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Development of a Web-Based Student Attendance Management System Using Visual Basic

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Abstract
Efficient attendance tracking plays a vital role in overseeing and improving student performance in educational settings. Conventional manual attendance methods are typically slow, prone to mistakes, and lack efficiency, resulting in administrative difficulties and possible errors in maintaining accurate records. This study introduces the development and deployment of a web-based Student Attendance Management System built with Visual Basic. The system streamlines the process of recording attendance through automation, enhances data accuracy, and simplifies reporting processes. Key features include user authentication, subject-wise attendance logging, and the generation of detailed reports. The system significantly reduces administrative workload, improves the reliability of attendance data, and facilitates informed decision-making by academic staff. It has been successfully deployed and tested within an academic environment, demonstrating operational efficiency and user satisfaction.

Keywords: Attendance Management System, Visual Basic, Student Monitoring, Web Application, Educational Technology

Introduction

Student attendance plays a vital role in determining academic success and institutional efficiency. Regular monitoring and management of attendance are essential not only for assessing student participation but also for maintaining discipline and academic standards. However, traditional methods of attendance tracking—typically involving paper registers—are cumbersome, prone to human error, and inefficient in terms of time and data management (Afolayan & Afolayan, 2022). To address these challenges, technological solutions are increasingly being adopted in educational institutions. The Student Attendance Management System developed in this study is a software application designed to automate the process of recording, storing, and retrieving student attendance data. By assigning unique login credentials to faculty members, the system enables secure and efficient management of class attendance records. Faculty can log into the system, select relevant course and semester details, and update or view attendance data accordingly. This approach enhances accuracy, saves time, and provides timely access to comprehensive attendance reports (Khan et al., 2023).

The system also improves data security by restricting access to authorized users, and it integrates features that support the generation of performance reports, which can be utilized for academic planning and student evaluation. Ultimately, this project aims to streamline attendance management through automation, thereby promoting administrative efficiency and academic integrity in higher education institutions. A computer can operate more efficiently than a human. This simplifies tasks for employees, conserving some human

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resources while ensuring data accuracy. Reliable information can be obtained quickly, and data can be accessed easily and randomly, saving significant time. The login system also prevents unauthorized individuals from accessing the data. The system reduces the complexity of tasks, which would be challenging to achieve with a manual or semi-automated approach, thereby maximizing time efficiency.
This study aims to develop a Web-Based Student Attendance Management System Using Visual Basic, and the Objective of the study is to develop a student attendance management system, to collate students' attendance and to implement it.

Because regular attendance increases a student's chances of academic success, the attendance rate is significant. A higher percentage of pupils missing class frequently hinders the lecturer's and the class's ability to improve and advance. Students who miss school frequently are more prone to cause trouble and run afoul of the law in addition to falling behind academically (Obi & Nwachukwu, 2021). Effective school activities typically start by involving students and ensuring their regular attendance. While this may seem straightforward, it is less apparent that the repercussions of missing classes can be quite severe.

For effective use of the student attendance management system, the following hardware components are required to improve student engagement and lower dropout rates. A computer system will help you send and receive emails to a single person or perhaps a group of people. Biometric strategies have outperformed many other strategies in the past when it comes to student attendance management systems. The use of biometrics in college management methods helps track students' and faculty's attendance. If the college implements a biometric program, the application will automatically record faculty and student attendance periodically. This module is used to record student and faculty attendance; otherwise, professionals will collect faculty and student attendance separately (Olowolagba et al., 2020).

