

# Technology Triggered Automated College Management System

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## ABSTRACT

In recent years, Radio Frequency Identification (RFID) based systems have seen large improvement and have been successfully applied to different areas including health care, security, and IT industry. RFID technology provides wireless identification using electronic tags (passive and active) with suitable scanners. This project is worked on an attempt to solve recurrent attendance monitoring problem and leave management system for the faculties in present global academic situation.

The application of attendance monitoring system to RFID is developed and deployed in this work, i.e. capable of reducing the time wasted during manual roll calls for attendance and perform managerial decisions by the fact and proof that student or faculty was present or absent on the particular day. This study is also extended to faculty attendance system, library management system and student welfare module.

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## 1. Introduction

Time consuming, recurrent manual attendance and wastage of library resources are the major problems faced by organizations. These problem will be solved in this study by RFID based technology. Radio Frequency Identification (RFID) is tag based identification method that relies on storing and extracting the data remotely using devices called RFID transponders. RFID based technology relies on RFID scanner and RFID tags as two main parts.

Radio Frequency Identification (RFID) as made its mark and is one among the automatic identification method that is more popular nowadays. There is a lot of research and implementation performed in this area that tries to make maximum benefit of this technology. New application and research areas will appear in upcoming years so as to improve the society by automation. Security and privacy are the areas for more concern as people work with it and use tags in day today life.

In country like India, lot of technology has been incorporated that gave initiative to some extra ordinary development such as Radio Frequency Identification (RFID), Bluetooth, robot etc. So has to make our life feasible and comfortable with these technology been adopted. Management of the organization should insist to adopt these technologies for improvement of their quality of work.

Making sure graduates with quality and discipline are not far behind the latest development and well equipped to understand the advanced technologies in the future. Firms should adopt latest technologies for attendance management system that will leverage optimal working condition. The effective way to regulate the attendance management system would be by motivating the firms as in students in college and employees in the company instead of going for manual attendance system.

The attendance management system in the college should have well equipped database with information of faculties and students so as to enable the faculties to alter data, any update in the database and modify manager accordingly and have a UI to make interaction a easy job. Attendance management system should mostly be commercialized in a user friendly manner.

## 2. Literature Survey

Many authors have worked in this area with different approaches. This literature study would be as follows.

**Yi Jiang, Ruonan Zhang, Wei Cheng and Wei Sun et al [1]** has worked on various techniques to resolve the reader collision. When the communication with tags of a reader is disturbed by the operation of other readers, a reader collision will occur, which is achieved less attention than the tag collision in previous studies. To solve several types of reader collisions, they propose an efficient algorithm named multi-channel reader collision avoidance (EMRCA), which is suitable for the multiple readers RFID system.

After analysing the relationship between the distance of two readers and the types of reader collisions, they give the solutions of reader collisions, and present the principle of choosing data channels. Using several data channels, the new processing procedure of communication with tags is designed, in which the neighbour readers and the relevant readers have the different communication principles.

The simulation results showed that the proposed protocol has many better performances than the previous protocols in terms of the number of failed interrogations, the process time of interrogation, and the network overhead.

**Aamir Nizam Ansari, Arundhati Navada et al [2]** in their work Automation of Attendance System using RFID, Biometrics, GSM Modem with .Net Framework came up with

the concept of automating attendance using both RFID and Biometrics.

The work done in this paper is to locate a student, automate student attendance and detect anomalies by developing a wireless system. Students provided with ID card are tagged with Radio-frequency identification (RFID) i.e. passive tag that is compared with the database and biometric fingerprint is used to verify finally. Using GSM a short message is sent to the guardian to intimate if the student has reached the college or not. Students and faculties can be easily located in the college premise as RFID transponder is installed in labs, lecture halls, library and staff rooms. Present location of the students, guardians and faculties can be viewed just by logging in into a website within the campus. If a student needs to be located, this can be done by logging in into the website and by sending a student identity number as a message to the GSM that will reply based on last location stored in the database.

