Online Leave Management System for College Paper publication

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Abstract—Attendance is one of the major factors for measuring eligibility, punctuality and commitment to the institution. To keep and manage the attendance records efficiently is very important for the assessment of students and employees. In today's world, paper based attendance marking system is used in educational institutes where the teacher calls out students roll numbers. This is a manual process which is prone to many human errors and very time consuming for the both students as well as teachers during conducting the classes. Similarly, the management of staff's attendance record daily and generating monthly/ annual report using manual computational process has become a difficult challenge. For the stated reasons, an efficient Web-based application is designed to track student's activity in each class and also monitor the check-in and check-out time of each employee through fingerprint verification. This system consists of several modules: student's attendance monitoring and management system, class routine management system, student's information management system, employee's attendance and leave management system, and employee's information management system. The developed dynamic database stores the necessary data and information of each students and employees. This application takes employee's attendance using fingerprint scanning devices and also takes student's attendance of each courses of a specific department electronically, the records of the attendance are storing in the database. The system is implemented using the power of Laravel Framework, JavaScript is added to the application to improve the use of the system, and MySQL is used for the application database. Hardware level programming is performed to interface the fingerprint devices with our application. Insertions, deletions, and changes of data in the system can do straightforward via the designed GUI without interacting with the tables. This system is able to save valuable time of students as well as teachers for conducting the classes also save time to monitor check-in time, check-out time, working hour, and absent days of each employee. As a result, we can perform attendance management and monitoring related tasks like automated course-wise daily attendance report generation, automated course-wise semester attendance report generation, attendance report of a specific student, dynamic class routine preparation, daily/ weekly/ monthly/ half-yearly/ annual attendance and leave report generation of each employee etc. accurately and efficiently without any hassle. The test case of the system exposed that the system is working efficiently and is ready to use for the university or any similar academic institutions.

Index Terms—Class Attendance System, Class Routine Management, Employee Attendance System, Employee Leave Management, Fingerprint Recognition, Web Application, MySQL Database

I. INTRODUCTION

A fingerprint is an influence or lines of an impression from the friction ridges, from the floor of a fingertip of a person's finger. A friction ridge is a raised part of the epidermis on the fingers and includes one or extra linked ridge units of friction ridge skin [1]. Those ridges additionally assist in gripping rough surfaces, as well as clean wet surfaces. Impressions of fingerprints may be left behind on a floor with the aid

of the herbal secretions of sweat from the eccrine glands which can be present in friction ridge pores and skin, or they will be made via ink or other materials transferred from the peaks of friction ridges at the pores and skin to a pretty easy floor including a fingerprint card [2]. Fingerprint attendance system purpose is to automate the manual attendance management using the unique properties of the fingerprint technology [3-4].

In order to identify the employee and to know their entering an institution and leaving the institution can efficiently capture and processed using optical or ultrasonic or any other type of sensors. Almost many higher education institutions are using today fingerprint biometric attendance system to maintain organization employees in and out time [5-6]. In educational institutions or any other institutions or organizations, attendance is used for several purposes which include assessment of students' eligibility for promotional exams, assessment of staffs' commitment toward their job, and record keeping for employees. In most of the educational institutions like university, a certain percentage of mark is allocated for class attendance and a minimum percentage of class attendance is mandatory to sit the final or promotional exams. But, the traditional student attendance includes all the hassles of roll calling and very time consuming for the both students as well as teachers during conducting the classes in the department. So, a new approach will be needed to handle this process. At present, most of the works in our daily life depends on computer technology and application. This motivates us to design a reliable attendance management system for academic or any other type of institutions. The biometric identification systems are widely used for unique identification of humans, like students, mainly for verification and identification. Also, the use of biometric features in student attendance management system is a secure approach. A biometric system can be either an identification system or a verification (authentication) system. Several biometric features are used for user verification. These are DNA matching (chemical biometric), ear (visual biometric), eyes (iris recognition and retina recognition), face recognition (visual biometric), fingerprint recognition (visual biometric), gait (behavioral biometric), signature recognition (visual/ behavioral biometric), speech and speaker recognition (auditory biometric) etc. [7-