Methodology

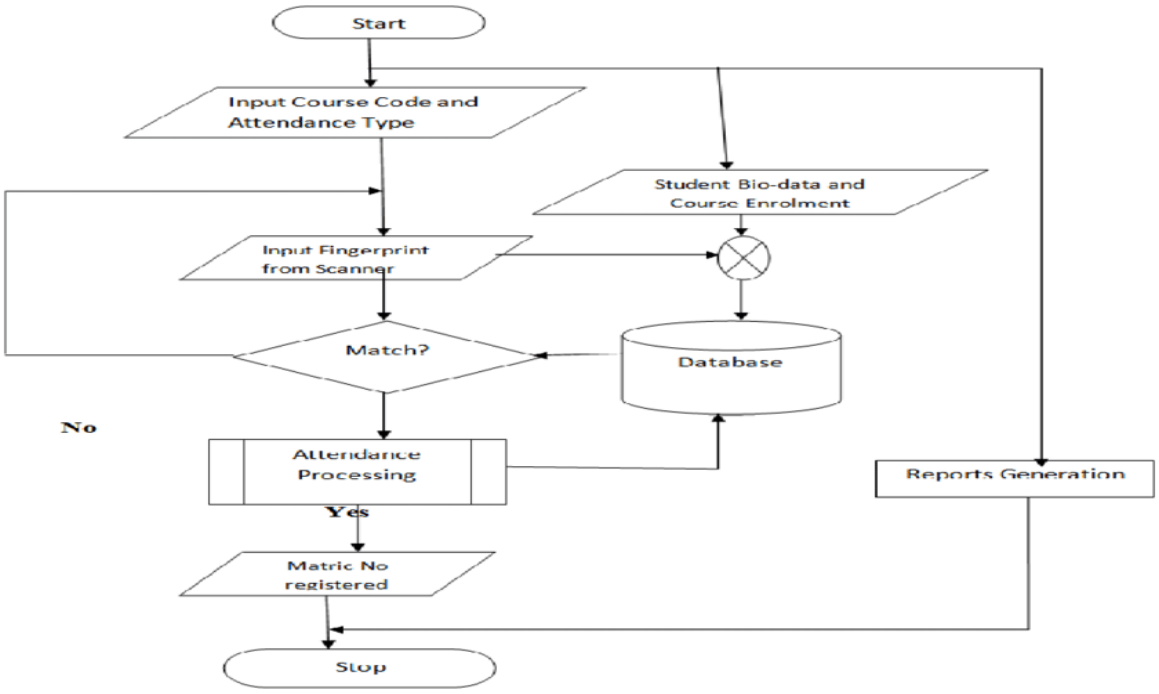

Figure 1: System Architecture

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System Analysis and Design

Students must manually enter information into the current system. Here, the handwritten registers will be used to record attendance. For the user, keeping the records will be a tedious job that requires significant human effort. Since the entries are stored in handwritten logs, accessing the information is relatively easy. However, it is essential to input the correct data into the designated fields for the application to work properly. If incorrect information is entered, the application may fail to function, making it difficult for the user to operate.

Table 1: Attendance Data Table **structure for clarity and professional presentation:**

S/No	Field	Date type	Description
1	User name	Text	Stores the username used to verify identity name
2	Password	Text	Holds the password linked to the corresponding user
3	User type	Text	Indicates the role of the user, such as administrator or regular user

Table 2: Teacher Details Database

S/No	Field name	Date type	Description
1	Teacher id	Number	A unique numeric ID assigned to each teacher
2	Teacher name	Text	The complete name of the teacher

Table 3: Attendance Records

S/No	Field name	Date type	Description
1	Student name	Text	Full name of the student whose attendance is being recorded
2	Status	Number	Total number of class sessions attended by the student
3	Semester	Text	The academic semester the student is currently enrolled in
4	Subject	Text	Specifies the subject for which attendance is tracked.
5	Month	Text	The month of attendance based on a 20-day academic schedule

Table 4: Course Subjects

S/No	Field name	Date type	Description
1	Code	Number	A unique identifier assigned to each subject
2	Subject name	Text	The name of the subject offered across different semesters
3	Semester	Text	Specifies the semester in which the subject is being studied by the student

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Table 5: Student Information

1	Student ID	Number	A unique identification number (roll number) assigned to each student
2	Student Name	Text	The full name of the student
3	Course	Text	The academic program the student is enrolled in; default is MCA
4	Semester	Text	Indicates the student's current semester; default is set to Semester IV

Input Design

A component of the overall system design, input design calls for extra care in order to create input data that is simple to enter and error-free. The NET framework's controls are used in the design of the input forms. Every piece of data entered undergoes validation. Users facing challenges are provided with access to assistance information. The process of converting user-generated inputs into a computer-readable format is referred to as input design. To create reports, a system user interacting through a workstation must be able to direct the system on whether to accept the input. Collecting input data is considered the most expensive aspect of system design, as it requires careful planning to ensure relevant information is obtained.

