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DEVELOPMENT OF A STUDENT MONITORING ATTENDANCE FOR IMPROVED LEARNING USING UI/UX DESIGN

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Abstract

This research focused on user interface and user experience design approach for developing a student attendance monitoring system to enhance the learning experience in educational institutions. Attendance is crucial in ascertaining a student's academic success. It serves as the foundation for knowledge acquisition and the conduit for learning experiences and development. Consistent attendance guarantees that students remain aligned with the curriculum, participate actively in class discussions, and obtain prompt feedback from educators. Insufficient oversight of student's attendance results in considerable knowledge deficits and diminishes the probability of academic success. This study proposes a monitoring student attendance system that will prioritize clarity, simplicity, consistency, and accessibility for both the students and the lecturers. The system integrates real-time feedback, gamified incentives, and a face recognition-enabled mobile app coupled with an administrative dashboard. High-fidelity prototypes were created using Figma, emphasizing usability and scalability. The design also incorporated analytics dashboards for educators and intuitive interfaces for students to streamline attendance tracking and foster engagement. This system will reduce administrative burdens, enhance parental involvement, and provide actionable insights for institutional policies if implemented. This research is expected to bridge the gap between functionality and usability, hereby improving the students' attendance to lectures and educational outcomes.

Keyword: Student's attendance, learning, User Interface and User Experience, Gamification and Figma.

Introduction

In recent years, the importance of monitoring student attendances in educational institutions has gained significant attention. Attendance is more than a measure of physical presence; it serves as a key indicator of student engagement, academic performance, and overall learning outcomes Mawardi et al., (2021). Research indicated that regular attendance is directly linked to better grades, improved social skills, and higher retention rates in educational programs (Epstein & Sheldon, 2016). Consequently, as educational paradigms shift towards more student-centered approaches, the development of effective tools for attendance tracking has become essential for fostering an environment that supports academic success. Traditional methods of attendance monitoring, such as roll calls or manual attendance sheets, are often inefficient and prone to errors, resulting in inaccurate records and wasted instructional time. Moreover, these methods do little to actively engage students or provide educators with actionable insights into attendance

trends. For instance, in large lecture halls, manual roll calls can consume up to 15 minutes per session, detracting from valuable teaching time. Additionally, manual systems are vulnerable to fraud, such as students marking attendance for absent peers or proxy attendance.

The advent of technology in education has opened new avenues for improving attendance monitoring systems. Digital solutions such as biometric scanners, Radio Frequency Identification (RFID), and mobile-based applications have revolutionized the process. For example, in Singapore, schools have implemented RFID-based systems that automatically record attendance as students enter classrooms, reducing administrative burdens and ensuring accuracy (Tan, 2018). However, the effectiveness of these technological solutions depends significantly on their design and user experience. Poorly designed systems can lead to frustration among users, limiting adoption rates and diminishing the intended benefits. This is where User Interface (UI) and User Experience (UX) design principles play a crucial role. An intuitive, user-friendly interface can simplify the process for both students and educators, while an engaging UX can encourage active participation and compliance. For instance, a mobile app with features such as attendance notifications, gamified incentives for consistent attendance, and real-time analytics can transform attendance tracking from a mundane task into an integral part of the learning experience.

A real-life example of effective UI/UX design in attendance monitoring is the "Class123" platform used in South Korea. The platform combines attendance tracking with features like behavior monitoring, parent-teacher communication, and personalized feedback. Its gamified approach, including reward systems and progress dashboards, has been shown to improve student engagement and participation rates (Choi, 2022). Hence the need for attendance monitoring system for schools, most especially for Bamidele Olumilua University of Education, Science and Technology, Ikere.Ekiti, Nigeria.

Problem Statement

The effectiveness of monitoring student attendance is a critical factor in fostering academic success and engagement. While various attendance management systems have been introduced, many fail to deliver an optimal user experience for both students and educators. Key challenges include overly complex interfaces, lack of real-time updates, and limited integration of engagement features, which often result in low adoption rates and reduced system efficiency. This study focuses on a UI/UX design approach to monitoring student attendance by developing a system that prioritizes simplicity, accessibility, and engagement features such as seamless navigation, real-time feedback, and gamified incentives in order to create a tool that will streamlines the attendance tracking process and fosters active participation and collaboration between students, educators, and parents.