11]. Since, fingerprint features are considered to be the best and fastest method for biometric identification. These features are more secure to use and unique for every person that don't change in one's lifetime [1] [4]. This research work describes the problem of managing the number of attendances or absences in the academic environment, as well as proposing a system of record and control of these data. In this work, we proposed an idea of an automated information management system over the day-to- day handwritten attendance registries, in order to facilitate the process. For the identification of students, teachers, and employees, a fingerprint recognition based identification system is designed and developed in this work. The system comprises a timekeeping system that will register every student, teacher and employee in a database. The database itself will be managed by the university, so that reports, either individual or collective, can be issued whenever they are needed on both physical and electronic format. Also, these reports would be used to create statistics and further help the growth of the academic process correlated with students, teachers and employees. This work is focused on the designing and development of an smart attendance and information management system which integrates the following sub-system: the employees and student's class attendance system, student's ID card generation system, class routine management system, employee's attendance and leave management system for an academic institute like university which manages the class attendance and absent records of all students of each department, dynamic class routine management, as well as the attendance, leave, and working hour records of each staff of the university.

II. LITERATURE REVIEW

There are many research articles available in the literature on attendance management systems by using various biometrics for example fingerprint, face, iris, voice or speech, gait behavior and many more for implementing an automated attendance system, few related works are described briefly in this paper. A fingerprint-based attendance management system proposed in the [12] for an educational organization that had one fingerprint sensor and LCD screen placed at suitable place of the

institution. The main advantage of this proposal is the students can be used the fingerprint sensor in order to give their attendance. To maintain the attendance a dedicated server is implemented by the system and time to time when a student places his/ her fingerprint on the sensor it can be identifies the particular student and his /her attendance is updated on the system server. The main feature of this system is to decrease the problem of manual work and also the time consume is saved by the automatic attendance system. In [13], authors proposed a fingerprint identification system for intelligence entrance of guard. They have identified challenges of earlier authors or research problems and proposed some solution for an efficient identification of user using the special techniques of fingerprint identification system and an intelligence system. A student attendance maintenance system is proposed by using a framework which is automated and the attendance report will be show over online in [14]. In [15-17], authors proposed a recognition or identification system for student attendance or for college administration by using a minutiae-based fingerprint system with the help of GPS communication. In this paper, they proposed an attendance maintenance system uses face recognition module along with fingerprint sensor used also for the objective of identifying a missing person with the aid of GPS. In [18-19], authors tried to make a simple, fast, accurate and very efficient attendance system. In this article, the study was conducted based on the quantitative data collection method which uses questionnaires based on fingerprint matching technologies. Authors designed and developed a portable automated attendance maintenance system in [20-21]. They introduced an independent source of energy that mainly operate the system and this petty design made the system highly secured and optimal. The weakness or flaws of existing manual attendance system has been overcome by the proposed new portable fingerprint based attendance maintenance system. Authors in [22] proposed another portable fingerprint attendance system is designed using Arduino board based on ATmega1280. The fingerprint scanner ZFM 20 is used alone with its own processor and memory. A user friendly interface named TFT touch screen provides to show the report and SD card is used for storage of student's records. To extract attendance date and time a RTC (real time clock) is used. Caeser Cipher cryptographic technique is used both in [22] and [23] so that data cannot be accessed or modified by illegitimate person. From the articles [24-28], it can be summarize that fingerprint based attendance system is very simple, fast, secured and cost effective. Authors in [29-30] introduced artificial intelligence (AI) based smart attendance system using fingerprint recognition.

III. PROBLEM STATEMENT

There are several limitations in the current manual attendance management and monitoring system. In this sub-section, major problems are explained briefly. To run particular institutions smoothly it is very important issue to take the attendance strictly, daily attendance will not only ensure the regularity of students and also identify who will get opportunities of the institution, and it is also one of the major criteria to determine their final grade sheet. By taking regular attendance accurately it will helpful to track and monitor the student activities in schools, colleges, universities or any academic institutions. It will also helpful to calculate how much time the student spends in the institution. But the maintenance of attendance using the manual attendance system could be tedious, time consuming and there have more possibility to do mistake. The manual attendance system that is use in classroom is not secure because a teacher can be lost the hard copy of the attendance sheet. The most common drawback of manual attendance processing system is that the teacher need to take student daily attendance and manually filled the record in attendance sheet or book for every lecture. By any change if the attendance sheet or book is missing or misplace, the teacher could be fall into a big problem because the teacher need the attendance record to make analysis, calculate the grade and also generate an attendance report. There have another common problem is that the teacher will need extra time to calculate and generate the semester final attendance report because the teacher needs to search and refer the old attendance record first. And also the teacher can do an error when the teacher makes the calculations to generate the attendance report manually by themselves. Even though to maintain the attendance record is irritating for the teacher and also it is