**Shouhao Geng, Guangming Li\*, Wei Liu et al [3]** in their work Design and Implementation of Attendance Management System Based on Contactless Smart IC Card propose the concept of contactless smart IC card.

TCP/IP protocol is designed to better understand Attendance Management System (AMS). Their study explains the principle of the RFID scanner device in Attendance Management System based on its hardware and software design. The scanner reads ARM LM3S9B90 as the core and transceiver chip Philips's MFRC531 as RFID reader. The system has worked stable in different application and has good real-time performance.

**Julius Quarshie Azasoo, Felicia Engmann and Kafui Ayite Hillah [4]** in their work on RF Based Multithreaded RFID Student Attendance Management Information System propose the processes that is more efficient Information Communication Technology (ICT). The design proposed use of radio frequency (RF) as a means of communication between the RFID Card Readers (RCR) situated in the various classrooms or lecture halls and the Attendant Management Data Server (AMDS). The student Attendant Management Information System (SAMIS) manages the student attendance by collecting the records from RFID scanners installed in the lecture halls. RCR verifies the students identification at entrance, this data will shared with AMDS. Various stakeholder of the SAMIS and administrator are provided with the interface in this proposed work. The development of this system will evolve both the attendance taking process and attendance information management.

**Ankita Agrawal and Ashish Bansal et al [5]** this work addresses the problem of RFID based online attendance

Management System with Object Counter Radio Frequency Identification (RFID) based attendance system.

To overcome the manual work problems of reporting and recording of the students is performed by IIS servers and ASP.NET, web based application with RFID systems. They could have proposed the system in this paper using C#. System designing is done by the use of Microsoft Visual Studio. Issue related to fake and false attendance has been addressed through the RFID system to eliminate it by using a special object counter for the head count.

**Murizah Kassim, Hasbullah Mazlan, Norliza Zaini and Muhammad Khidhir Salleh [6]** in their study they proposed system consisting of three main modules i.e. RFID reader, Data Reporter and Web server. Extended functionality is performed as the modules are integrated. Module provides their own features and functionality like reading and extracting information from the RFID tags is performed by RFID reader. All the log data i.e. captured student ID, time, date at 30 minutes interval is fetched by component called Data Reporter. All the data will be recorded into the database that is accumulated from online servers. This server automatically restart every time the system reboots and is kept up to date and running.

The web server specified above is hardware or software that provides ease of content delivery that will be publicly accessible via internet. Requests from the users browser is accepted and replied by sending HTML pages and associated file. Enabling the functionalities of the system dynamically, hosting of the data collector by the web server, database and graphical user interface pages enables online transaction with user of the system. The job of the data collector is to continually listen to incoming data sent by the Data Reporter component online. These log data will be inserted for the purpose of recording into the database once received.

For the purpose of friendly interaction with the users, GUI component for the system is developed. The GUI component of the system is purposely developed for friendly interaction with the users. This supports two types of users, students and academic staffs with a given unique access to their individual member area, while the students have access to their personal information and the staffs can observe their students information. The GUI developed is a database driven dynamic web page. Data is extracted from the database for constructing the information displayed on the web pages. The modules user list, log, timetable and attendance are the four categories in which the web page can be categorized. The pages are constructed by using the PHP scripting language and compatible with all major web browsers.