In this project, the initial data will be entered into allocation forms created for student details and subject entries. The table format will facilitate the calculation of attendance on a subject-by-subject basis. Additionally, verification of your data will be available through detailed display forms. The project allows for the entry of attendance for individual subjects or for all subjects collectively (Platt, 2010).

OUTPUT DESIGN

Output Design the "Student Attendance Management System" application primarily pertains to the results and information produced by the system for various end-users. The output serves as the primary motivation for developing the system and is the foundation upon which its effectiveness is assessed. The results are designed to be visually attractive, functional, and informative. Various features are integrated into the design of the forms to enhance the console output. An improved design should strengthen the system's connection with users and support decision-making, as the outputs represent the main sources of information for the users. The layout available for information capture and the output displayed are further explained in Fenn's design.

The output that the system generates is among its most crucial components. The information and outcomes produced are referred to by this system. The output of a computer system is utilized to communicate the results of the processing to the user. The attendance management system is designed to present reports on staff attendance by subject. When viewed as a complete unit, the report is accessible only with administrator privileges. This form will display weekly reports and compile data by date, batch, and class for our end users. We aim to modify our report to allow conversion to Excel format if any changes are needed (Mackey, 2010).

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SYSTEM ARCHITECTURE

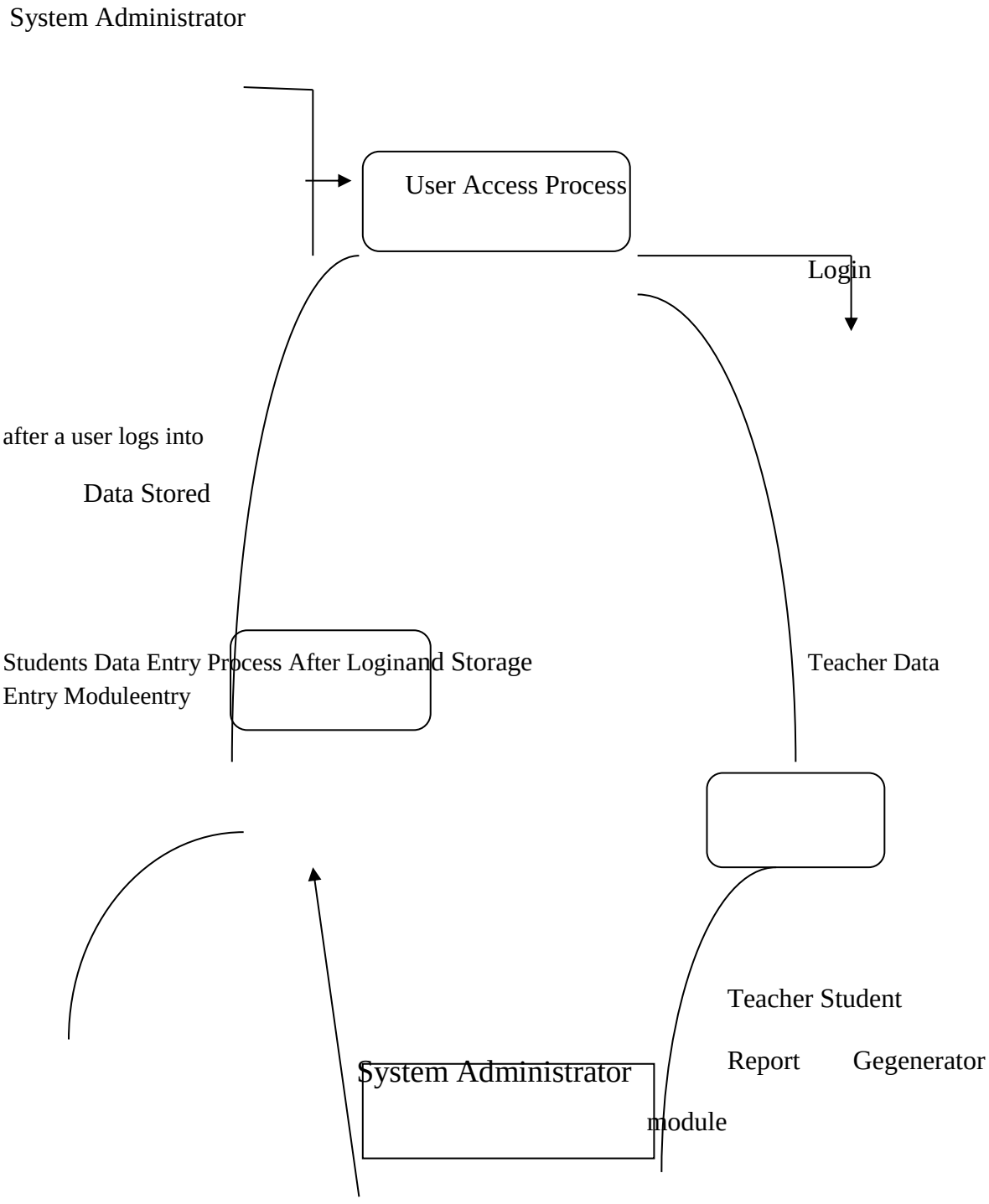

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Figure 2: System Implementation

System implementation represents the critical stage where the conceptual and design elements of the project are transformed into a fully operational application. The implementation phase involves deploying the Student Attendance Management System to handle core functionalities such as managing student and staff records, securing access through distinct login credentials, and organizing class schedules.

The system facilitates the input of subject-specific attendance data, automatically compiles weekly attendance summaries, and generates reports for administrative and academic use. Primarily, attendance is calculated based on selected date ranges, enabling dynamic report generation that reflects student participation over custom time periods (Thatcher, 2007).

