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SEAIT OJT Monitoring System using Face Recognition Technology: Improving Usability and Accessibility

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Abstract: This research project focuses on improving the SEAIT OJT Monitoring System by integrating face recognition technology to enhance usability and accessibility. Traditional methods of tracking On-the-Job Training (OJT) attendance are often time-consuming and prone to errors. By implementing a face recognition system, the project aims to automate attendance tracking, reduce human errors, and increase security. The study evaluates the system's performance through usability testing, measuring metrics like accuracy, efficiency, and user satisfaction. Results indicate that the system simplifies attendance monitoring, provides real-time data, and improves overall user experience. However, challenges such as environmental factors and device compatibility were noted. The project demonstrates the potential of face recognition technology to streamline administrative tasks in educational settings while emphasizing the need for further improvements in accessibility and reliability.

Keywords: *Face Recognition, OJT Monitoring, Usability, Human-Computer Interaction (HCI).*

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I. INTRODUCTION

A. Background and Context

The technology is very useful in Human-Computer Interaction (HCI), on how people use computers and other digital systems. The purpose of Human-Computer Interaction (HCI) is to design systems that are easy to use, accessible, and efficient. In this project, the focus is on improving the usability and accessibility of the SEAIT OJT Monitoring System by using face recognition technology to make student monitoring faster and more convenient. The common problem in monitoring the attendance of On-the-Job Training (OJT) students is the traditional way of tracking their attendance. So we use face recognition technology, which allows students to check in automatically using their faces. This reduces errors, increases security, and makes the monitoring process more reliable. By using HCI principles, the system is designed to be user-friendly and easy to navigate for OJT students, teachers, and company supervisors. This study is HCI in biometric systems, particularly in how face recognition can improve user experience and accessibility in monitoring systems.

B. Research Problem

The problem herein is the lack of efficiency in current mechanisms for monitoring OJT (On-the-Job Training) students, particularly in educational institutions like the South East Asian Institute of Technology (SEAIT). Existing manual or basic digital methods are often time-consuming, prone to error and seamless tracking of OJT students attendance and performance. This inefficiency can lead to biased evaluations, delayed feedback, and missed opportunities for improvement in the training process. Therefore, it is crucial to develop a system that is not only efficient but also highly usable and accessible to both OJT and OIC. A user-friendly and mobile-accessible platform would empower stakeholders to easily log, monitor, and evaluate OJT progress anytime and anywhere supporting a more transparent, responsive, and data-driven approach to managing the OJT program at SEAIT.

C. Research Questions and Objectives

- How can facial recognition technology be improved to record student attendance during on-the-job training?
- What is the difference in facial recognition technology

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from other techniques in its influence on the effectiveness of OJT monitoring?
- How facial recognition systems historically affected the accuracy and reliability of OJT in monitoring data?

D. Objectives

- To assess how much facial recognition technology automated and increased the attendance tracking by OJT students, given its real-time monitoring capability and minimizing human errors. Assess the system's usability, accuracy, and efficiency from the perspective of students and faculty.
- To calculate the time and resources saved for an OJT monitoring system utilizing facial recognition as opposed to manual or old attendance systems.
- To analyze how facial recognition technology has enhanced the security features of the information collected in OJT sessions by ensuring data is authentically accurate, tamper-proof, and non-repudiable.

E. Justification and Significance

The monitoring system that uses face recognition technology improves accuracy, efficiency, and security in tracking attendance automatically. It eliminates human errors and tampering attendance, making it easier to monitor OJT attendance and performance in real-time. This allows institutions to keep a closer watch on students. This study is relevant because it shows how facial recognition can make interactions with technology simpler, more intuitive, and almost touchless. This technology is part of Human-Computer Interaction and is being used more in education and the workforce, raising concerns about privacy and data protection. Overall, the system makes AI and machine learning more effective, bringing innovation to both practical and ethical areas of technology.