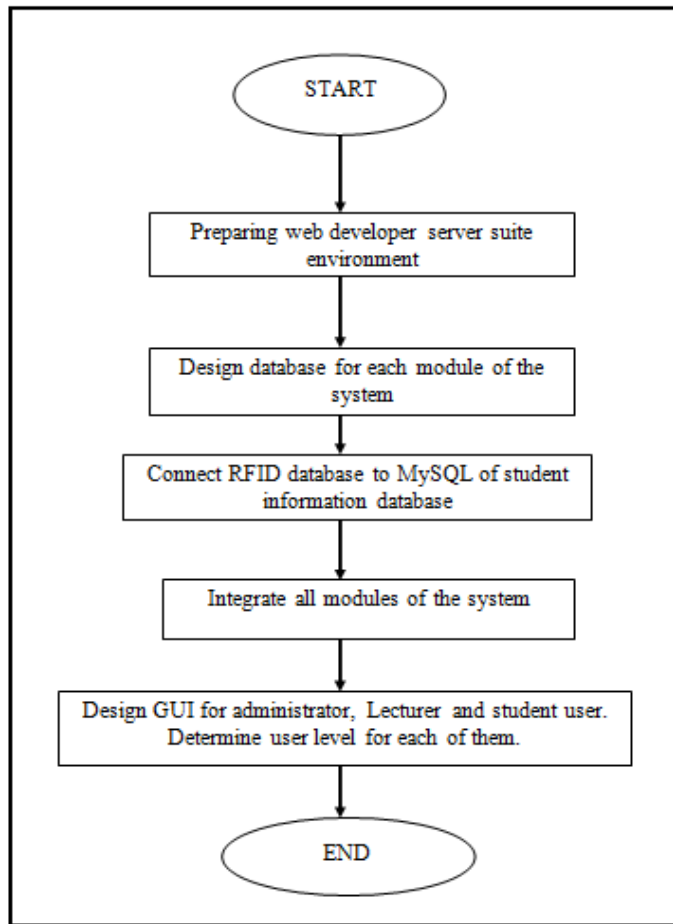


Figure 1. Design for Web Based Student's Attendance System

### 3. Design and Implementation

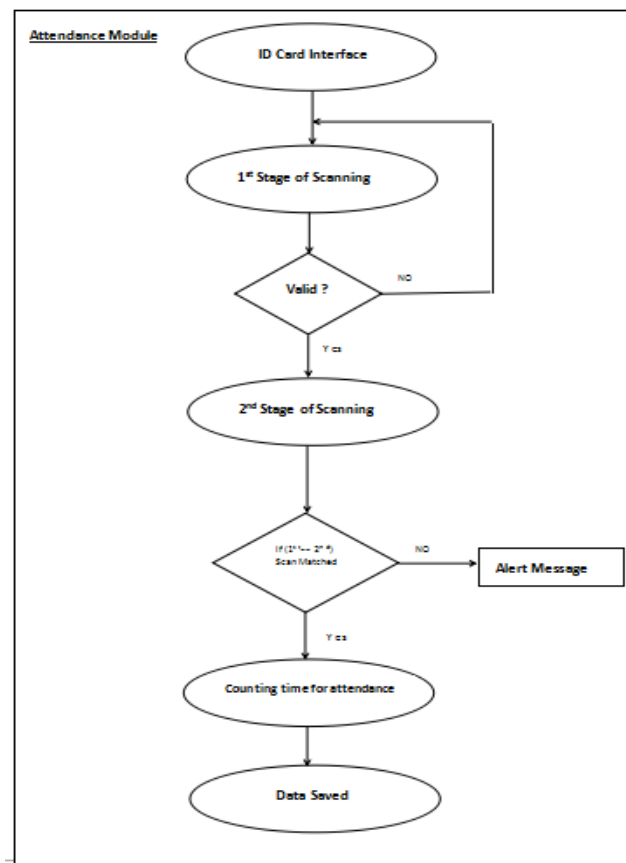


Figure 2. Student Attendance Module

Figure 2 focuses on implementing the automation of attendance system for students using RFID attached to ID cards. There exist two stage of RFID scanning to verify that the student has attended the class. At the college stage and a class stage, because student entering to the college might have not entered the class. So to understand this intensity we adopted two stage of RFID scanning. So based on the logs entered into the database the calculation is perform to understand for how many lectures the student was available in the class, based on this total no of lectures for that particular day is recorded. If the students scan the RFID at college stage and fail to scan it at class stage within stipulated time, an alert message will be sent to the student.