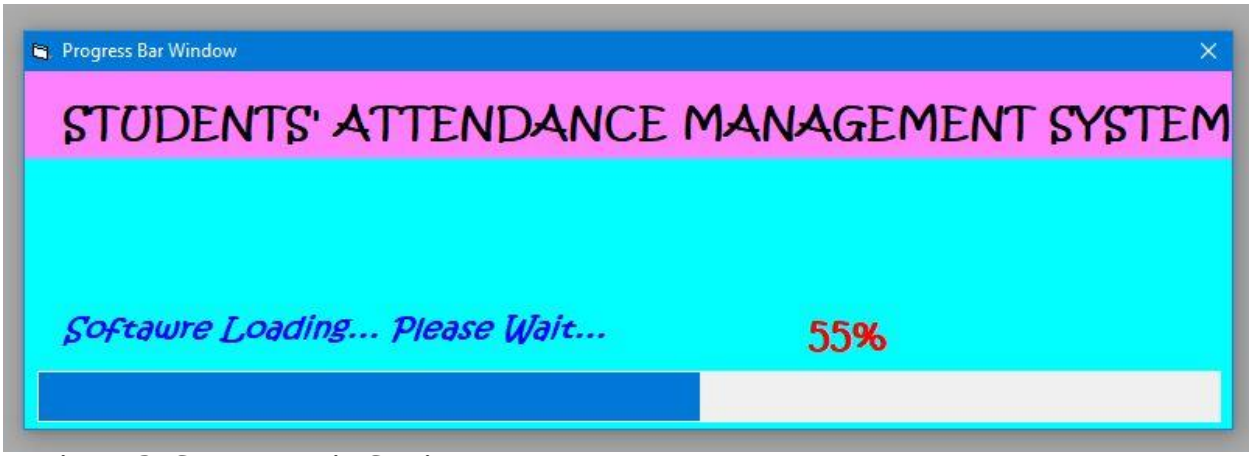

Figure 3: System Login Section

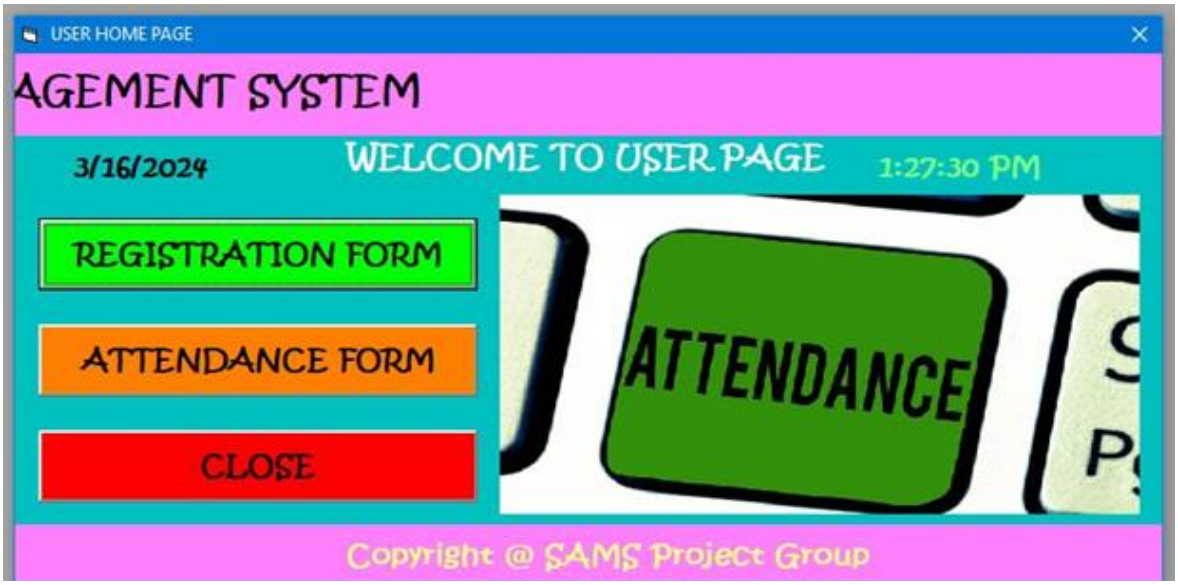

Figure 4: User Home Page

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Figure 5: Student Registration Form

