

Look & Go: Development of a Facial Recognition-Based Event Attendance Monitoring System for Events

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ABSTRACT

This study focuses on the development of Look & Go, a facial recognition-based event attendance monitoring system for school events. In previous years, attendance was recorded through manual signing, while the current process uses attendance cards with stamps. Although these methods provide a way to record participation, they still require manual checking and may take additional time when many students attend an event. While facial recognition has been applied to classroom and institutional attendance, its use in fast-paced, high-volume school events remains underexplored. The proposed system aims to improve the attendance process by using facial recognition to verify student identities and record attendance electronically. The system may be implemented using available devices such as laptops, smartphones, iPhones, webcams, or tablets depending on the final setup. Liveness detection will also be considered to help prevent attendance using photographs or other presentation attacks. The system will be developed with consideration for the existing data privacy procedures followed by students during enrollment. The study population consists of CCIS students enrolled in AY 2026-2027 (~920). Using Slovin's formula at a 5% margin of error, a minimum sample of approximately 280–290 students will be targeted for registration and testing during the pilot events. Convenience sampling will be used, since participation depends on actual attendance at the SPCF Fair and Animation Day. The expected outcome is an automated attendance system that can reduce manual attendance checking, improve the organization of attendance records, and provide a more convenient method of monitoring student participation during school events.

Keywords: *Facial Recognition, Event-Based Attendance, Attendance Monitoring System, Liveness Monitoring*

SECTION I — INTRODUCTION (THE PROBLEM AND ITS SETTING)

1.1 Introduction

Attendance monitoring is an important part of school events because it provides a record of students who participate in different activities. In previous years, attendance was recorded through manual signing, where students wrote their names on attendance sheets. Recently, the attendance process has changed to the use of attendance cards with stamps. Although this provides a more organized way of checking attendance, it still requires students to present their cards and requires event organizers to manually check and manage attendance records.

With the development of facial recognition technology, attendance monitoring can be made more automated and convenient. Facial recognition allows a system to verify a person's identity through facial features and record attendance electronically. However, the use of facial recognition also presents challenges, including spoofing attempts, different lighting conditions, facial angles, and the proper handling of biometric information.

This study proposes Look & Go: Development of a Facial Recognition-Based Event Attendance Monitoring System for School Events. The system will use facial recognition to verify student identities and automatically record attendance. It may use available devices such as a webcam, laptop, smartphone, iPhone, or tablet depending on the final system implementation. Liveness detection will also be considered to help prevent the use of photographs or video replays for attendance. The system will be evaluated based on recognition accuracy, processing time, spoof rejection rate, false acceptance and rejection rates, and reduction in administrative workload.

1.2 Background of the Study

Attendance monitoring is commonly used during school events to keep track of student participation. In CCIS, the attendance process has changed over time. Previously, students recorded their attendance by manually signing their names. The current process uses an attendance card with a stamp. While the current method provides a physical record of attendance, it still involves manual checking and management, particularly when a large number of students attend an event.

The College of Computing and Information Sciences has approximately 920 students during the first semester, with an estimated 550 students potentially attending major events. With this number of participants, manually checking attendance cards can require considerable time and effort from the people managing the event.

Facial recognition technology provides an alternative method for attendance monitoring by allowing individuals to be identified through their facial features. Recent studies have explored facial recognition, facial embeddings, and liveness detection for automated attendance systems. Liveness detection is particularly important because facial recognition systems may be vulnerable to photographs and video replay attacks when an anti-spoofing mechanism is not included.

However, facial recognition systems can also experience challenges due to lighting conditions, camera quality, facial angles, masks, glasses, and changes in appearance. In addition, facial biometric information requires proper protection because biometric data is considered sensitive personal information under the Philippine Data Privacy Act of 2012.

The proposed Look & Go system aims to address these concerns by combining facial recognition with liveness verification and appropriate handling of biometric information. The system may operate through available devices such as laptops, webcams, smartphones, iPhones, or tablets. It will be tested during one to two major CCIS events, such as the SPCF Fair and Animation Day, to observe how the system performs in an actual event environment.

The study also addresses a methodological gap identified in previous research. Rather than focusing solely on classroom environments where recognition performance is refined under controlled conditions, this study examines how the underlying attendance methodology itself can be transitioned — from manual, card-based verification to an automated, facial recognition-based process suited for the pace and volume of school events. The proposed study will therefore develop and evaluate this methodological shift, using facial recognition for school event attendance and measuring its performance through recognition accuracy, processing time, liveness/spoof detection, and reduction in manual workload.

1.3 Objectives of the Study

- **General Objective:** The general objective of this study is to develop a facial recognition-based event attendance monitoring system that automates identity verification and attendance logging for school events, reducing the need for manual attendance checking.
- **Specific Objectives:**
 1. To develop a facial recognition module capable of verifying the identity of registered students during school events.
 2. To integrate liveness or anti-spoofing detection to help prevent the use of photographs and video replays for attendance.

3. To automate the recording of student attendance through a centralized attendance database.
4. To develop an accessible attendance interface that can operate using available devices such as laptops, smartphones, iPhones, webcams, or tablets.
5. To provide authorized users with a way to monitor and manage attendance records.
6. To evaluate the system based on recognition accuracy, processing time per student, spoof rejection rate, false acceptance and rejection rates, and reduction in administrative workload.

1.4 Scope and Limitation of the Study

- **Scope:** This study covers the development of Look & Go, a facial recognition-based event attendance monitoring system for school events. The system will focus on identifying registered students and recording their attendance electronically.

The system will include facial registration, facial recognition, liveness detection, attendance recording, and attendance record management. It may be accessed through available devices such as a laptop, Mac, smartphone, iPhone, webcam, or tablet/iPad, depending on the final implementation.

The study population consists of CCIS students enrolled in AY 2026-2027 (~920). Using Slovin's formula at a 5% margin of error, a minimum sample of approximately 280–290 students will be targeted for registration and testing during the pilot events. Convenience sampling will be used, since participation depends on actual attendance at the SPCF Fair and Animation Day. For UAT specifically, a subset of at least 30 students and 5 authorized personnel will be selected via purposive sampling to ensure both end-user and administrator perspectives are captured.