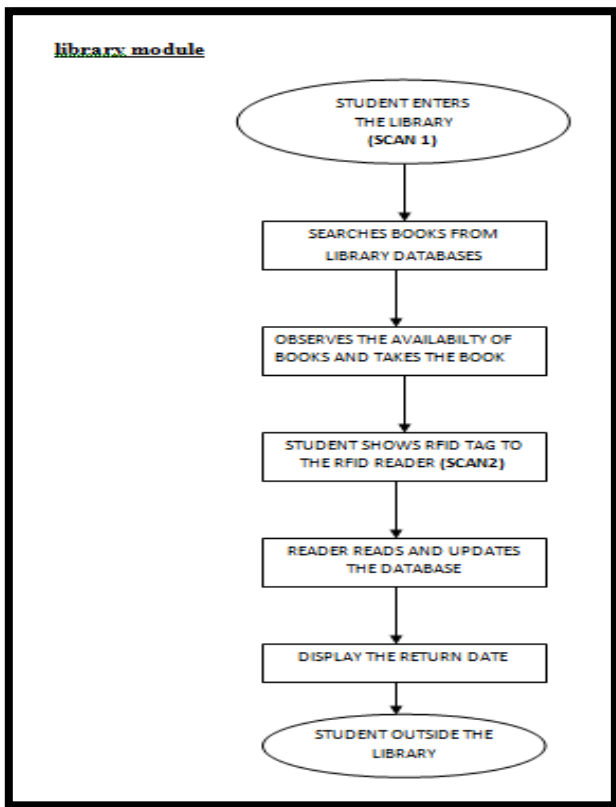


Figure 3. Library Module

In this module as shown in Figure 3, when a student enters the library his presence will be captured by scanning the RFID at the entrance. To borrow a book student have to search the book manually or in the database, once the physical book is found he/she just have to scan the RFID along with the book barcode at the counter, and the book will be allotted to his name along with displaying the due date. Students failing to deposit the book back within specified due date leads to some minimal fine amount.

Faculty attendance module shown in Figure 4 automates the attendance system similar to student attendance. When staffs enters into the college or exits from the college his or her RFID tag attached to the ID card will be scanned and updated in the database along with In-time or out-time. If faculty is late by stipulated time (for ex. 1Hour) there will a provision for late punch, for which leave will not be deducted. Similarly there is provision for early punch (Both early and late punch is

restricted to 3 no's in a month), for which leave will not be deducted.

Faculty leave management module shown in Figure 5 is integrated in this project where the staffs wish to apply for leaves has to login into the portal with essential credential and will be able to view the available number of leaves and the type of leave (includes Casual leave, earned leaves and restricted leaves). Based on the need he/she can apply for leave using a digital card. The same will be forwarded to the head of the department for the approval. If approved or rejected it will get updated in the database and an alert will be sent to the staff about the status of leave.