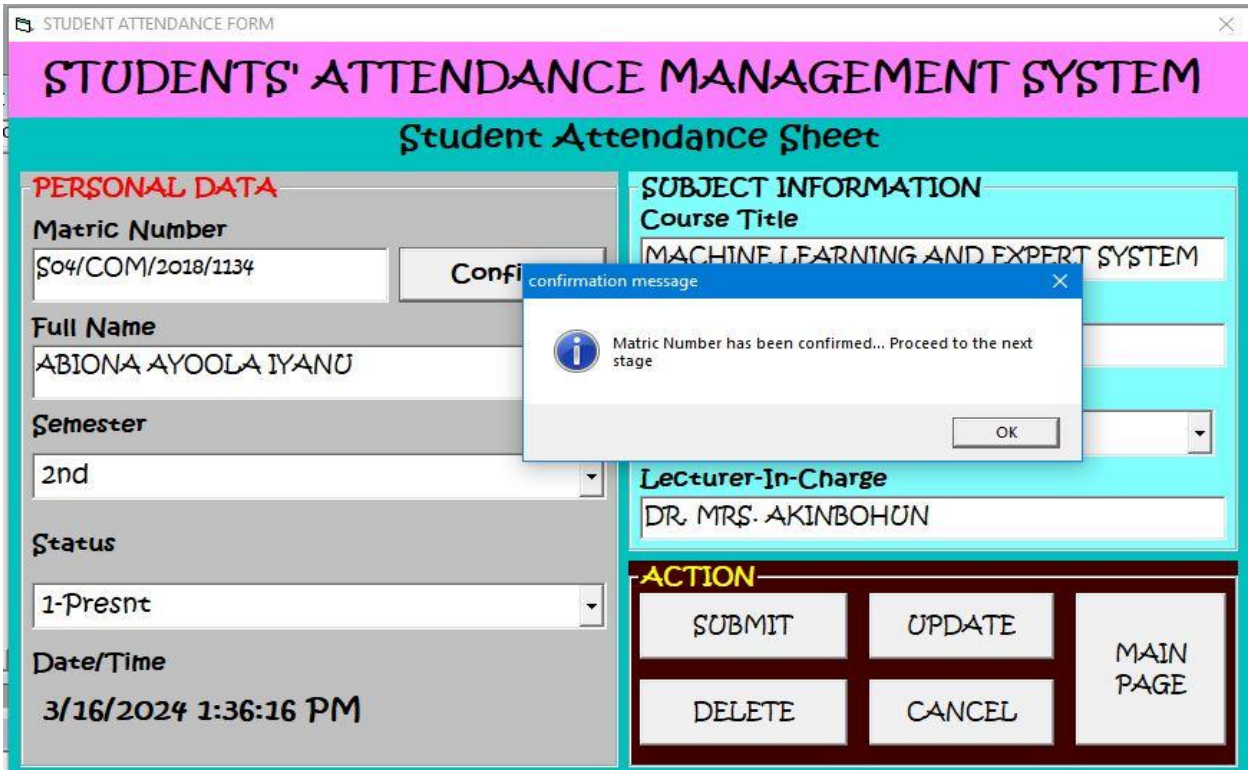

Figure 6: Student attendance sheet

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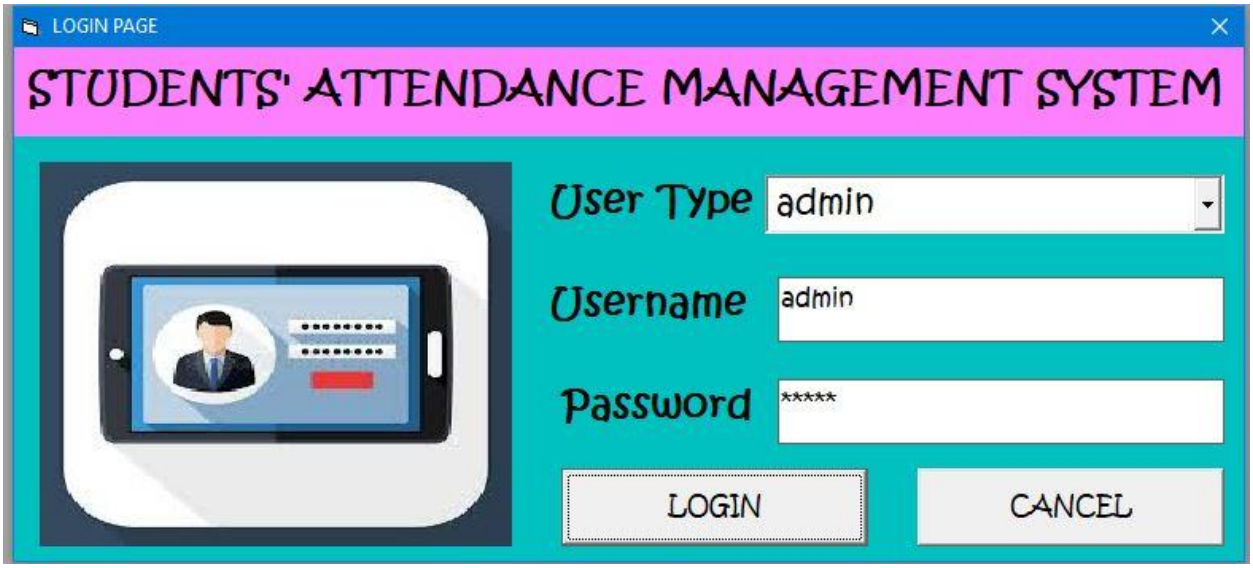