II. LITERATURE REVIEW

A. Overview of HCI Theories and Models

Humans work together with computer systems to enhance system design through the identification of Human-Computer Interaction. Trust in human–computer interaction (HCI) has been studied from multiple angles using a variety of theoretical frameworks digital technologies increasingly permeate every facet of daily life, trust has become a crucial factor in human–computer interaction (Gulati, S., et al., 2024). The Face Recognition Attendance Management System is a powerful tool for institutions and organizations seeking to modernize their attendance tracking processes and represents a step forward in leveraging cutting-edge technology to enhance efficiency and accuracy in attendance management (Ghorpade, Y., et al., 2024).

B. Review recent studies, papers, and advancements in HCI

Attendance is an important concept to be implemented in order to enhance organizational performance. Measuring attendance may be a concern issue for many organizations, especially with the rapid changes that have occurred in this era of digitalisation. Face recognition is one of many approaches to support long distance attendance, unfortunately, there are some issues that need to be overcome regarding face recognition, for example, its verification (Anshari, A., et al., 2021).

C. Analyze existing solutions related to the research problem

Face recognition is useful for tracking attendance and safety monitoring, but it still has some problems. Systems depend on users doing everything correctly, like facing the camera the right way. But people often make mistakes they might move too fast or not know how to use the system properly. These small errors can cause the system to fail. That's why we need face recognition tools that are easy to use and can still work even when users don't follow instructions perfectly.

III. METHODOLOGY

A. Research Design

This study will use a descriptive research design to explore how facial recognition technology can improve the monitoring of OJT (On-the-Job Training) students. The goal is to describe the current problems in the attendance system and develop a new system that solves these problems using face recognition.

B. Participants

This study will involve every student and teacher from SEAIT. By including the entire SEAIT community, the study plans to collect a variety of ideas and opinions about the QR code-based attendance tracking system currently in use. Including many participants ensures that any improvements will effectively meet the needs of users from different years, departments, and teaching methods.

C. Data Collection

This study on the SEAIT OJT Monitoring System using Face Recognition Technology, we used purposive sampling to collect data. This means we didn't just pick people randomly instead, we chose specific individuals who we thought could give the most useful and relevant feedback. These OJT students were chosen on purpose because they're the ones who would actually use or manage the system in real life. Since they have experience with monitoring or being monitored during OJT, their opinions and insights are more valuable for improving the usability and accessibility of the system. By using purposive sampling, we made sure the feedback we got was from people who really understand the system and its purpose.

D. Data Analysis

The responses from collected data will be analyzed using simple statistics like percentages and averages. The performance of the facial recognition system will be evaluated by measuring time efficiency, identification accuracy and user experience.

E. Ethical Considerations

One of the main ethical considerations will be protection of privacy and making sure that the participant has given informed consent. During the informed consent procedure, the participants will be made fully aware of the

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research objective and the ways their data will be utilized. The research project will strictly follow the ethical guidelines concerning biometric data usage, such as ensuring that the face recognition system will not keep or misuse private data. All the participants will be asked for their permission and based on the anonymity of their data privacy would be guaranteed for the individuals. This research seeks to make a unique contribution to the field of HCI when it examines a real-life educational context in which face recognition technology is used. Furthermore, the study also hopes to create proximity to the technology by focusing on the possibility of its integration and the enhancements it would offer.

IV. ADVANCED HCI DESIGN

A. System Architecture

The SEAIT OJT Monitoring System using face recognition technology integrated with an advanced Human-Computer Interaction (HCI) framework to improve the usability and accessibility of monitoring student On-the-Job Training (OJT) activities. The architecture is designed to ensure seamless interaction, secure data handling, and real-time monitoring

B. Features and Functionalities

The system features uses face recognition that scans the users face automatically to take attendance. No more manual method and it's more accurate and tamper proof in taking attendance of OJT using this system.