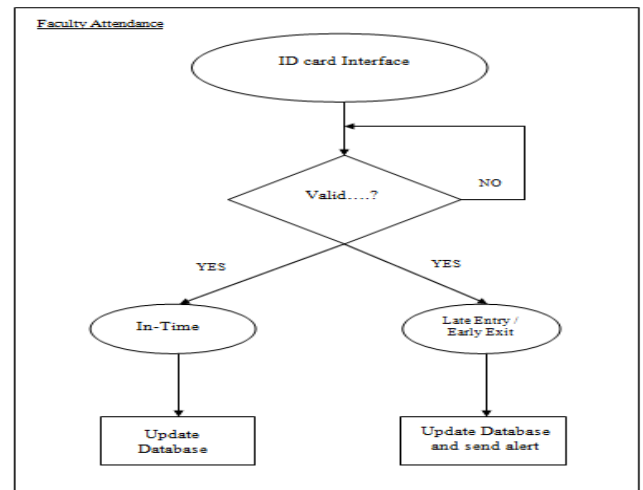


Figure 4. Faculty Attendance Module

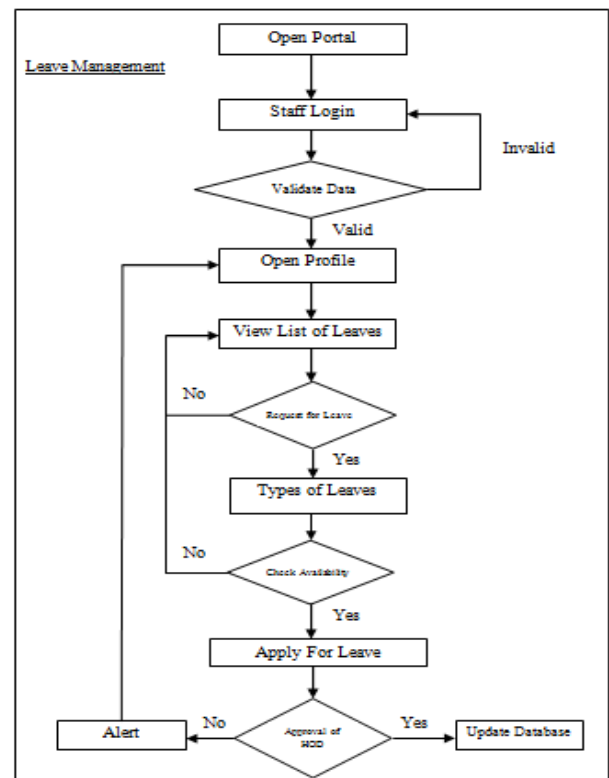


Figure 5. Faculty Leave Management Module

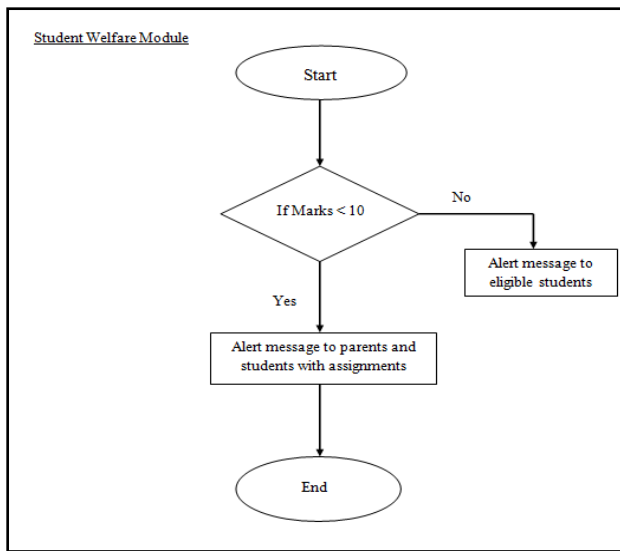


Figure 6. Student Welfare Module

Student welfare module shown in Figure 6 keeps track of the students with low performance. If a student has less than required marks, an alert message will be sent to the student and guardian along with the task that he/she may have to perform.

4. Experimental Results

In an experiment performed during Oct 2016, we could come with certain results with regard to each module in this work.

Student Attendance System

College scanner Readings	Classroom scanner Readings	Total periods
011	011	7
012	012	7
013	013	6
014	014	5
015		0

Figure 7. Experimental Results for student attendance system.

As per the student attendance module is concern Figure 7, as we had scanning of RFID card attached to the ID card of the student at two different stage so as to understand if the student has attended the class or entered the college but haven't attended the class. Based on two level readings, entry time and exit time of the student of the class the total lectures attended is calculated.