The system will be evaluated using recognition accuracy, processing time per student, spoof rejection rate, false acceptance rate, false rejection rate, and reduction in administrative workload.

- **Limitation:** The study will focus specifically on attendance monitoring during selected school events and will not cover regular classroom attendance. The performance of facial recognition may be affected by environmental conditions such as lighting, camera quality, facial angles, masks, glasses, and changes in hairstyle or appearance. The system will also require students to be registered before their faces can be recognized for attendance. This initial enrollment process may require additional time and administrative effort. The pilot testing will be limited to one to two major CCIS events, such as the SPCF Fair and Animation Day. Therefore, the results may not represent attendance conditions for every type of school event. The study will also depend on the available devices and resources, including laptops, Mac computers, smartphones, iPhones, webcams, and tablets/iPads. For data privacy, the study will coordinate with the school regarding the collection and use of student information

1.5 Significance of the Study

The study may benefit the following:

Students. The proposed system may provide a more convenient way of recording attendance during school events. Students may no longer need to rely entirely on attendance cards and manual checking.

Event Organizers. The system may reduce the time and effort needed to check attendance cards and manage attendance records, especially during events with a large number of participants.

CCIS Department. The system may provide an alternative digital method for monitoring student participation during major events. With a sizable student population attending major events, automated attendance may help manage larger groups more efficiently.

School Administrators. The system may provide organized digital attendance records that can be accessed and reviewed by authorized personnel.

Researchers and Developers. The study may provide a reference for developing facial recognition attendance systems that combine identity verification, liveness detection, and appropriate biometric data handling.

Future Researchers. The study may serve as a reference for future studies involving facial recognition, automated attendance monitoring, event-based attendance systems, anti-spoofing technology, and data privacy.

The proposed system also supports the reduction of manual attendance work and aims to provide more organized and auditable digital attendance records.

1.6 Definition of Terms

Anti-Spoofing. Techniques used to detect and reject attempts to fool a biometric system with fake credentials, such as printed photographs, video replays, or masks.

Attendance Card. The physical card that CCIS students currently present at events to be stamped as proof of attendance.

Attendance Monitoring System. A system that records and keeps track of the people who take part in an activity or event.

Attendance Record Management. The process of viewing, organizing, updating, and reviewing stored attendance data by authorized users.

Biometric Data. Personal information based on a person's physical characteristics, such as facial features, that can be used to identify them. Under the Data Privacy Act of 2012, it is treated as sensitive personal information.

College of Computing and Information Sciences (CCIS). College of Computing and Information Sciences (CCIS). The college whose students are the focus of this study.

Data Privacy Act of 2012 (Republic Act No. 10173). The Philippine law that protects personal information and sets rules on how it is collected, processed, stored, and disposed of.

Event-Based Attendance. Attendance monitoring for events such as the SPCF Fair and Animation Day, where many students arrive within a limited period, as opposed to regular classroom attendance.

Facial Embedding. A numerical representation of a person's facial features generated by a model. Embeddings are compared to determine whether two faces belong to the same person.

Facial Recognition. A technology that identifies or verifies a person by analyzing and comparing their facial features against stored data.

Facial Registration (Enrollment). The process of capturing a student's face and storing its data in the system so that the student can be recognized during events.

False Acceptance Rate (FAR). The proportion of attempts in which the system wrongly accepts an unregistered person or the wrong identity as a valid match.

False Rejection Rate (FRR). The proportion of attempts in which the system wrongly rejects a registered student who should have been recognized.

Liveness Detection. A verification step that checks whether the face presented to the camera belongs to a live person rather than a photograph, video, or other spoofing material.

Look & Go. The proposed facial recognition-based event attendance monitoring system developed in this study.

Presentation Attack. An attempt to deceive a biometric system by presenting fake biometric evidence, such as a photo or video of a registered student.

Processing Time per Student. The time the system takes to capture a face, verify identity, check liveness, and record attendance for one student.

Recognition Accuracy. The percentage of correct identifications made by the system out of all recognition attempts.

Reduction in Administrative Workload. The decrease in time and effort event organizers spend checking and managing attendance compared with the manual and card-based methods.

Registered Student. A CCIS student whose facial data has been enrolled in the system with the necessary consent and data privacy procedures.

Spoof Rejection Rate. The percentage of spoofing attempts, such as photos or video replays, that the system correctly detects and rejects.

SECTION II — LITERATURE REVIEW

2.1 Introduction to the Review

This chapter presents the literature and studies related to the development of Look & Go: Development of a Facial Recognition-Based Event Attendance Monitoring System for School Events. The review focuses on recent studies published from 2021 to 2026 concerning facial recognition, automated attendance monitoring, deep learning, liveness detection, portable and mobile systems, privacy protection, and the use of facial recognition in educational environments.

The reviewed literature is organized from global studies to national and Philippine studies, followed by studies closely related to the proposed system. Global studies provide the technical foundation for facial recognition and automated attendance systems. Philippine studies provide a local context for the application of facial recognition in educational and organizational settings. Focal studies are then examined to identify approaches involving liveness detection, real-time recognition, portable devices, privacy protection, and event participation.

The review aims to identify the common findings, technologies, advantages, and limitations of previous studies. It also establishes the research gap that supports the development of Look & Go as an event-based attendance monitoring system for CCIS school events.

2.2 Review of Related Literature and Studies

Recent literature shows that facial recognition has become an increasingly studied approach for automated identity verification and attendance monitoring. Global research has focused on improving recognition accuracy, reducing processing time, preventing attendance fraud, and making facial recognition practical in real-world environments.

Alhanaee et al. (2021) developed a facial recognition smart attendance system using deep transfer learning. Their study demonstrated that pretrained deep-learning models can be applied to automate attendance identification and reduce the effort associated with maintaining attendance records. Similarly, Orozov and Isaev (2024) developed a face recognition-based automated attendance management system that uses a camera to capture and identify students, verify their identities, and automatically record their attendance in a database. The study showed that facial recognition can reduce the time and human errors associated with traditional attendance methods. This study supports the use of facial recognition technology for automated and efficient student attendance recording.