C. User Interface Design

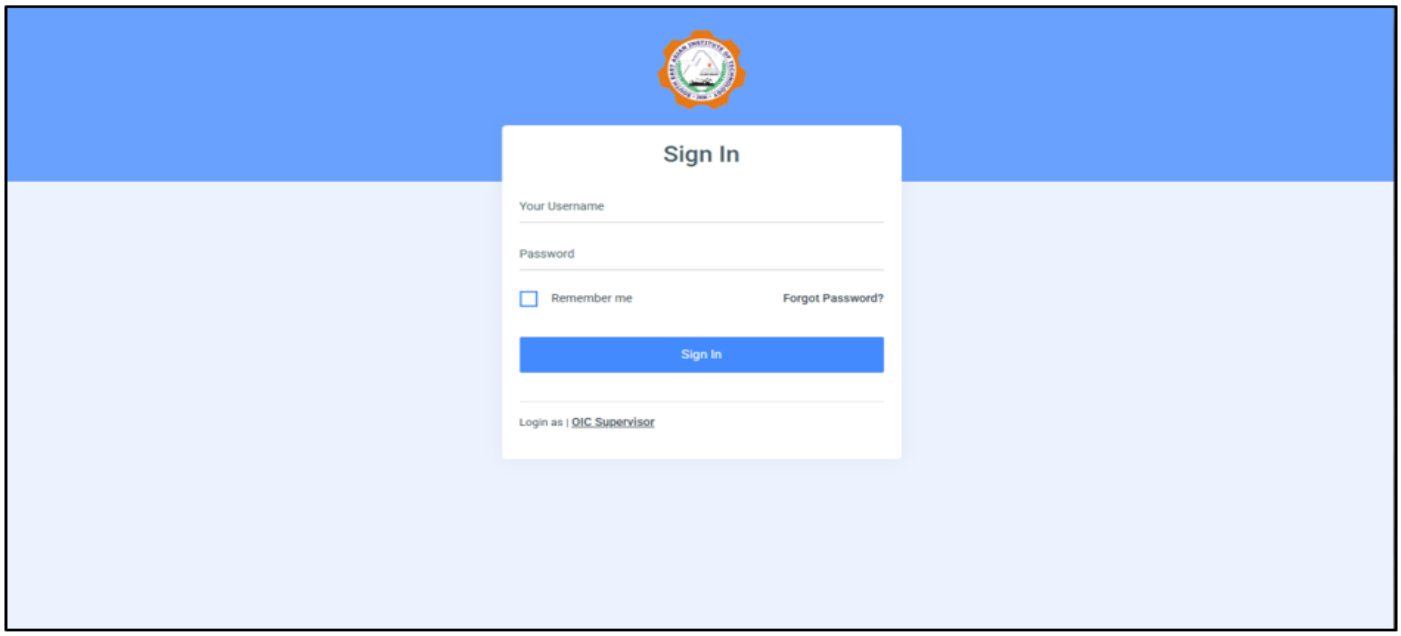

Fig 1 In this figure, it shows the login page of the system.