difficult for a teacher to generate the attendance report instantly. If the institution wants to analyze the attendance record for future actions it is normally being delay because of the processing needs more time to do manually. The delay of analyzes would not fruitful for the institution to take necessary action in urgent basis. Similarly, the processing and management of employee's attendance records like check-in time and check-out time daily, absence records like casual leave, and medical leave etc. and finally generating weekly/ monthly/ half-yearly/ annual attendance and leave reports using conventional paper based calculation has become a very and time wasting job specially in large academic intuitions like universities.

IV. THE PROPOSED SYSTEM

The proposed new system framework considers the following issues and restrictions mentioned in the previous sub-section as guidelines and will overcome those limitations of the existing attendance management system. It will helpful for the teachers to keep the student attendance record for long time in the database that makes it easy for teachers to access the database and also he/ she can easily generate the student grade within a short time. This system can securely store in the database which will be free from damage of the manual attendance sheet. In addition, our proposed system will provide user friendly interface which will help to guide each user to use it correctly without any specialized training. The most striking features that we have introduced are that it not only capable to take attendance and generate details attendance report automatically for students but also it will take attendance and generate detailed attendance and leave reports for the employees and teachers by using fingerprint recognition. Huge attendance data can be analyzed for further use. This system removes the drawback of separate attendance system for students, teachers and employee. In our system, the student can see their course-wise daily/course-wise semester attendance reports and they will get other facilities such as class routine, attendance presentence, collegiate, non-collegiate status, session-wise student's information, department's information, and faculty information etc. The teacher can be login to the system by his/her username password or by fingerprint. The assigned

courses are appeared in his/her profile, and then the teacher can be taken class attendance electronically in the web application. Teacher can search any student by their roll number/name to get his/her attendance report. Beside that the system can also generate the employee's attendance and leave reports for a specific span of time like daily, weekly, monthly, half-yearly, and yearly etc. It enables to calculate the total expected working hours, total service hours, number of late entrance days, and number of early exit days etc. for a particular employee which is very important to judge him/ her performance, dedication and activeness. A super administrator can monitor the entire system securely.

V. METHODOLOGY AND SYSTEM DESIGN

5.1. System Users

In the proposed system there are four types of users: administrator, teacher, employee, and student. In this paper, top-down model is adopted and the analysis is broken down into different components where the design is started from the main component down to the elementary components. The system is categorized into four major subsections: admin subsection, teacher subsection, student subsection and employee subsection. Each of the subsections has a different user privilege to use the system shown in figure 1.

Administrator- the registration of the students, employees

and teachers in the system will be verified by the system administrator (admin). To maintain all the administrative function, the admin has the full authority and access over the system. Admin have to login the system by using username and password. Admin can add, view, edit, and delete student, teacher, and employee's information, can add courses, can assign courses to the teacher, can see the students, teachers, and employees reports, and can edit class routine. The vital role played by the admin in the system is to assign role to each user of system and provide username as well as password thus registration of all users will be completed through the administrator.

Teacher- every teacher gets a profile after registration. This

profile shows all the basic information about the teacher. Admin assign different courses to different

teacher. When a course is assigned to a teacher then it appears in his/her profile. Then the teacher can take attendance to each class using the web application. The teacher can edit the attendance sheet selecting particular roll numbers of a student on the website before it is uploaded on the server database. The teacher can view and print course-wise daily, semester end, and a specific period of time attendance report, teacher can also view class routine. Student- the student enables to view his/her course-

wise daily or semester attendance of all his/her courses and also view class routine by logging into the website after providing the username as well as passwords.

