
MEDIAN	**2.25**	**2.75**	**0**	**0**	**0**	**5**

Robustness was evaluated on the ability of the system to control and handle invalid API requests. This was done by providing the option for users to cancel requests when they deemed necessary, administering usernames and passwords based on unique faculty, the capability of the system to update the checklist according to the DepEd guideline, and the ability to save large amounts of data efficiently. The median values calculated for these factors were 2.25 for Excellent and 2.75 for Very Good. Such satisfaction is a good indication that the system has been able to deliver on the promise perceived by the respondents. In general, the Facial Recognition-Based Attendance Management System handled faculty requirements for attendance monitoring, account management, and data management while functioning smoothly and securely.

Results

The proponent identified various key results from the Development and Implementation of the Facial Recognition-Based Attendance Management System for faculty at PHINMA Saint Jude College Manila and has
come up with the following:

- Automated Faculty Attendance Tracking

- Seamless Facial Recognition-Based Login and Logout
- Error-Free Data Recording and Retrieval
- Secure Multilevel Access Control
- Clear and Organized Attendance Reports
- Real-Time Data Processing and Storage
- Compliance with CHED Guidelines
- User Account Management and Role-Based Access
- System Reliability and Performance Optimization
- Data Security and Confidentiality Assurance

Discussions

1. *Faculty Attendance Tracking*
   The proponent designed the system to automate the attendance monitoring process for faculty members at PHINMA Saint Jude College Manila. With the implementation of facial recognition technology, manual logging of attendance will no longer be required, reducing errors and unauthorized timekeeping. The system ensures accurate and real-time attendance tracking while maintaining security and reliability.
2. *Time Efficiency in Attendance Logging*
   The proposed system significantly reduces the time required for faculty members to log their attendance. efficient process. Unlike signing attendance sheets, or using RFID cards, which happen manually, upon scanning, the facial recognition system is able to authenticate instantaneously. This addresses log-in/ log-out delays and streamlines the process.
3. *Accuracy and Security of Attendance Records*
   This system cleans up fraudulent attendance systems such as proxy attendance or buddy punching. Faculty logins and logouts are only possible through facial recognition, which prevents manipulation of attendance records and maintains the integrity of attendance records. The attendance logs are securely stored in a database that only authorized personnel have access to, protecting the data privacy and security.
4. *Real-Time Monitoring and Reporting*
   The system acts as a system for close monitoring of the faculty's attendance. Detailed reports, such as an attendance summary of a particular month, together with other factors such as tardiness and absenteeism, can then be accessed by the HR and Academic Secretary. These reports are used for tracking work hours and compliance with faculty schedules, as well as workforce management.
5. *Data Storage and Accessibility*
   Attendance records will be securely stored in the cloud-based/local database. It helps ensure that the data is easily accessible and can be retrieved when needed, thus minimizing the risk of lost or tampered records. Faculty can also view their attendance logs, paving the way for accountability and transparency as well.
6. *User Management and Access Control*
   The system provides different access levels for users, including faculty members, HR personnel, and academic administrators. There are also unique login credentials per user;

this ensures that only authorized people can change or extract attendance information.

7. *System Sustainability and Maintenance*
   The proposed system can last long with minimum maintenance. It will be periodically updated and upgraded to remain efficient and future-ready. Data is kept safe & secure in cloud storage and on local servers.
8. *Technical Support and User Training*
   Faculty members and administrators will be trained on accessing the system through a user manual and training sessions. Technical support will also be available to ensure a smooth transition from the manual attendance logging system to a facial recognition-based automation system.

4. CONCLUSION

After developing and implementing the Facial Recognition-Based Attendance Management System for the faculties of PHINMA Saint Jude College Manila, a considerable increase was observed in attendance checking, data accuracy, system security, and overall operational efficiency. According to the evaluation made by the HR and Academic Secretary through the use of the Likert Scale, the system had remarkably high ratings from Excellent to Very Good on all success indicators that were evaluated: Functionality, Usability, Reliability, Performance, Security, and Robustness. Furthermore, there were no records of ratings given within the Good, Fair, or Poor categories, a feature that denotes a strong overall satisfaction of the systems evaluators.

The intuitive design system in terms of functionality was praised, supported by an organized structure with a user interface easy to follow. The users claimed that the program worked flawlessly, enabling them to navigate it independently, without quirks. The system was also commended with great usability for displaying and printing attendance records clearly and in an organized manner, thereby improving the accessibility and presentation of information for administrative purposes.

Reliability was reinforced by error-free system operation using standard and readily available equipment with sound accuracy of output. Respondents were confident that the system would demonstrate continuous functioning, regardless of condition under which the operation was carried out. The good performance rating proved that the system functioned orderly by allowing fast log-in and log-out procedures, granting less delay during attendance logging through facial recognition.

Security was considered the system's major strength. With multilevel access control, role-based account management, and mechanisms for data confidentiality, the users were assured that the system would protect sensitive faculty data. Good support for robustness came from being able to deal with invalid requests, validating data, real-time checklist updating with DepEd guidelines, and utilizing large data storage efficiently.

Key results of the implementation include:

- Automated, real-time faculty attendance tracking
- Seamless facial recognition for accurate login/logout
- Multilevel user access and role-based permissions

- Organized and secure attendance report
- User account management with strict authentication
- Compliance with CHED guidelines for monitoring faculty attendance

In addition, the system contains solutions to common problems faced by traditional attendance tracking, including buddy punching, manual errors, and delays. The system enhances time efficiency, accountability, and data transparency, thus being an efficient tool for educational institutions. Attendance records are stored securely in both cloud-based and local database systems, giving durability, accessibility, and safety.

The design is also meant to ensure sustainability in the long run, requiring very little maintenance with arrangement for future upgrades. Training sessions and user manuals would facilitate transition for all faculty and administrators with technical support extended to handle any concerns or issues.

To summarize, the Facial Recognition-Based Attendance Management System fulfills and exceeds its expectation in offering a modern, accurate, and secured attendance tracking system. Results show positive evaluations for it being in a position to become a benchmark for digital attendance systems across educational settings and affirm the institution's commitment to innovation, data integrity, and administrative efficiency.

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I owe profound gratitude to the Human Resource Department and the Academic Secretary of PHINMA Saint Jude College Manila for allocating their time and cooperation in taking part toward the evaluation of the system. Your feedback and suggestions really added depth to the improvement of the system's operational capacity and relevance.

To the faculty members who supported and tested the system, thank you for your patience, trust, and willingness to explore a new way of managing attendance. Because of this, the system was indeed comprehensive in terms of addressing real-world needs.

This project is a result of collective effort, and I am thankful to everyone who contributed their part in making it successful.

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