Other studies have examined the practical implementation of facial recognition in educational environments. Rastogi et al. (2022) analyzed an automatic attendance system using facial recognition and highlighted that manual attendance can be a time-consuming task for teachers. Their study explored facial recognition as a biometric solution that can identify students and automatically record their attendance in an attendance database. JosephNg and Chow (2022) similarly investigated JomAttendance and reported that traditional paper-based attendance can be inconvenient in large university classes, particularly because of delays and attendance manipulation. How et al. (2022) developed a masked face recognition attendance system using a modified Convolutional Neural Network (CNN). The system integrated a Support Vector Machine (SVM) to improve the recognition of masked faces and automatically record attendance. The study achieved a recognition accuracy of 98.92%, demonstrating the potential of facial recognition and deep learning for automated attendance systems.

The literature further shows that researchers have compared different facial recognition algorithms for attendance. Budiman et al. (2023) conducted a systematic literature review comparing Local Binary Pattern Histogram (LBPH) and Convolutional Neural Network (CNN) approaches for student attendance. The review found that CNN generally achieved higher accuracy and more stable performance than LBPH when external factors affected facial recognition. This suggests that deep-learning approaches can be useful for attendance systems operating under changing environmental conditions.

The development of mobile and portable attendance systems is another important direction in recent research. Wan Abdul Rahman and Roslan (2023) developed a face recognition-based mobile application for student attendance and identified traditional paper attendance as vulnerable to proxy attendance. Their work demonstrates that facial recognition can be integrated into mobile applications to provide a more automated

attendance process. Nandhitha and Benisha (2024) also developed a facial recognition attendance system using OpenCV and Python, showing the continued use of computer vision frameworks for automated attendance applications.

Research in 2024 continued to explore deep-learning and pretrained models. Ahmad et al. (2024) evaluated several pretrained facial recognition models for attendance and selected FaceNet for their system after obtaining more than 95% accuracy. Irawati et al. (2024) developed a TensorFlow-enabled CNN model for student attendance and tested the system under different lighting and facial pose conditions. Their model achieved 93% validation accuracy and a response time of less than 0.3 seconds in their reported experiment. These studies indicate that both model selection and processing speed are important considerations for practical attendance systems.

Another 2024 study examined facial recognition for event participation rather than only classroom attendance. Sirimongkol et al. (2024) developed a facial recognition attendance system intended for event participation using CNN and YOLO-based face detection. The researchers tested different camera distances and numbers of detected faces. This study is particularly relevant to Look & Go because it demonstrates that facial recognition can be considered for event participation, although its testing conditions were still controlled and primarily focused on indoor lighting.

Liveness detection has also become an important part of recent facial recognition research. Facial recognition systems that only compare facial images may be vulnerable to presentation attacks using photographs or other artificial representations. A systematic literature review on face liveness detection published in 2023 identified spoofing as an important challenge in biometric facial recognition and examined artificial intelligence techniques for determining whether a captured face belongs to a live person (Khairnar et al., 2023).

Surantha and Sugijakko (2024) developed a lightweight portable attendance system combining facial recognition and liveness detection. Their system was designed for portable hardware and achieved an average processing time below 0.6 seconds in their reported testing. The researchers also found that adding liveness detection affects processing time. This is directly relevant to Look & Go because the proposed system may operate using available devices such as smartphones, iPhones, laptops, webcams, or tablets.

A 2024 IEEE study also combined an Android-based attendance system with facial recognition, liveness detection, and RFID. The researchers used FaceNet for facial feature extraction and a liveness detection model to distinguish genuine users from presentation attacks. Their results demonstrate how multiple verification mechanisms can be combined to strengthen attendance authentication (Yudas Malabi et al., 2024).

Santoso et al. (2024) further investigated the integration of liveness detection and deep learning in attendance management. Their research emphasized that liveness detection can be used to verify whether a person presenting a face to the system is genuine before attendance is recorded. This supports the inclusion of an anti-spoofing component in systems where attendance authenticity is important.

Recent research has also focused on real-time attendance monitoring. A 2025 study on real-time face tracking proposed continuous facial tracking instead of recording attendance only at one point in a class session. The system used OpenCV, CNN-based recognition, Firebase synchronization, and real-time reporting. This demonstrates the movement toward attendance systems that provide faster processing and more organized attendance records (Emmanuel Buggingo et al., 2025).

Lateef and Kamil (2025) developed a real-time facial recognition attendance system using YOLOv7 and MySQL. Their study identified manual attendance as time-consuming and examined facial recognition as a way to improve attendance efficiency. The study also emphasized challenges involving cost, implementation complexity, and reliability.

Mohaimen et al. (2025) developed a smart biometric attendance system using InsightFace and cosine similarity. Their system used an HD camera for real-time image acquisition, facial feature extraction, and similarity matching before automatically recording attendance. The researchers also considered different classroom lighting conditions and database integration. This is relevant to Look & Go because the proposed system will similarly require facial feature matching and electronic attendance recording.

Research published in 2025 also examined hybrid and alternative recognition approaches. Devi et al. (2025) investigated a facial recognition attendance system using a Support Vector Machine. This study demonstrates

that different algorithms can be used depending on the required recognition performance, processing requirements, and system environment.

Other 2025 studies focused on mobile and real-time student attendance. Sriyanto et al. (2025) investigated a facial recognition system for online or distance-learning student attendance, considering different lighting conditions, facial perspectives, and remote learning environments. Another 2025 study used YOLO-based real-time face recognition for student attendance and examined the potential of newer object-detection models for improving attendance processing (Yel et al., 2025).

Hu et al. (2024) proposed a privacy-preserving face recognition method based on extensible feature extraction. Their approach used encrypted facial feature representations while maintaining recognition performance. A related study by Huang et al. (2024) examined privacy-preserving face recognition through randomization and local feature learning, protecting facial information while retaining useful recognition characteristics. These studies emphasize the importance of protecting biometric information throughout the face recognition process.

Hu et al. (2024) proposed a privacy-preserving face recognition method based on extensible feature extraction. Their approach considered the use of encrypted or protected facial representations while maintaining recognition performance. A related 2024 study on privacy-preserving face recognition through randomization and local feature learning also examined how facial information can be protected while retaining useful recognition characteristics. These studies emphasize that biometric systems should consider the protection of facial information throughout the recognition process.