Objective of the Study

The main objective of this study is to develop a student monitoring attendance system that incorporates best practices in UI/UX design to bridge the gap between functionality and usability, hereby improving students' attendance to lectures and educational outcomes.

Literature Review

Overview of Digital Attendance Systems

A digital attendance system for students leverages technology to automate and streamline the process of tracking and recording student presence in educational institutions. These systems typically utilize tools such as biometric scanners, QR codes, or mobile applications to register student attendance in real time, reducing human error and the administrative burden associated with traditional methods like roll calls or manual attendance sheets (Siew *et al*., 2024). These systems not only improve accuracy but also enhance efficiency by providing instant updates and analytics on attendance patterns, enabling educators to identify trends, address absenteeism, and provide timely interventions. Additionally, digital attendance systems often integrate with other institutional management tools, creating a centralized platform for monitoring student performance and engagement. Moreover, modern systems increasingly focus on user-centered design, ensuring they are intuitive and accessible for both students and faculty, while incorporating features like notifications, gamification, and personalized feedback to increase user engagement and participation (Dicheva *et al*., 2015). This combination of automation, real-time data, and user engagement contributes to a more efficient, accurate, and positive learning experience for all stakeholders.

Overview of UI/UX

User experience (UX) design is a process that involves cultivating a good relationship between a company, the company's software products /services, and the company's clients/customers. The main goal is to provide a pleasant and positive experience for the user, to create digital products that a user feels comfortable when using, and for the user to accomplish their task and have their needs met (Interaction Design Foundation, 2025). While the UI (User Interface) design is all about the look, feel, and aesthetics of a digital product. It involves every visual aspect and appearance of the product the user interacts with. UI design is a subset of UX design and a small part of the UX design process. But it is a separate discipline on its own. A well-designed UI can make a digital product visually appealing, intuitive, and easy to navigate, while a well-designed UX can ensure that users have a positive experience throughout their entire journey, from discovering the product to using it and seeking support (Nasrullah Hamidli, 2023).

User Interface design and its importance

User interface design entails the creation of the visual and interactive components of a digital product, such as a website or mobile application, with which a user engages. It entails designing an interface that is aesthetically pleasing, user-friendly, and conducive to a favorable user experience (Interaction Design Foundation, 2017). The significance of UI design in the success of digital product creation is multifaceted.

i. User Experience: The interface serves as the primary means by which users engage with a digital product. An effectively designed UI facilitates user navigation and task completion, resulting in a favorable user experience.
ii. Branding: The interface design of a digital product is an essential element of its branding. It conveys the product's identity, principles, and distinctive attributes to the user, rendering it memorable and identifiable.
iii. Engagement: An effectively designed interface can enhance user engagement by providing a visually attractive and interactive experience. This may result in heightened utilization and recurrent visits.

iv. Efficiency: An effectively designed interface enhances user efficiency by minimizing the time and effort necessary to accomplish tasks. This may result in enhanced productivity and user happiness. User interface design is essential for developing a digital product that is functional and visually appealing, resulting in an enhanced user experience and greater engagement.

The key principles of UI design

The primary goal of UI design is to create a seamless user experience, which can be achieved by following the following principles (Smashing, 2017).

i. Simplicity: Effective user interface design relies on simplicity and clarity. The user interface should be simple to use and navigate, with little distractions or clutter. The simpler the design, the easier it is for people to achieve their objectives without becoming frustrated or confused.

ii. Consistency: Good UI design requires consistency to provide users with a sense of predictability and familiarity. Consistent design features such as colors, font, and layout help users comprehend and navigate the interface. When creating a UI, it is critical to establish consistent patterns and stick to them across the interface.

iii. Feedback: Effective UI design includes providing feedback to users to assist them understand the impact of their actions. Feedback can take various forms, such as visual indications, sound effects, or animations. For example, when a user clicks a button, the button should change color or display some visual indicator that the activity was accomplished.

iv. User-centered Design: Effective UI design prioritizes the user's wants and preferences. The design should be targeted to the intended audience, and the user experience should be simple, pleasant, and effective. The user interface should be accessible to all users, including those with disabilities.

v. Visibility: A well-designed user interface should provide clear feedback, such as text or visual cues, to ensure users understand the system's state and options. By following these principles, UI designers can create easy-to-use, aesthetically pleasing, and intuitive interfaces that increase user engagement and satisfaction.