Library Management System

Lib scanner Readings	Book ID	Borrowed date	Due date	Return date	Fine amount
013	1012	20/10/2016	30/10/2016	9/11/2016	100
015	2014	21/10/2016	31/10/2016	27/10/2016	
011	0016	25/10/2016	05/11/2016	05/11/2016	
013	5210	03/10/2016	13/10/2016	14/10/2016	10
011	2103	04/10/2016	14/10/2016	10/10/2016	

Figure 8. Experimental Results for library management system.

As the experimental results shown for library management system in figure 8 for the month of Oct 2016, library scanner reads the RFID of each student entering the library and keeps track of the activity through picking the book from the rack to return the book on time or off time. Books before the issue will be scanned against the bar-code that tracks the issue date and

indicates the due date for return of the book. It records the return of the book, as the book can be returned before the scheduled date without any fine or return after the scheduled date with some minimal fine amount.

Faculty Attendance Management

Faculty ID	Login time	Logout time	Remarks
2012	9:00	16:35	
2053	8:45	16:36	Early punch
2016	8:55	16:45	Early punch
1163	9:10	17:00	Late punch
0136	9:00	17:34	

Figure 9. Experimental Results for faculty attendance system.

This experimental results obtained shown in figure 9 provides us details of login and logout time of the faculty. This module also logs early punch and late punch done by the faculties.

Faculty Leave Management

Faculty ID	Date of application	Type of leave applied	Period of leave		No of days	Reason
			From	To		
2012	03/10/2016	EL	05/10	10/10	5	personal
2053	15/10/2016	CL	20/10	23/10	3	Health problem
0136	17/10/2016	RH	18/10		1	sick
1163	19/10/2016	CL	01/10	03/10	2	personal
2012	25/10/2016	CL	27/10		1	personal

Figure 10. Experimental Results for faculty leave management.

The experimental result in figure 10 shows overall view of the faculty leave management system for the month of Oct 2016, that involves faculty identity number, date of applying leave, type of leave applied, period of leave, no of day and reason for the leaves.

Faculty leave table

Faculty ID	Types of leaves		
	EL	CL	RH
2012	10	12	2
2053	7	10	2
0136	8	12	2
1163	5	7	1
2012	10	10	2

Figure 11. Experimental Results for faculty leave table.

This experimental result shown in figure 11 will be accessible to the administrator to keep the track of type leaves available with faculties to claim.

Student welfare

Student ID	Marks_obtained						Action
	S1	S2	S3	S4	S5	S6	
011	18	02	13	12	10	06	Assignment(S2)
012	05	10	13	18	12	07	Assignment(S1, S6)
013	13	16	01	12	06	05	Assignment(S3, S5, S6)
014	16	02	04	10	06	11	Assignment(S2, S3, S5)
015	16	12	15	10	13	19	

Figure 12. Experimental Results for student attendance system.

Based on performance of first internal test marks as shown in figure 12 this experimental result has been depicted

for few students. Considering the marks (i.e. below 10) in various subjects, they are assigned with some assignments.

## 5. Conclusion

This system i.e. automated college management system was developed keeping in mind the loss of time and automation. With this system we could achieve automation on all the modules that we have covered. This system takes the college to a different level operating smartly. Human resources and usage of paper will be minimal. Automation in leave application management helps faculties to apply leave digitally with minimal time required.

Students can be tracked easily in the college by the administrator. Attendance shortage notification is easy at the end of semester as the faculties will have the proof of students

attending the lectures. Students will be motivated to intensely concentrate on their studies as the marks they obtain will be tracked and monitored by student welfare department to see that he or she improves in the subjects.

## 6. Future Work

This work can be further extended to other modules like examination, admissions, and results in order to understand the student's behaviour. Addressing the challenges like students carrying two ID cards is a major concern which can be accomplished. The use of camera integrated scanners for improving the clarity can also be worked on. Using of analytics in this system will help in understanding faculty leave application, student visit to the library and attendance system. In this way student module can be improved by using new innovations.

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