Melzi et al. (2024) provided an overview of privacy-enhancing technologies for biometric recognition and explained that biometric information is sensitive and requires protection. A 2024 survey on privacy-preserving biometrics similarly examined methods for protecting biometric information used for authentication (Arman et al., 2024). These studies support the importance of privacy considerations in the development of facial recognition attendance systems.

Philippine studies provide additional context for the proposed system. Domingo and Ladia (2024) developed QSUM-eASys, a face recognition and web-based attendance monitoring system for Quirino State University–Maddela Campus. The study demonstrates the use of facial recognition for institutional attendance management in the Philippine setting.

The Philippine literature shows that facial recognition is already being explored for educational and organizational attendance. However, many local applications focus on employees, classrooms, laboratories, or general institutional attendance rather than attendance at large school events. This distinction is important because event attendance can involve a larger number of participants arriving within a shorter period and may require faster verification and more flexible hardware arrangements.

The most recent global research further supports the need to combine recognition, efficiency, security, and privacy. Abiodun et al. (2026) proposed LaED, a lightweight, edge-aware, explainable deep-learning model for privacy-preserving facial attendance tracking in resource-constrained educational environments. Their study identified privacy, demographic bias, spoofing, and computational limitations as continuing challenges in real-world educational deployment.

Overall, the reviewed studies show that facial recognition can automate attendance and reduce dependence on manual attendance processes. They also demonstrate that recognition accuracy alone is not sufficient for a reliable attendance system. Liveness detection can help address presentation attacks, lightweight models can support portable devices, real-time processing can reduce delays, and privacy-preserving techniques can help protect biometric information. However, most existing systems remain focused on classrooms, employees, or controlled environments. Only a smaller portion of the reviewed literature directly examines facial recognition for event participation or large school-event environments. This creates an opportunity for the proposed Look & Go system to focus specifically on school-event attendance.

For the Philippine and CCIS context, this research is particularly relevant because the existing attendance process has changed from manual signing to attendance cards with stamps. Although the current process provides a physical way to record participation, it still requires manual checking and handling. Look & Go therefore proposes an electronic alternative using facial recognition that can operate through available devices such as laptops, smartphones, iPhones, webcams, or tablets. However, the system will still have supervision from the designated

council, which will monitor the operation of the facial recognition system and oversee the attendance records to ensure that the process is properly implemented and monitored.

The study will focus on CCIS, whose population consists of CCIS students enrolled in AY 2026-2027 (~920). Using Slovin's formula at a 5% margin of error, a minimum sample of approximately 280–290 students will be targeted for registration and testing during the pilot events. Convenience sampling will be used, since participation depends on actual attendance at the SPCF Fair and Animation Day. For UAT specifically, a subset of at least 30 students and 5 authorized personnel will be selected via purposive sampling to ensure both end-user and administrator perspectives are captured. This event-based focus distinguishes the study from many previous attendance systems that were primarily designed for regular classroom attendance.

2.3 Conceptual Framework

The conceptual framework of Look & Go follows the Input-Process-Output (IPO) model. The model explains how the information and resources required by the system are transformed into verified and organized event attendance records.



Figure 1. Conceptual Framework

The Input consists of the information, devices, and requirements needed by the system. Student information and registered facial information are used as the basis for identity verification, while event information determines where and when attendance should be recorded.

The Process represents the main operations of Look & Go. The system captures a student's face, detects the face, performs facial recognition, and applies liveness detection to help determine whether the presented face belongs to a live person. After successful identity matching, the system records the student's attendance electronically.

The Output consists of the verified identity and organized attendance records. These records can be used to monitor participation during school events and generate attendance reports. The overall transformation is intended to reduce dependence on manual attendance checking while providing a more organized method of recording student participation.

2.4 Synthesis

The reviewed literature from 2021 to 2026 demonstrates that facial recognition is increasingly being applied to automated attendance monitoring. Studies have shown that deep learning, CNN-based recognition, facial embeddings, and similarity-based matching can be used to identify students and automatically record attendance. Research has also demonstrated that mobile and portable devices can support facial recognition when lightweight models and efficient processing techniques are used.

The literature also shows that security is an important concern. Facial recognition systems can be vulnerable to presentation attacks, making liveness detection an important additional feature. Studies from 2023 to 2025 demonstrate different approaches to liveness detection and anti-spoofing, while newer research combines liveness with other verification mechanisms.

Privacy is another consistent concern across recent studies. Researchers have examined privacy-preserving facial recognition, encrypted biometric representations, and methods for reducing the risk of facial information leakage. These findings support the need for appropriate handling of student facial information when developing an attendance system.

Philippine research demonstrates that facial recognition attendance systems can also be applied within local educational institutions. However, the available local studies identified in this review generally focus on institutional, employee, classroom, or laboratory attendance. There is less emphasis on using facial recognition specifically for large school events.

The main gap identified from the reviewed literature is therefore methodological rather than purely technological. Existing studies largely focus on refining facial recognition performance within environments that still assume a controlled, single-point verification process similar in structure to manual or card-based checking — for example, one student verified at a time under stable lighting. Few studies address the methodological shift required to move an institution's attendance process away from manual or card-based verification altogether and toward a fully automated, biometric-driven methodology capable of handling the pace and volume of a live school event.

Look & Go addresses this methodological gap by developing and testing a system that replaces CCIS's existing manual, card-based verification method with an automated facial recognition-based methodology — one that integrates identity verification, liveness detection, electronic attendance recording, and privacy safeguards into a single process suited for high-volume, event-based conditions.

Therefore, the reviewed literature provides the technical and conceptual foundation for the proposed system while also establishing the need to investigate how facial recognition can be applied specifically to school-event attendance rather than limiting its use to traditional classroom attendance. The study will focus on the CCIS student population, with pilot testing during one to two major CCIS events, such as the SPCF Fair and Animation Day.

SECTION III — METHODOLOGY

3.1 Research Design

This study employs a Descriptive-Developmental Research Design with a Quantitative Approach. The developmental aspect focuses on the planning, designing, development, implementation, and improvement of the proposed Look & Go: Facial Recognition-Based Event Attendance Monitoring System. The descriptive-quantitative aspect focuses on evaluating the developed system based on measurable criteria such as recognition accuracy, processing time, attendance recording, liveness detection, false acceptance rate, false rejection rate, and system usability.