User Experience design and its importance

User experience (UX) design is the process of creating digital products or services that are tailored to the user's needs, preferences, and habits. UX design aims to provide a seamless and intuitive user experience that satisfies the user's needs and expectations. This entails comprehending the user's objectives and motivations, identifying pain areas and friction points, and developing a design that addresses those difficulties. The role of UX design in developing user-centered digital products is critical. Here are a few reasons why UX design is essential:

i. Improved usability: UX design focuses on designing products that are simple to use and navigate, lowering the user's cognitive burden and making it easier to achieve their objectives. This may increase user pleasure and loyalty.

ii. Increased engagement: A well-designed UX can boost user engagement with the product, causing them to return and use it more frequently.
iii. Improved brand perception: A positive user experience can enhance the user's perception of the brand, resulting in favorable word-of-mouth marketing.
iv. Lower development costs: A user-centered design approach can assist uncover possible difficulties early in the development process, lowering the cost of resolving them later.
v. Competitive advantage: A superior user experience can set a product or service apart from its competitors, giving it a competitive advantage in the market.

UX design is critical for developing user-centered digital products that are simple to use, engaging, and responsive to the user's needs. Understanding the user's goals and behaviors allows UX designers to create a design that tackles pain spots while providing a seamless and intuitive experience, resulting in a more successful product (Smashing, 2018).

Principles of UX design

User experience design is the process of developing digital products or services that offer users a seamless and intuitive experience. The key concepts of UX design are around producing a design that is both functional and entertaining to use. Here are some of the main principles of UX design:

i. Usability: Usability is one of the most important principles in UX design. The design should be simple to use and navigate, lowering the user's cognitive burden and making it easier to achieve their goals. The interface should be simple and straightforward to use.
ii. Accessibility: Accessibility is a key element in UX design, ensuring that the product or service is useable by everyone, including people with disabilities. To ensure that all users have an equitable experience, the design should be accessible, using features such as text-to-speech and keyboard navigation.
iii. Delight: Delight refers to the emotional response that the user experiences when utilizing the product or service. A well-designed UX should elicit positive feelings, such as delight or excitement, increasing the likelihood that the user would engage with the product or service again.
iv. Efficiency: Another important concept of UX design is ensuring that the user can do their tasks swiftly and easily. The design should be optimized for speed and performance, lowering the time required for the user to complete tasks.
v. Clarity: Clarity is a core element of UX design that ensures the interface is clear and easy, giving the user the information they need to execute their tasks. The design should be visually appealing while maintaining clarity.

Following these principles allows UX designers to develop digital products or services that are both functional and entertaining to use. A well-designed UX can improve user engagement, contentment, and loyalty, resulting in a more successful product.

Comparative analysis on UI/UX designs of different Students' attendance

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When comparing UI/UX designs for attendance systems across various platforms, notable differences emerge in their approach to accessibility, design aesthetics, and user engagement. For instance:

Student Attendance Management System (Mobile UI - Light & Dark): This design is focused on providing clear, easy-to-navigate interfaces with options for both light and dark modes. It enhances accessibility by ensuring high contrast and simplicity, making it adaptable for different User preferences.

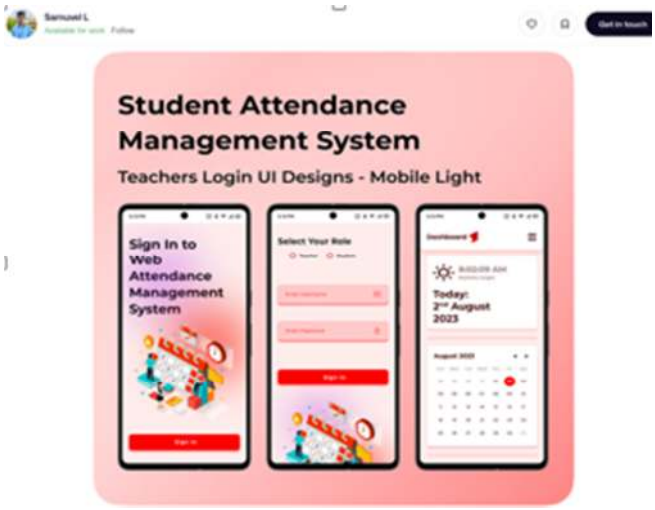

Figure 1: Student Attendance Management System

1. **Employee Attendance Management System (Web UI)**: Aimed more at corporate environments, it emphasizes a clean, minimalist design with data-centric features, such as time tracking and detailed analytics. The design uses a functional layout that highlights employee performance alongside attendance data.