Figure 7: Admin Login Section: Figure

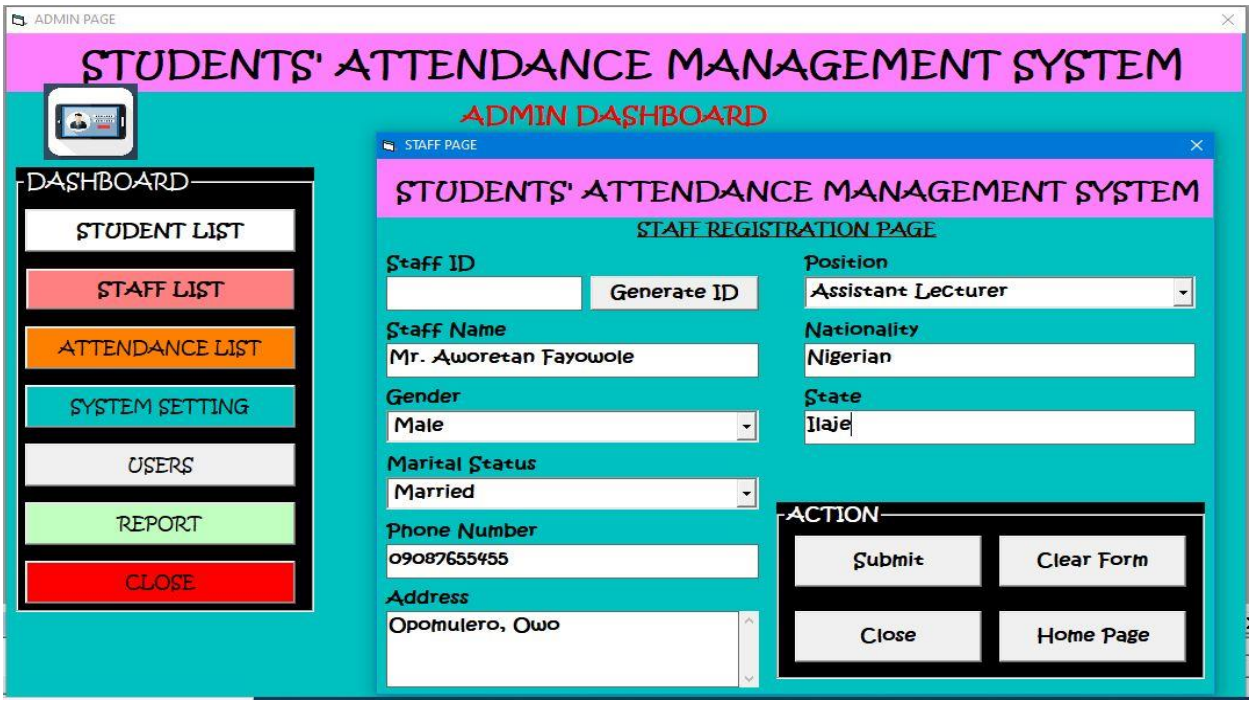

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Figure 8: Admin Dashboard

Conclusion

The Attendance Management System functions as a centralized component capable of interacting with various databases and executing a range of tasks. It efficiently records attendance with minimal limitations, provides a user-friendly implementation environment, and offers flexible report generation features. Developed using Visual Basic, the system has successfully met its intended objectives. It has reached a stable operational state, with all known issues and bugs resolved. The system runs smoothly and efficiently, and both teachers and users have acknowledged its usefulness and reliability. It effectively resolves the challenges outlined in the initial requirements and serves as a robust solution for managing student attendance.

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