The study aims to develop an electronic attendance monitoring system that can assist in verifying student identities and recording attendance during selected school events. The system will be evaluated using actual or controlled attendance scenarios to determine whether it can reduce manual attendance checking and organize attendance records more efficiently.

3.2 System Development Methodology

The study will use an Agile Development Methodology for the development of the Look & Go system. Agile allows the researchers to develop the system in stages, test individual functions, identify problems, and make improvements throughout the development process.

The development process will involve the following activities:

1. **Planning and Requirement Gathering** – The researchers will identify the existing attendance process, system objectives, user requirements, and available hardware.
2. **System Design** – The researchers will design the system architecture, database structure, user interface, and attendance workflow.
3. **Development** – The facial recognition, liveness detection, attendance recording, and monitoring functions will be developed and integrated.
4. **Testing** – Individual system components and their integration will be tested to identify errors and performance issues.
5. **Evaluation and Improvement** – The system will be evaluated using defined performance criteria, and necessary improvements will be applied based on the results.

The participants will consist of CCIS students who will participate in the selected testing or pilot events. The study will focus on selected major CCIS events, such as the SPCF Fair and Animation Day. The exact number of participants will depend on the actual attendance and the procedures approved by the school.

3.3 Requirement Specification and Analysis

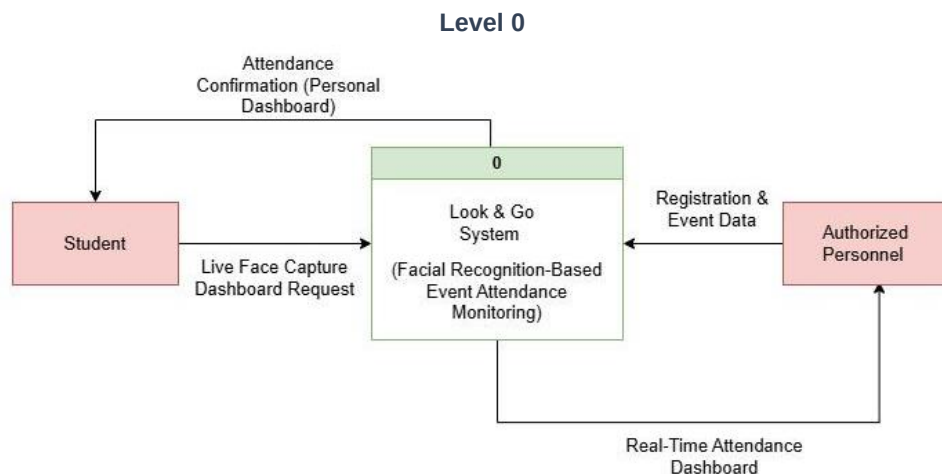


Figure 2.1 Data Flow Diagrams (DFD)

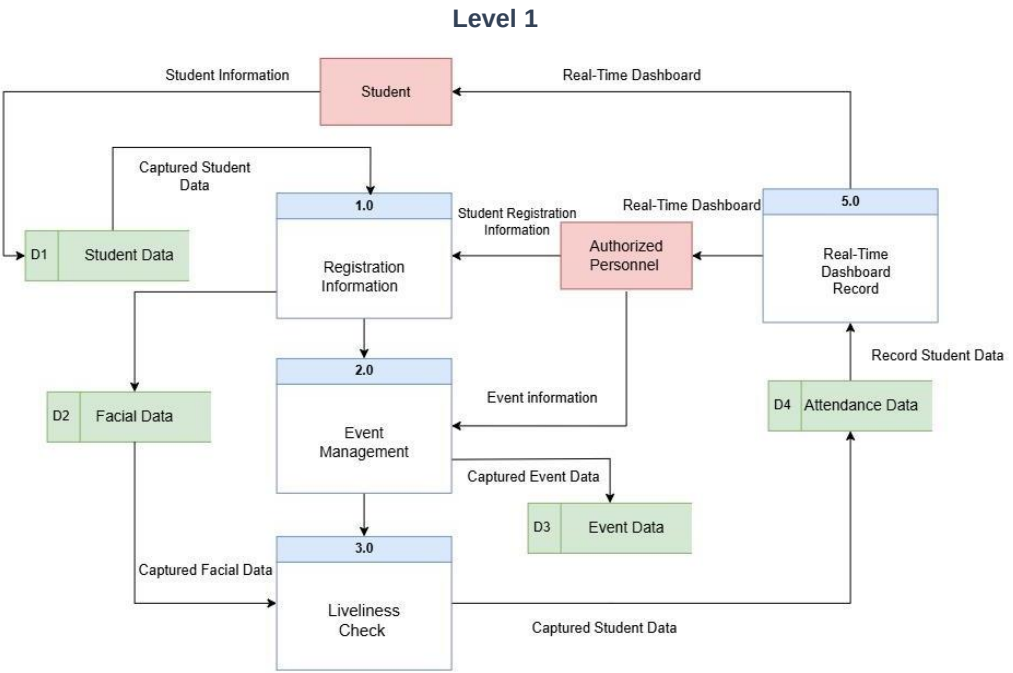


Figure 2.2. Data Flow Diagrams (DFD)