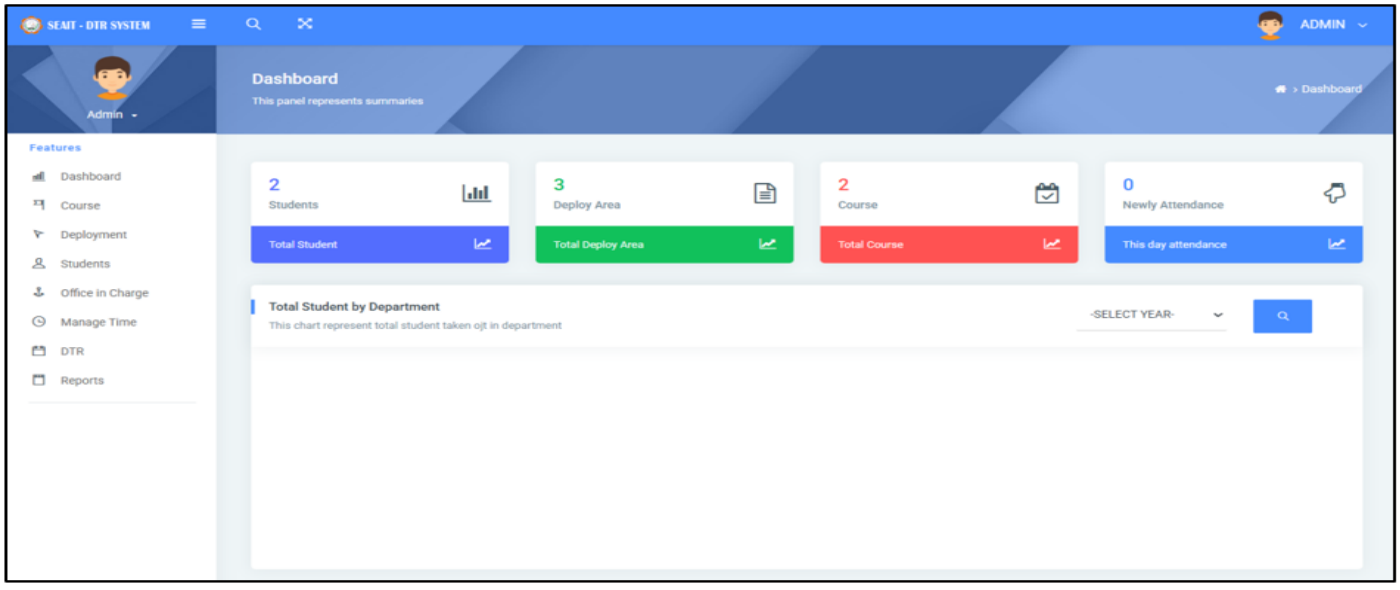

Fig 2 In this figure, it shows the dashboard of the system.

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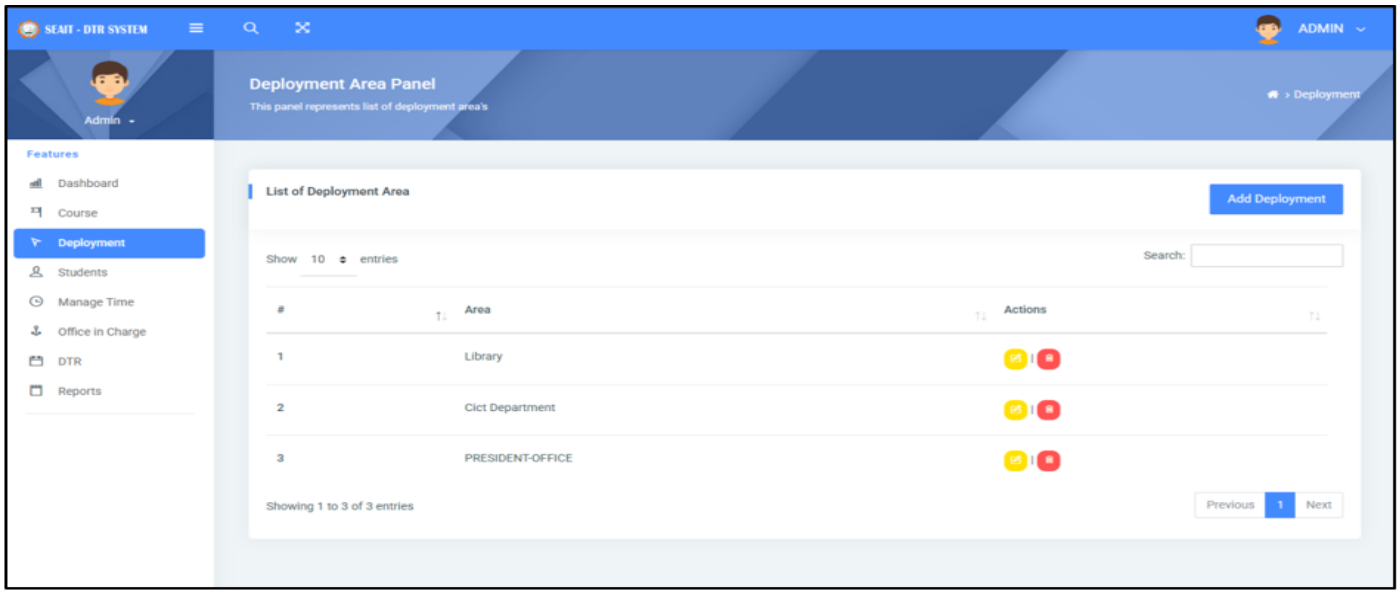

Fig 3 In this figure, it shows the deployment where the OJT students deployed.