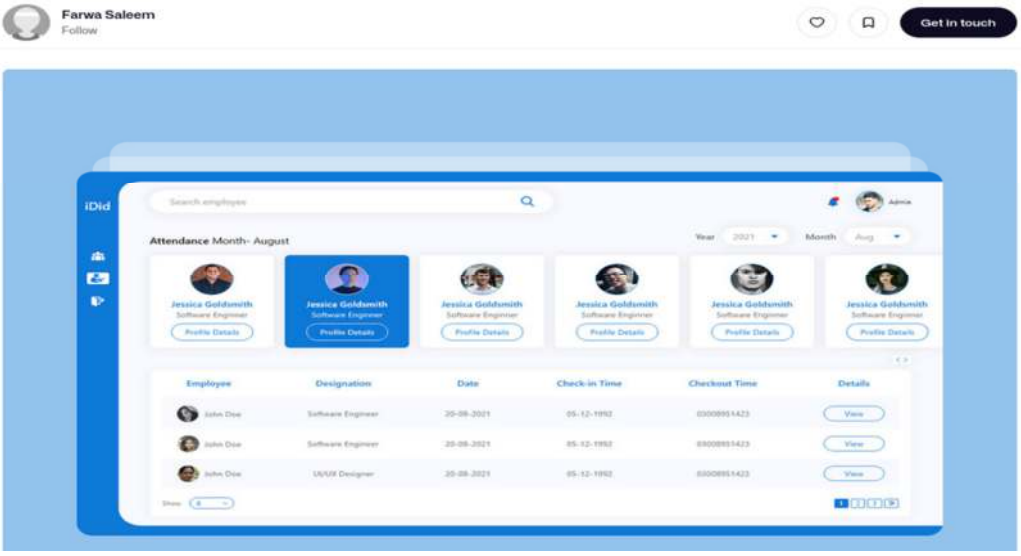

Figure 2: Employee Attendance Management Platform

2. **Smart Attendance App**: This mobile app design focuses on providing real-time notifications and engagement features, ensuring users remain connected with attendance-related updates. It's highly intuitive, with the addition of gamification elements to encourage frequent use and attendance tracking.

These systems highlight different approaches in prioritizing minimalism for efficiency, while others incorporate engaging features like gamification to boost interaction and consistency in attendance tracking (Dicheva *et al*., 2015).

Challenges of existing Students' attendance monitoring UIUX

The challenges faced by existing student attendance monitoring systems, especially regarding user interactions and user experience design, stem from several factors:

1. **Complex Interfaces and Navigation**: Many systems are not user-friendly, featuring outdated or overly complicated interfaces. This can lead to frustration for both students and educators, ultimately discouraging use. Modern users, accustomed to sleek and intuitive designs in commercial apps, expect similar standards in educational tools. Systems with unintuitive navigation or cluttered layouts struggle to engage users effectively
2. **Lack of Real-Time Feedback**: Traditional and even some digital systems fail to provide immediate or meaningful feedback to students about their attendance status. Without real-time insights, students cannot take proactive steps to address attendance issues, potentially impacting their academic performance.
3. **Limited Accessibility**: Accessibility issues, such as poor mobile optimization or insufficient support for assistive technologies, make these systems harder to use for a diverse student population, including those with disabilities. Cloud-based and cross-platform designs are often underutilized in current systems, limiting their reach and utility
4. **Ineffective Engagement Features**: Attendance systems often lack features that incentivize or gamify participation, such as attendance rewards, reminders, or progress tracking. Without engaging features, these systems fail to promote consistent use, particularly among students who might already be disengaged.
5. **Privacy and Data Security Concerns**: Students are increasingly aware of how their data is collected and used. Attendance systems that do not transparently handle data privacy or fail to secure sensitive information may encounter resistance from both students and administrators.

