

## **Student Attendance Management System Based on Fingerprint Recognition**

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### **Abstract**

During lectures in the university, traditionally students' attendance is taken manually by using attendance sheets given by lecturer in class and not by an automated system. At the end of the semester, the students' attendance is used in calculating the final grade of each subject. Supporting staff manually input attendance data into excel sheets based on signature lists collected during lecture hours. This manual method requires a lot of stationery materials. It will be a tedious job to maintain the record by the user and the retrieval of the information is not as well. Hence, this manual process consumes a lot of human and physical resources, and has many disadvantages such as, expensive and time consuming data entry process, large manual data insertions prone to errors, sometimes lecturers find it inconvenient to track and analyze attendance registry due to dishonest behaviors of students and lack of automated system. The lecturers are responsible to monitor all the students' attendance for the whole semester and it is apparent that the current manual process is highly inefficient. Because of this problem, an automated system is needed in order to reduce the human intervention and the physical resources used in recording the attendance of the students more accurately and efficiently and to forward the attendance to final grading process. This manual system was analyzed and identified the necessary features for the automated system as functional and non-functional requirements. As a result, this implemented system is mainly comprised of development of student attendance management system using fingerprint authentication. A fingerprint device will be provided at each lecture hall at the faculty. This system will record the attendance of students in class when the class begins. The main objectives for this study were to reduce the paper usage, avoid human errors, compare efficiency between the proposed system and the manual system, generate effective reports, and use various sensor technologies to enhance the User Interface experience. The implemented system significance can be discussed from three perspectives such as faculty, lecturers, and students. This system can keep the track of students, courses, time table details etc. This system can only be accessed by the authorized people and there are different privilege categories. Student Attendance Management System provides useful analysis graphs for lecturers with other calculation processes and flexible report for all students.

To fulfill all analysed requirements, the system consists of three modules. The first module allows the system administrator (admin) to log into his account and to accomplish the functions such as, adding new students, modifying students' information and deleting students, adding new course modules and modifying/deleting course details, enrolling students in courses, marking student

attendance, adding students' tutorial marks, practical marks and final marks for each course modules, generating attendance reports, result sheets for each course and each student. Furthermore, reports can be printed or sent via email, generating data analysis graphs for each course unit, managing time table details, adding new users and modifying user information, provision to change login password. The second module of this system defines itself in terms of being used by the lecturers. Lecturer has to enter their login user name and password in system. There are the privileges for lecturers provided by the system such as only view the students' details, mark students' attendance/tutorial marks/practical marks/final marks can only be entered by the relevant lecturer, generate attendance reports and can be printed, view time table details, change login password, send special notices to the admin. The last module is for the students. This module provides a web based system for students with the privileges such as view their personal details, time tables, his/her attendance details and results.

Student Attendance Management System uses JAVA to implement the front-end and has connectivity with MySQL. The implemented system is based on the database, object oriented and networking techniques. With the Fingerprint module, can check fingerprint, while up to 600 fingerprint memories and 60,000 transaction records contained. It can also get information out of it, because the fingerprint machine supported USB cable and USB Flash Drive both. NetBeans used as the IDEs. Mainly used languages are JAVA, JavaScript, PHP. Student Attendance System consists of a server and a central database. The system administrator can access the database using admin panel. Test cases were created for each criterion and Simple Unit Tests, System Testing, Integration Testing, Security Testing and Performance Testing were successfully done to check all the functional requirements.

After analysis of this system's goal and research direction, a set of objectives were established, such as implementing the attendance system with N-tier architecture, testing the software in a real environment, generating effective reports like attendance reports/results sheets. Implemented system is faster and more accurate than the existing system.

As the future work, I am planning to implement the fingerprint machine using a GT-511C1 fingerprint scanner and Arduino and also using Wi-Fi shield fingerprint machine can be passed among the students during the lecturer. Further, the efficiency of this automated system can be enhanced using the Multi Agent Technology introducing different software agents who bare distinct responsibilities within the system. Finally, this system can be integrated into current information system used within the faculties in the university.

**Keywords:** *Students Attendance Management System, Fingerprint recognition, Calculating Final Grades, Report Generating, Software Testing*