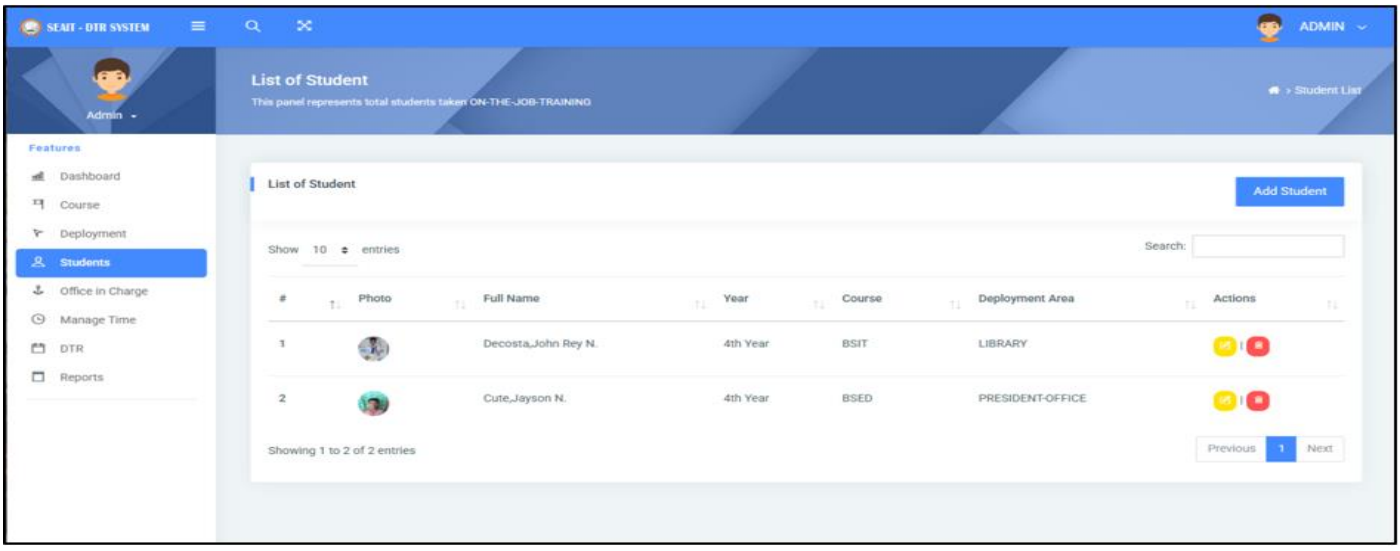

Fig 4 In this figure, it shows the list of students.