Employee- the employee can view his/her daily, weekly, monthly, half-yearly or annual attendance or leave report by logging in to the website using the provided username as well as passwords.
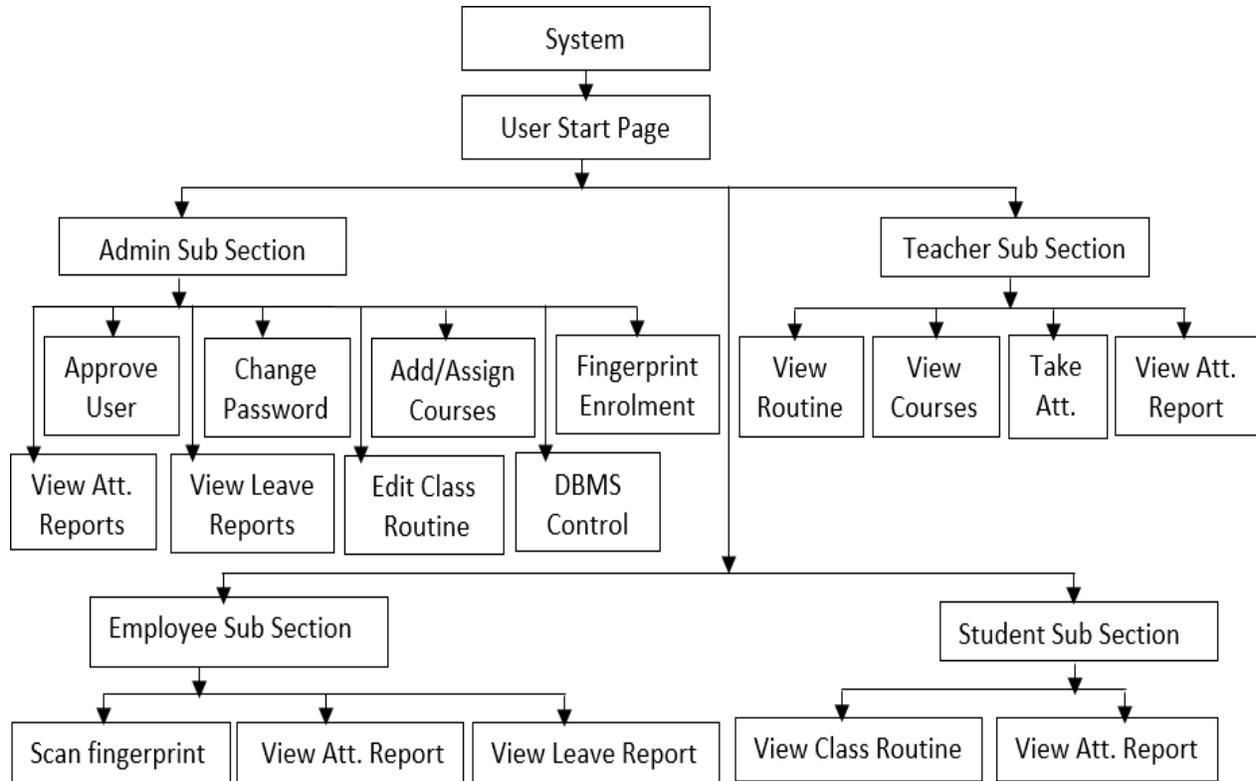
Fig. 1. Top-down design approach for the proposed system

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5.2. Web Application Development

In this work, the web application is mainly developed using PHP, MYSQL, HTML, CSS, and JavaScript programming languages/ technologies. The overall logic is implemented using PHP Laravel framework. MYSQL is used to provide the database functionality in the system to store data. HTML and CSS Bootstrap Framework are used to design the front end reliable web application. By using the CSS, all the front end design settings are stored in a single CSS file and whenever there is need to make any change we don't need to change it at every page so we change only on value in the CSS file and this change is made in the whole website. JavaScript is used to

create the application dynamic and interactive for the users with the help of Ajax and jQuery library. When the development is completed, all the features and content management system are strictly tested. When the initial testing is done, we then allow to the multi-browser check, where our website is checked over major browsers such as IE, Edge, Firefox, Google Chrome & Safari etc. and finally we launch the website to the server which is available for every user.

5.3. DBMS Development

We need to manage huge data of students, teachers and employees for generating results, ID cards, class

routines, attendance and leave reports etc. or any other type of management systems. MySQL server is used to implement the back end of the system that is the DBMS is developed using MySQL structured query language. The server uses relational database management system that offers a variety of administrative tools to ease the burdens of database development, maintenance and administrations. The DBMS automates the process of data handling, thus, saving a great deal of time, it also minimizes the chances of human error. The best thing about DBMS is that it can be accessed from anywhere 24/7. It keeps the digital track of all data, thus reducing paperwork. Cloud-based student database management system is way more secure and reliable than manually stored information. Moreover, role-based access prevents unauthorized access to the highly confidential files.