Related works

Mustapha *et al*., (2025) employed Internet of Things and radio frequency identification technology to develop a method for managing student attendance. The researcher devised a method employing RFID tags integrated into student bracelets to collect data through strategically positioned sensors. The system employs real-time databases and Google technology to improve the student experience via an online platform, while also using RFID for verification. The researcher concentrated on enhancing user experience (UX) via proficient design utilizing

web technologies. The study underscores the capability of RFID technology to enhance student management and academic achievement. Mawardi *et al*. (2021) examined students' attendance in classroom lectures as a dependent variable based on the method of attendance tracking. This study aimed to analyze students' perceptions regarding classroom attendance and see whether more rigorous attendance monitoring could enhance attendance rates. The researcher employed a percentage strategy within an observable methodology. The employed procedure is not a conventional statistical approach for attaining improved outcomes. Epstein and Sheldon (2016) analysed data from 347 schools across 21 districts to find factors that facilitate the implementation of policies for parental participation. The article examined research topics about the influence of school and district procedures on the quality of school-based partnership programs. The findings suggested that a policy on parental involvement may be highly beneficial. (Tan, 2018) Assessed a systematic literature review on IoT-based attendance systems utilizing RFID, which facilitates automation and mitigates various issues associated with manual processes. This system automatically records students' attendance by simply scanning their student cards at the RFID reader, thereby preventing unnecessary delays and stress in manual attendance registration. The results underscored the potential of these techniques to fundamentally transform attendance tracking in educational environments. Nguyen et al., (2022) developed an intelligent attendance management system based on the Internet of Things (IoT). This study evaluated the merits and demerits of current smart attendance management systems and developed an IoT-based intelligent attendance management system utilizing cloud technology, a web server, Google API, a non-contact body temperature sensor, and the Raspberry Pi 4 module (4G), while also summarizing user satisfaction levels with the system. Diab-Bahman *et al*., (2022) analyzed the relationship between academic success and e-learning attendance, in contrast to traditional classroom environments. The researchers employed an investigative technique. The data reveal that attendance have a statistically significant influence on student grades. Abdullahi & Nuhu, (2023) compared facial recognition and fingerprint usage in class attendance using a Likert scale questionnaire. Validity and reliability were assessed through simulated piloting among students. Descriptive and ANOVA statistics were used, concluding fingerprints as the preferred method. Ezeofor Chukwunazo Joseph, (2020) developed an IoT-based student attendance monitoring system, utilizing the University of Port Harcourt as a case study, where emphasis is lay on 75% attendance requirement for students prior to examinations. The system included a power supply, fingerprint biometric sensor, ESP32 controller, thin-film transistor (TFT) liquid crystal display, and light-emitting diode (LED) as hardware components, alongside a webpage, Embedded C language, and My Structured Query Language (MySQL) database as software tools. The fingerprint sensor recorded students at course registration and verified their identities for attendance during class. The ESP32 microcontroller linked the system to the webpage for data storage and presented information through a TFT LCD. The expense of implementation may be a great challenge. Chiang et al.,(2022) engineered GPS and NFC for Attendance Systems. They both made research and implement GPS-enabled NFC systems for attendance. However, it is more dependent on Smartphone. Kasinathan et al., (2019) started research on Student Motivation through Gamified Interfaces. Their aim was to resolve the issue of low student attendance, the researcher proposed a character growth game with the concept of gamification that can track and reward student attendance called PetAttendToClass, a client-based system developed using C# and unity 3D game engine, being a gaming engine it might be distractive.

Methodology

The main purpose of this project is to create an intuitive and user-friendly interface that streamlines the process of attendance monitoring by utilizing face recognition feature, enhances user engagement, and facilitates better data management to support the educational experience. Using Figma, we were able design clear and interactive prototypes to represent the functionality and user flow of the attendance system prioritizing the needs of students and administrators by focusing on accessibility, usability, and appealing visuals. We developed an interface that minimizes complexity and provides easy access to attendance records and analysis. We thrive to encouraging regular attendance and participation through engagement-oriented designs like personalized dashboards. Offering a platform for rapid iteration and feedback, ensuring the system meets the diverse needs of its stakeholders.

Overview of Figma software

Figma is a web-based design tool widely used for creating user interface (UI) and user experience (UX) designs. It supports collaborative, cloud-based workflows and is known for its accessibility, as it operates directly in the browser with options for desktop applications. Designers use Figma for wire framing, prototyping, interface design, and design systems management.