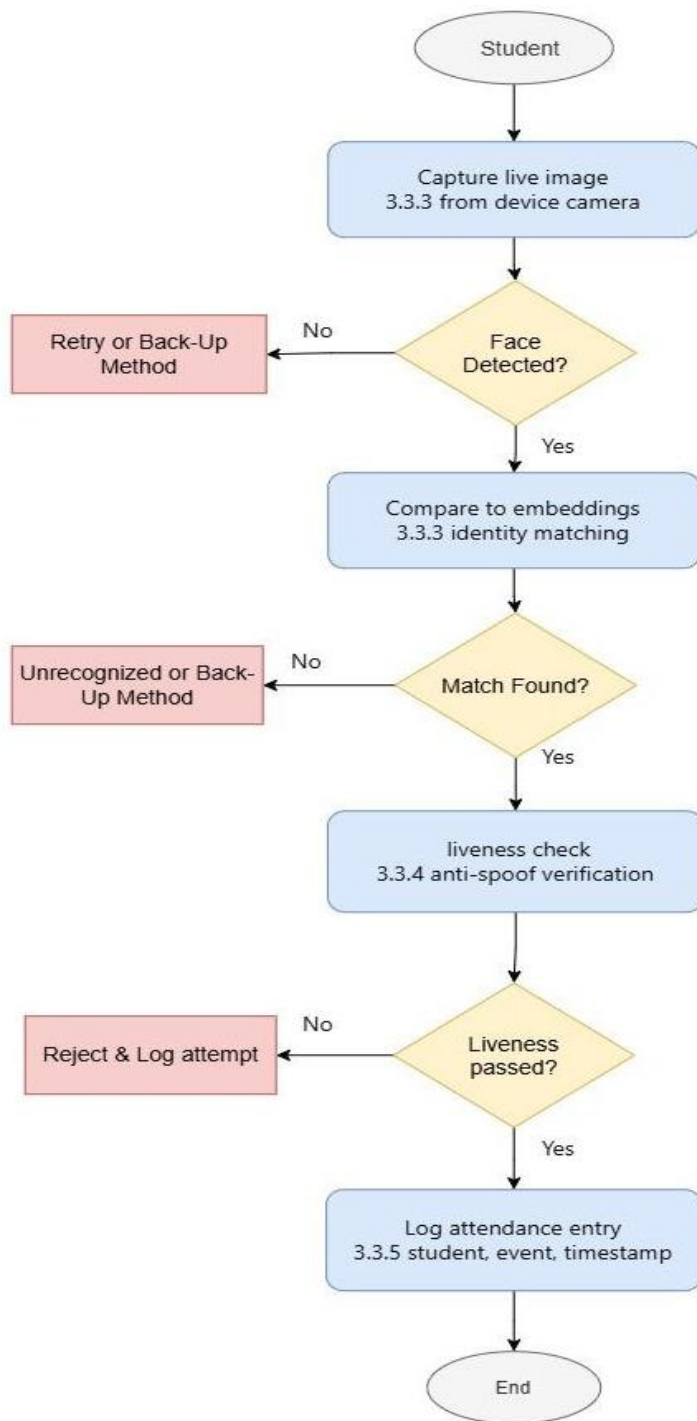


Figure 3. Flowchart

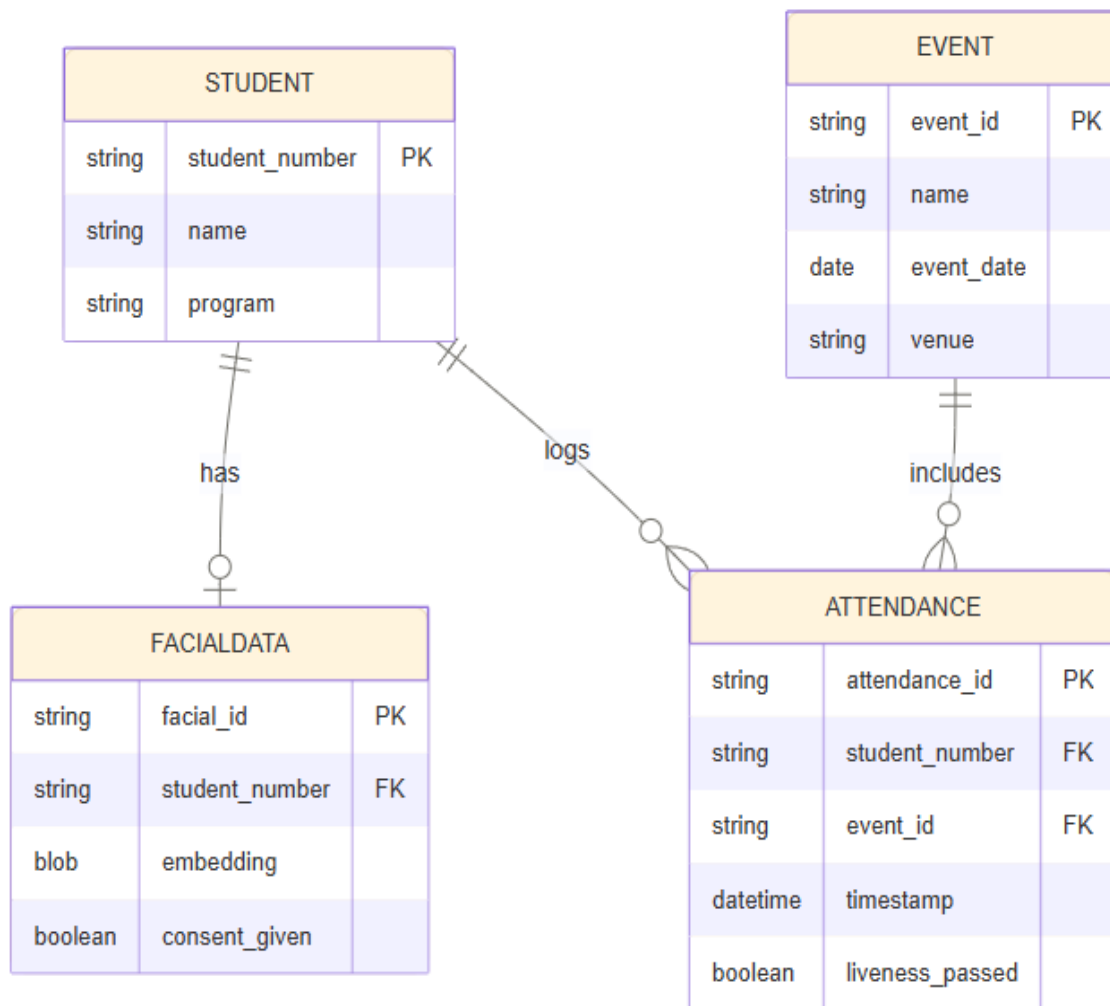


Figure 4. Entity-Relationship Diagrams (ERD)

3.4 System Design Specification

This section outlines the logical and physical specification of the Look & Go systems. The logical specification describes how the system will function from the user's perspective, while the physical specification describes the technologies and hardware that will support that functionality.

Logical Specification

The system will consist of three main interfaces: a Student Registration Module, an Attendance Capture Module, and an Admin Monitoring Dashboard.

Registration Module. Authorized personnel will enroll a student by capturing several facial images under varied angles and lighting, which the system converts into a facial embedding linked to the student's ID, name, and program. This embedding is stored securely for later matching.