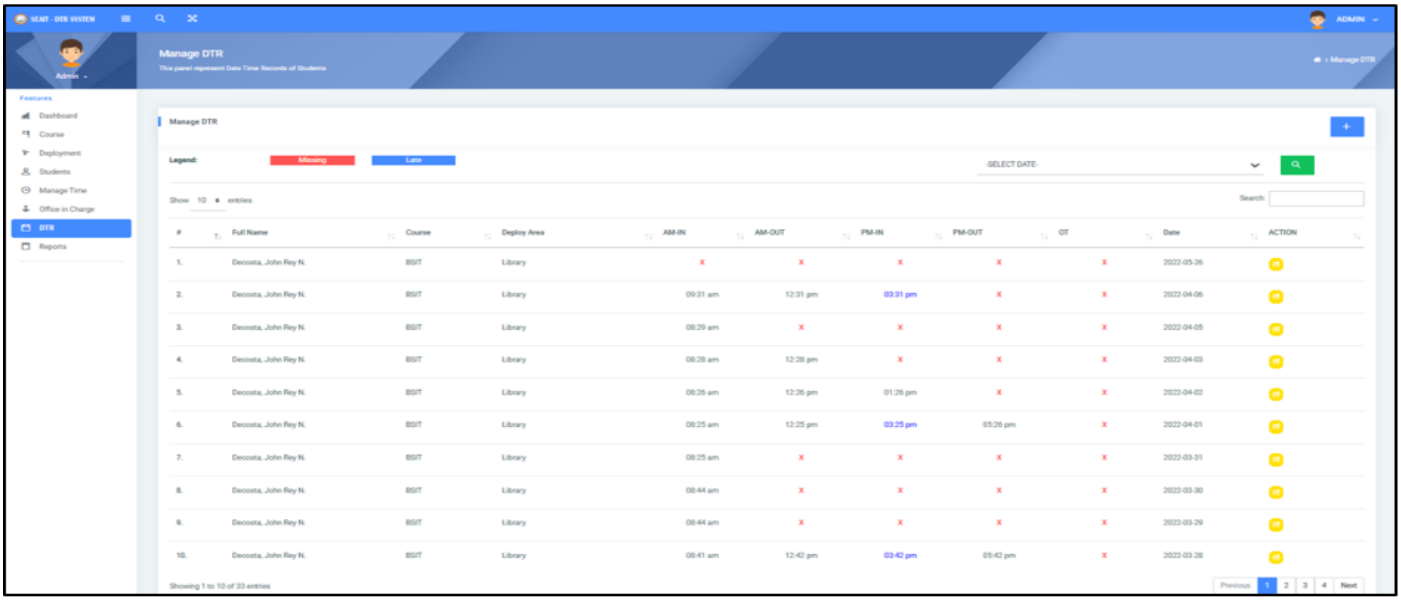

Fig 5 In this figure, it shows the DTR of the students.

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V. EVALUATION AND RESULTS

A. Usability Testing

The usability testing focused on BSIT fourth year students of the South East Asian Institute of Technology (SEAIT) that is taking the subject of PRACTICUM (480 hours). The testing was conducted using structured surveys where participants rated their experiences on a Likert scale (4 - Strongly Agree 3 – Agree 2 - Disagree 1 – Strongly Disagree). The survey aimed to identify system strengths and weaknesses and explore opportunities for improvement, particularly in the relationship between User Interface (UI) design elements and system effectiveness.

B. Performance Metrics

To evaluate the performance of the system's UI, we utilized a single key metric: the User Satisfaction Score, measured through a Likert scale. This metric directly addresses all three research questions by capturing participants' overall perceptions of the UI's impact on their experience. It provides insights into how the user interface design affects the overall user experience, efficiency, and accuracy of the exam-taking process. By gathering feedback on aspect like comfort, ease of use, and user satisfaction, the Likert scale helps identify both successful design elements and areas that require improvement. These metrics align with the research objectives by demonstrating how facial recognition technology automates attendance tracking, reduces human error, and enhances security. For example, time efficiency metrics directly address the objective of calculating saved resources, while identification accuracy reflects the system's reliability.

C. Comparative Analysis

The survey results for face recognition, based on 4-point scale, show average mean in Functionality= 3.49, Accessibility= 3.58 and Accuracy= 3.32.

D. Results and Findings

Research shows that how users interact with a system plays a big role in how accurate it is. This is especially true when people are new to the technology and don’t fully understand how it works. When users struggle with the system, mistakes are more likely to happen. However, studies found that making the design easier to use and adding clear feedback like helpful error messages or confirmation prompts can improve performance for all users, regardless of their experience level.

VI. DISCUSSION

A. Interpretation Findings

The findings of this study shows that the system enhances the overall effectiveness of the OJT monitoring system that includes face scanning detection. Respondents find features such as intuitive layout, clear labeling, and reduced cognitive effort made the platform easier to use, enabling quicker and more accurate access to monitoring functions Based on usability testing and user feedback, it is evident that the redesigned system with its emphasis on user-centered design has significantly improved task efficiency, and user satisfaction especially when it comes to manual attendance checking. Participants noted that features such as intuitive layout, clear labeling, and reduced cognitive effort made the platform easier to use, enabling quicker and more accurate access to monitoring functions. These improvements directly support the study's main inquiry into the system’s effectiveness. Users reported greater ease in performing tasks like logging training hours, verifying attendance via facial recognition, and generating reports.