The benefits of Figma in UI/UX

Figma gives room for Cross-Platform Accessibility which operate on any device with a browser. It encourages real-time editing and commenting for seamless teamwork. It is cloud-based storage which permit automatic saving and file management. Moreover, it is suitable for individual designers, small teams, and enterprise-level projects.

System Design

Problem Identification and Requirement Gathering

An oral interview was conducted to find out the need for electronic attendance from both staff and students of Bamidele Olumilua University of Education, Science and Technology. Based on their responses a thematic analysis was conducted to analyze the existing manual attendance monitoring systems for strengths, weaknesses, and gaps that are needed to be filled.

Design and Prototyping

Based on the findings an interactive prototype for the mobile app and administrative dashboard was developed utilizing **Figma** for designing the mobile and dashboard interfaces. User centered design principles that incorporated accessibility, simplicity, and consistency was applied. This was done in order to achieve high-fidelity prototypes of the app interface, easy interactive dashboard design for managing attendance data and generating reports, and an interactive android app prototype that integrates face recognition from database to mark attendances of students.

Results

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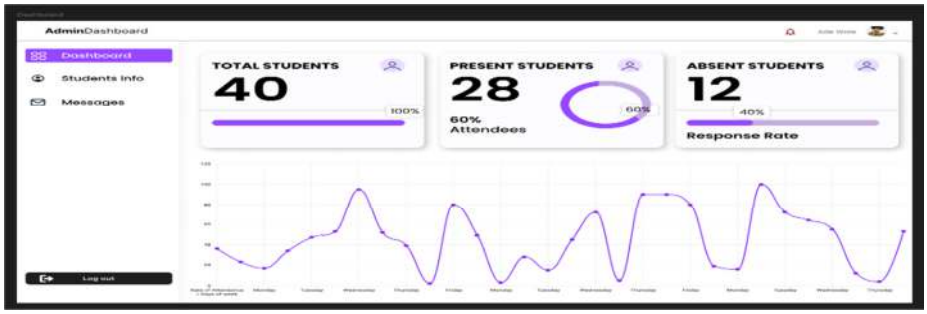

Figure 3: Admin Dashboard section

This is the administrative dashboard which will contain the analysis and reports of total students in the class, the number of students that are present and the number of students that are absent. The chart represents the rate of attendance of all students for each day in a week.

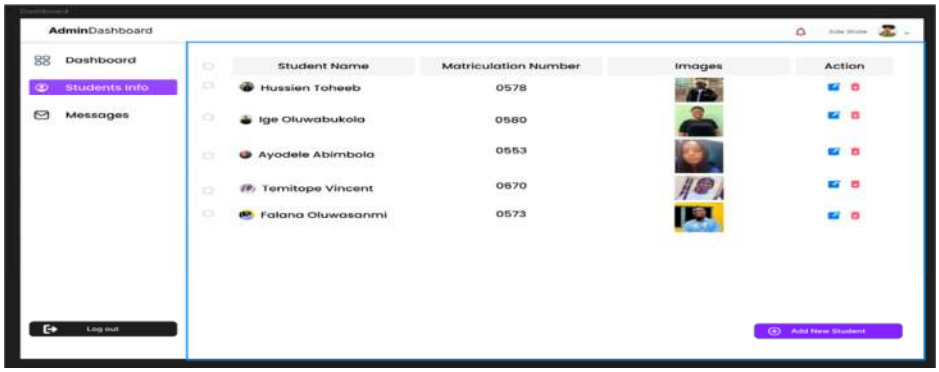

Figure 4: Student Information section

This is just a table of students' information and those images are the predefined images for the face recognition. Each students have an image that has been assigned to their names and matriculation number so when the client app scans the face, the client app will be able to fetch the rest of the students' information, successfully mark their attendance and display their information on the last screen. There is also a button that functions as adding new students' information and their corresponding image for face recognition. Students' information can be edited and deleted.

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Figure 5: Onboarding Screen

This is the client app in which the students will use to mark their attendance and the screen above is called an onboarding screen that is used to welcome users and tell the user a little bit more the app and the functionality of the app.

Figure 6: Face Recognition Screen

This is the screen where the user will verify their face and mark their attendance if the face is successfully recognized.