VI. IMPLEMENTATION AND RESULT

This sub-section refers to how the main parts of the system are being implemented. There are several interfaces that make up the entire system that are briefly described below.

6.1. Hardware Setup and Interfacing

The developed system has been tested to ensure its proper functionality. Fig. 2 shows the overall prototype. Four ZKTeco K40 fingerprint reader time attendance terminals are used for access control. It is a very simple access control device with compact design, 2000 mAh built-in battery back-up, 2.8 inch TFT screen, TCP/IP and USB communication, 1000 fingerprint capacity, and 80000 record capacity facilities. The four different devices are connected with the host PC via a network switch. Fingerprint devices are integrated with our developed web application by hardware level programming. Devices can be placed at any location in the campus and connected to the server via internet.

6.2. Login Page

For security purpose each type of users have to login by inputting username and password to access the system. Only authorized teachers, employees and students can enter into the web application and any visitor user can view the university main website shown in Fig. 3.

Fig. 2. Hardware setup of the developed system.
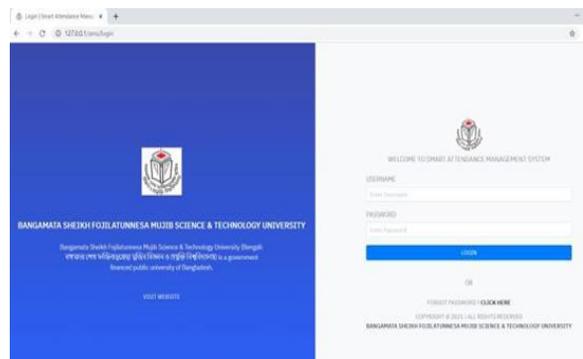
Fig. 3. Login page of smart attendance and leave management system.

6.3. Dash Board

After login, user will get the dashboard and only those options that assigned by the admin based on his/ her role. Only admin can access all the available options and the teachers, employees, and students can access his/ her necessary options. This page will show the total number of admitted students, discontinued students, pass-out students, current students, total number of appointed staffs and current staffs of the university. The dashboard shown in Fig. 4 represents the testing data and information.
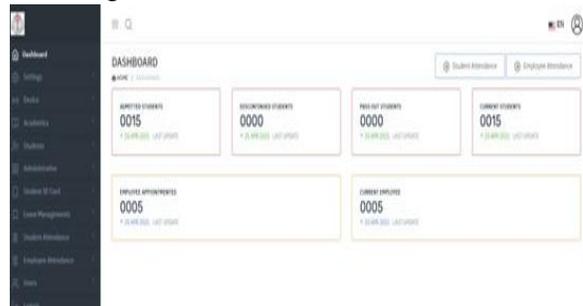
Fig. 4. Dashboard of smart attendance and leave management system.

6.4. Faculty and Department

In academics option, we can add faculty, department, program, batch, session, semester, section, academic year etc. related information. After adding data, we can see the information of each section, for example, total faculty and department relation information shown in Fig. 5.

Fig. 5. Details information of faculties and departments of the university.

6.5. Courses

To add a course in the system, we have to provide course credit, course title, no. of credit, course type, marks etc. The course registration process and detailed information of each courses are depicted in Fig. 6 and Fig. 7.

Fig. 6. Course registration form.

Fig. 7. Program wise course information of a specific department.

6.6. Class Routine

Fig. 8 shows how to prepare class routine. Multiple class routine can be managed for each academic batch of a specific department. After providing class routine related data, we can view the class routine presented in Fig. 9.

Fig. 8. Create class routine.

Fig. 9: Academic session wise class routine of a specific department.

6.7. Student's Registration

Fig. 10 presents the student registration form. Student registration is mandatory that can be completed by either student or the admin. After registration, we can see the batch wise student's information shown in Fig. 11. Similarly, we can also view student's information of a specific program/ department/ faculty or the university at a glance. These options are very important and necessary for any higher administrator of a university like teacher, course coordinator, the head of a department, the dean of a faculty etc. An authorized user can easily find out any data of any student from this page.

Fig. 10: Student registration form.

Fig.11: Batch wise registered student's information of a specific department.