Attendance Capture Module (student-facing). At an event, the device camera captures a live image of the student. The system performs face detection, compares the detected face against stored embeddings, applies liveness detection to confirm a live subject, and — upon a successful match — logs the attendance entry with a timestamp. This flow mirrors the process diagram in Section 3.3 (capture → detect → match → liveness check → log).

Admin Dashboard. Event organizers and the designated council can view real-time attendance counts, search or filter records by student or event, export attendance reports, and review flagged or rejected attempts (e.g., failed liveness checks).

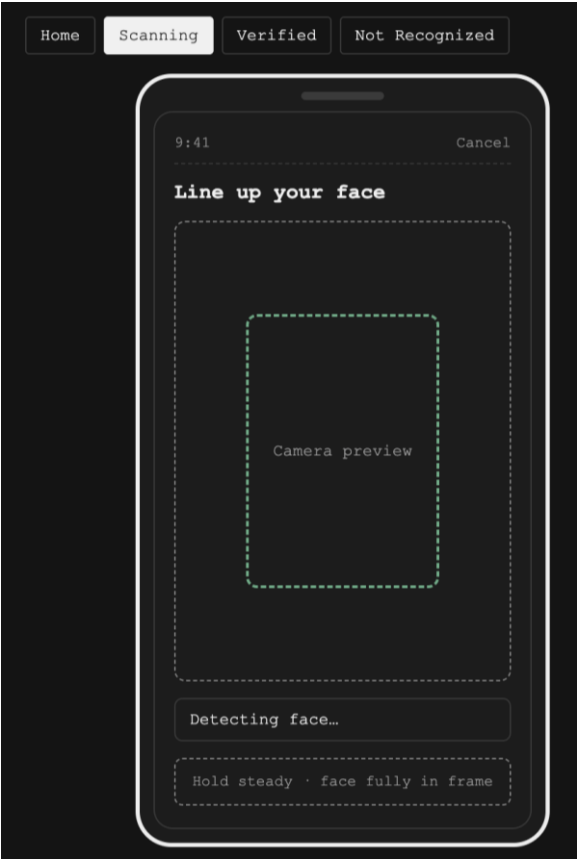
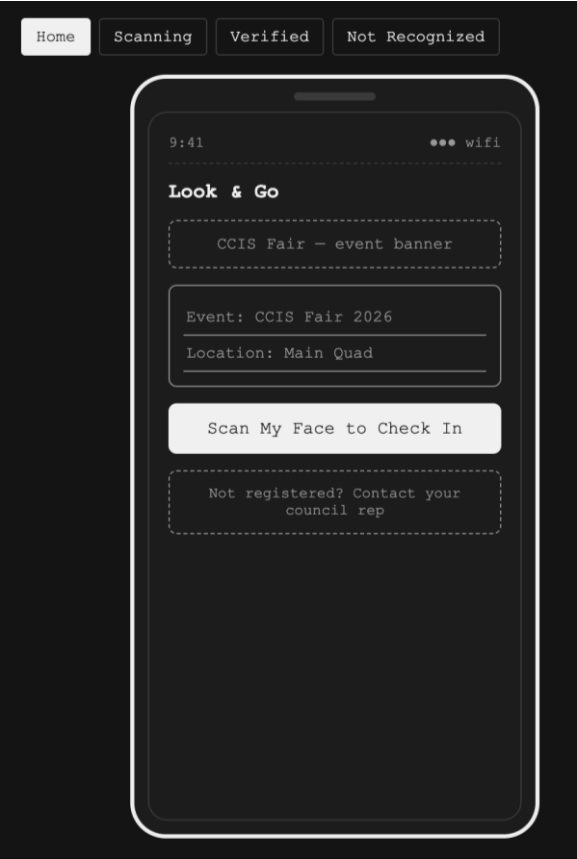


Figure 5.1. *Wireframe Home*

Figure 5.2. *Wireframe Scanning*

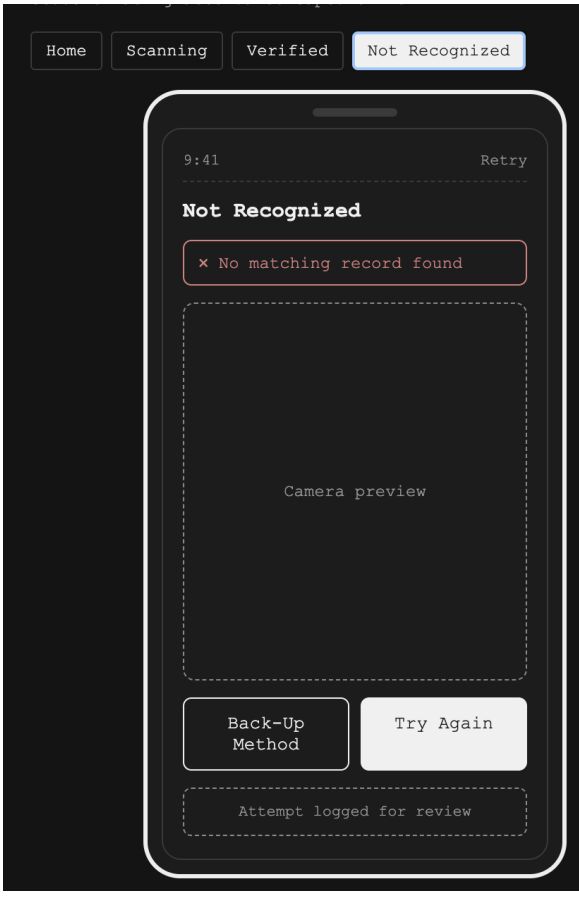
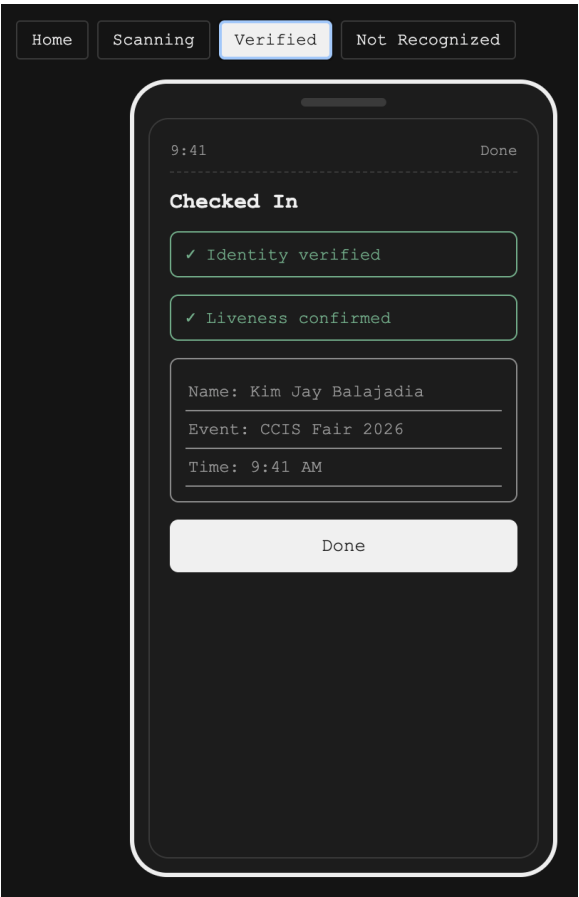