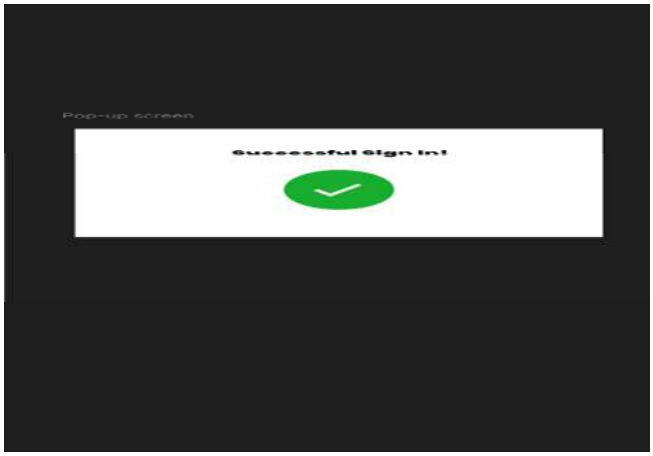

Figure 7: Successful Recognition Screen

This screen pops up when the face is successfully scanned and the face is found with a valid user students.

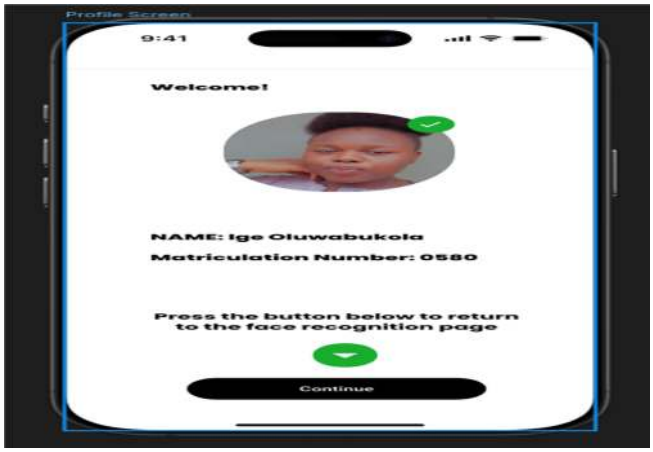

Figure 8: Student details Screen

This screen displays the successfully recognized students' information.

Discussion

Key findings suggest that the implemented design significantly improved usability, navigation, and overall user satisfaction. Feedback from user testing and evaluation further validated the design decisions, highlighting areas where the design met user expectations and where minor improvements were necessary. The findings demonstrate that a user-centered design approach effectively addressed the project goals. The consistent alignment of the design outcomes with user needs emphasizes the importance of iterative testing and refinement. Notably, the visual and functional improvements were well-received by participants, showcasing the value of balancing aesthetics with functionality.

In conclusion, the results affirm that a well-executed UI/UX process can lead to a more intuitive and engaging user experience. Future work could focus on refining specific aspects identified during testing and scaling the design for broader applications. This study reinforces the critical role of user feedback in achieving a design that is both practical and user-friendly.

Summary

This study developed a monitoring student attendance system that will prioritize clarity, simplicity, consistency, and accessibility for both the students and the lecturers. The system integrated features like real-time feedback, gamified incentives, and a face recognition system that enabled mobile app to coup with an administrative dashboard. High-fidelity prototypes were created using Figma, emphasizing usability and scalability. The design also incorporated analytics dashboards for educators and intuitive interfaces for students to streamline attendance tracking and foster engagement. These system was to automate attendance tracking, reduce administrative burdens, and provide real-time analytics to educators.

Conclusion

The project successfully bridges functionality and usability through a thoughtful UI/UX design, incorporating advanced features such as real-time feedback, gamification, and adaptive interfaces. By leveraging user-centered design principles like accessibility, visual hierarchy, and error prevention, the system not only streamlines the attendance process but also fosters active engagement and collaboration among students, educators, and parents. However, limitations such as scalability, technological constraints, and user diversity remain critical areas for further enhancement. For instance, ensuring compatibility across diverse devices and accommodating users with varying levels of technological proficiency requires ongoing innovation. Similarly, addressing privacy concerns in biometric or IoT-based systems is essential to gain broader acceptance and trust. This study contributes valuable insights into optimizing attendance systems for improved learning experiences, demonstrating the potential of well-executed UI/UX designs in transforming educational tools. It also sets a foundation for integrating emerging technologies like AI and adaptive learning, ensuring future attendance systems remain relevant and impactful in evolving educational contexts.

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