6.8. Taking Student's Class Attendance

When the teacher will conduct a course he/ she can take the student's class attendance of his/ her course. After taking the attendance the teacher needs to submit it, the whole process is shown in Fig. 12. The submitted student attendance information will be store into the attendance table of the database. The batch wise attendance of a particular course will store into the database.

Fig. 12: Taking daily course wise class attendance of students.

6.9. Class Attendance Report

The teacher can search attendance information of any student of his/her any course and can also print course wise class daily attendance report shown in Fig. 13 and semester wise attendance report of shown in Fig. 14. This facility is restricted for particular users such as teacher, administrator, head of the department or other permitted user. At the end of a semester, teacher will get the percentage of total attendance automatically which will be very helpful to calculate the final result of any course.

Fig. 13: Print daily course wise class attendance report of students.

Fig. 14: Print course wise semester end attendance report of students.

6.10. Employee Registration

Fig. 15 shows the employee registration form. Any employee can complete their registration process using this form by his/ her own or by admin. The process of registration is very simple and easy. The registration is mandatory for every employee. The admin can see the information of all registered employee depicted in Fig. 16 or detailed information of any particular employee by visiting this page. The administrator has privileges to delete, update or modify any information of any employees.

Fig. 15: Department wise employee registration form.

Fig.16: Registered employee information of the university.

6.11. Scan Employee's Attendance

Fig. 17 represents the four devices situated at different location of the campus which are integrated with the attendance and leave

management system. When a new user is added to any attendance terminal for fingerprint enrollment, admin need to integrate the new user(s) to the server by simply scan user option shown in Fig. 18. The admin

need to collect employee's attendance data from the fingerprint devices and upload to the server. After selecting any device, the admin hit scan button to collect employee's attendance data from that device and then simply hit save button to upload the new data into the server presented in Fig. 19. Admin can do this job anytime, it may be once/ twice in a week/ month. After getting this information the authority enables to know the working load of a particular device, then they can rearrange the device placement if necessary.

Fig. 17. Registered fingerprint devices information.

Fig. 18: Scan registered employees from different devices.

Fig. 19: Collect employee's attendance data from different devices to server.

6.12. Employee's Attendance Report

In this system, the admin can search and print the attendance report of a specific department for any date or a specific time span like a week/ month/ year etc. To know department wise reports of a specific/ all employee, firstly admin need to select the department, secondly select the time duration and then click the search button to show the information depicted in Fig. 20. Similarly, the admin can find the attendance summary report and also save the report using print option shown in Fig. 21. This filtering process will be helpful for administrator to monitor the attendance percentage of individual department easily.

Fig. 20. Department wise attendance report filtering.

Fig. 21: Department wise attendance report summary.

6.13. Employee's Leave Report

Every registered employee can view his/her leave report for any specific duration of time. In addition, the admin or any authorized user can view and save leave reports of any specific employee or all employee of the university for a specific period of time. The whole processes are illustrated in Fig. 22, Fig. 23, and Fig. 24. These options are very helpful for higher authority because they can automatically produce attendance and leave reports. Employee's attendance and leave reports are very necessary for annual performance evaluation of employees in any institution.

Fig. 22. Annual leave report for a specific employee.

Fig. 23. Employee's leave report for a specific duration.

Fig. 24. Annual leave report summary for all registered employees.

VII. CONCLUSION

It can be concluded from the above discussion that a reliable, secure, fast and an efficient system has been developed in this research work for attendance, leave, and information management of students, teachers and employees which replacing a manual and unreliable system. The main difference among our implemented system and others similar system is that the maximum attendance management system only works on student's management this but this project add whole employee's attendance of the university besides students. That's why the database management system is complicated and hard to link up each other. But our system shows optimal way how to handle the total attendance and leave management system for a large academic institution. Our proposed system offers a change in the process of monitoring and overall management of the attendances or absences as well as keeping track of the activity in the university environment and provides information based on the data it collects, being able to create personalized or batch reports. In the same time, the system gives the opportunity to easily create statistics and to show the general interest for a specific course, the general rate of attendance as well as helping the institutional calculations for faculty and staff, based on their own number of attendances or absences. Our system also makes storing the data easier as it can be kept on electronic format as well as printed on paper. This automated system will save time, reduce the amount of work, and eliminate the need for paper tracking and file maintenance. As a result, this system can be made work life easier for the students, teachers and employees.

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