Figure 5.3. Wireframe Verified

Figure 5.4 Wireframe Not Recognized

Frontend / Client. Cross-platform mobile app (for smartphone/tablet capture) built with a framework suited to the BSIT Mobile Development track (e.g., Flutter or React Native), plus a lightweight web-based admin dashboard for laptop/desktop use.

Backend. Python-based API (e.g., FastAPI or Flask) to host the facial recognition and liveness detection models and expose endpoints for registration, verification, and attendance logging.

Facial Recognition Engine. A pretrained embedding model (e.g., FaceNet or a comparable CNN-based extractor, consistent with models cited in your literature review) for generating and comparing facial embeddings.

Liveness Detection. A lightweight anti-spoofing model or blink/motion-based check integrated into the capture pipeline before a match is accepted.

Database. A relational database (e.g., PostgreSQL or MySQL) to store student records, facial embeddings (or embedding references), event details, and attendance logs.

Devices. Laptops, smartphones, iPhones, webcams, and tablets/iPads, depending on what is available at each pilot event.

Hosting. Local server or cloud-hosted instance (e.g., a single VM) sufficient for pilot-scale testing at one to two CCIS events.

3.5 Implementation

This section describes how the Look & Go system will be built and integrated, following the Agile methodology outlined in Section 3.2.

Code Organization. The backend will be organized into modules corresponding to each stage of the attendance workflow: a registration module (facial capture and embedding generation), a recognition module (embedding comparison and identity matching), a liveness module (anti-spoofing checks), and an attendance module (logging, storage, and reporting). The frontend will similarly separate the student-facing capture screen from the admin dashboard views, following standard component-based structuring for the chosen mobile framework. API endpoints will follow REST conventions (e.g., POST /register, POST /verify, GET /attendance/{event_id}) to keep client-server communication predictable and testable.

Database Setup. The database will include, at minimum, tables for students (ID, name, program, contact info), facial_embeddings (linked to a student ID), events (event name, date, location), and attendance_logs (student ID, event ID, timestamp, verification status, liveness result). Foreign key relationships will tie attendance logs to both the student and the event to support reporting and filtering on the admin dashboard.

Component Integration. The facial recognition and liveness detection models will be integrated as backend services called by the mobile client during the capture step. Each verification attempt will pass through detection → embedding comparison → liveness check → logging, matching the flow already defined in Section 3.3, with each stage returning a status the client can display to the user in real time (e.g., "Verified," "Not Recognized," "Please Try Again").

Testing and Migration Strategy. Since Look & Go replaces an existing manual, card-based process rather than an existing digital system, there is no legacy data migration in the traditional sense; instead, the initial rollout will

focus on a registration/enrollment phase, where CCIS student records (name, ID number) are pre-loaded into the database ahead of the pilot event, and facial embeddings are captured on-site or during a scheduled registration period. Unit testing will validate individual modules (e.g., accuracy of face matching, correct rejection of spoof attempts), while integration testing will simulate the full attendance flow under event-like conditions (multiple students, varied lighting) ahead of the SPCF Fair or Animation Day pilot.

3.6 Testing and Evaluation

The developed Look & Go system will undergo testing and evaluation to determine its functionality, reliability, performance, and usability in monitoring student attendance during school events. Testing will be conducted in different stages to identify errors and ensure that the system functions properly before pilot implementation. Prior to pilot testing, baseline data will be gathered from the current manual/card-based process — specifically, average processing time per student and total time to process a sample batch (e.g., 50 students) — during a comparable CCIS event or via records from event organizers. This baseline will be compared against Look & Go's measured processing time per student and total batch time to quantify the actual reduction in administrative workload, rather than relying on organizer perception alone.

Unit Testing. Will be conducted to test individual system components separately. This will include testing the facial registration, face detection, facial recognition, liveness detection, identity matching, attendance recording, and attendance record management functions. Each component will be checked to determine whether it performs its intended function correctly.

Integration Testing. This testing is conducted after the individual components have been tested. This stage will determine whether the different modules work properly when combined. The complete attendance process will be tested, starting from facial capture and face detection, followed by recognition, liveness verification, identity matching, and electronic attendance recording.

User Acceptance Testing (UAT). This testing is conducted with selected CCIS students and authorized users during controlled testing or selected pilot events. The participants will use the system during actual or simulated attendance scenarios and provide feedback regarding its usability, functionality, and ease of use. The designated council will also supervise the operation of the facial recognition system and attendance monitoring during testing.

For system evaluation, the study will use selected criteria from the ISO 25010 software quality model, particularly functional suitability, performance efficiency, and usability. A 5-point Likert scale may be used to evaluate the users' assessment of the system. In addition to the ISO 25010-based evaluation, the technical performance of the system will be measured using recognition accuracy, processing time per student, spoof rejection rate, false acceptance rate (FAR), false rejection rate (FRR), and reduction in administrative workload.

The testing and evaluation results will be analyzed to determine whether Look & Go performs its intended functions and can provide an organized electronic alternative to the existing manual and attendance-card-based process. The results will also be used to identify areas that require improvement before or during the pilot implementation.

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