B. Contributions and Innovation

By providing a quick, safe, and contactless way to manage attendance, the SEAIT OJT Monitoring System with Face Recognition Technology enhances the supervision of students conducting on-the-job training. It guarantees accurate recording of check-in and check-out times, does away with manual logging, and lowers substitute attendance. The system encourages a paperless procedure and gives supervisors and students quick access to attendance information. It enables accessibility across desktop and mobile devices and has a user-friendly layout for easier access. Including AI-powered facial recognition improves productivity and security. It also helps supervisors keep an eye on student performance by sending automated alerts for absences or late log-ins. The system is a creative and sustainable solution for OJT monitoring because it is scalable and can be extended to other departments.

C. Limitations and Future Work

The SEAIT OJT Monitoring System's depend on reliable internet and camera quality is one of its limitations, which might harm facial recognition accuracy in dark or unreliable network environments. Masks, accessories, or major changes to one's appearance may also cause the device to malfunction. Older devices might not be able to support all of the functionality of the software, which would limit accessibility for certain users. Future research can improve the system by adding mask detection characteristics and increasing the accuracy of facial recognition in a variety of environmental settings. More verification can be obtained by integrating GPS for based on location tracking. A mobile application version would also improve accessibility even more, and data analytics capabilities would allow students and OJT coordinators create performance reports and discoveries.

VII. CONCLUSION

D. Summary of Key Findings

The SEAIT OJT Monitoring System effectively illustrated how facial recognition technology can enhance the accuracy, safety, and effectiveness of tracking attendance for on-the-job training. The approach dramatically lowers the likelihood of substitute attendance and manual recording errors, according to important findings. Its usability was improved by users finding the interface to be simple to use and simple. Better tracking of training hours and attendance was made possible by real-time data capture and access, and supervisors were able to better supervise student performance with the use of automatic warnings. The system turned out to be a dependable and expandable solution despite the of

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several restrictions pertaining to environmental factors and device compatibility. Its contactless and paperless procedure also complies with safety and health regulations. In summary, by incorporating cutting-edge technology, the system improves accessibility and accountability in OJT monitoring.

E. Final Remarks

The SEAIT OJT Monitoring System with face recognition technology is a big upgrade for tracking student attendance during their on-the-job training. Instead of dealing with manual sign-ins or paper records, this system makes the process faster, more accurate, and way more convenient for everyone involved. It's also important to keep it user-friendly and make sure privacy isn't overlooked. Future improvements could focus on making the system work even better in different settings and for more users. Overall, this project shows how facial recognition can make school admin tasks way smoother helping students, teachers, and schools save time and avoid tampering of attendance. It's a step toward smarter, more efficient systems in education.

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APPENDICES

A. Functionality Questionnaire

- The face recognition feature quickly detects my face during attendance.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system accurately records my attendance every time.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I rarely experience errors when using the face recognition.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system works well even in different lighting conditions.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- Notifications are clear.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system loads fast without delays.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The face recognition process is simple and straightforward.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I trust the system to keep my attendance data secure.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system works smoothly.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The features meet all my OJT monitoring needs.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

B. Accessibility Questionnaire

- The system is easy to access from any location.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I can use the system even with a slow internet connection.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The interface is easy to read or see.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- Instructions are provided if there is a problem.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system is usable for people with PWD.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I don’t need technical skills to operate the system.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system is compatible with my device (phone/laptop).
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I can use the system without help from others.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The face recognition works even if I wear glasses/masks.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system is available whenever I need it.
- Strongly Agree ☐ Agree ☐ Disagree ☐Strongly Disagree

C. Accuracy Questionnaire

- The system recognizes my face correctly every time I check in/out.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I rarely need to retry because the system didn’t detect my face.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- Attendance records are always accurate.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system works well even if I change my appearance slightly.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐

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- It correctly identifies me even in different lighting.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- My attendance updates immediately after face recognition.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- The system still recognizes me if I wear a face mask.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I trust that my attendance data is always recorded correctly.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- I haven't experienced any errors where the system marked me absent when I was present.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐
- Overall, the face recognition is precise and reliable.
- Strongly Agree ☐ Agree ☐ Disagree ☐ Strongly Disagree ☐