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# Real-Time Faculty Engagement System using IOT Technology

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## Article Info

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## ABSTRACT

This article presents a new approach to a Real-Time Faculty Engagement System using Internet of Things (IoT) Technology. To achieve the Real-Time Faculty Engagement System here, we used the IOT Technology. The Internet of Things (IoT) provides an efficient platform for developing and designing innovative solutions that overcome the drawbacks of a faculty's traditional attendance-taking methods. Previous attendance-taking methods are pen and paper methods and manual attendance-taking methods which are Time-Consuming, and Prone to Errors and there is a chance of data loss. So, to overcome these disadvantages we decided to use the Radio Frequency Identification Technology. The main idea is to engage the faculty in the classroom at the proper time and there is no deviation or inconvenience in the classrooms. This system enables the attendance of faculty in a school or classroom in an efficient way. This enables Proper Classroom study Maintenance and Proper faculty Engagement in the classroom during their particular class hours. For this, we used various IOT components like RFID Readers, RFID Tags, microcontrollers, LCD Display, Arduino IDE, GSM, Bread Board, and jumping wires. All these components are connected from one to another.

**KEYWORDS:** *Internet of Things, Radio-Frequency Identification, Faculty Attendance.*

## INTRODUCTION

This paper offers helpful insights for institutions looking to create a cutting-edge attendance system that increases faculty involvement and academic achievement by looking at guiding principles, best practices, and the successful resolution of difficulties. → The concept

“Internet of Things” (IoT) has recently attracted growing attention from both academia and industry. Radio-frequency identification technology has emerged as the best way for faculty attendance tracking. It is used in many sectors like Agriculture, retail sales, smart cities, businesses, transportation, and educational institutions. So here RFID technology plays an important role in this

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system. This Radio Frequency Identification technology uses Electromagnetic fields for identifying the tags attached to the objects. These objects include people, animals etc. This technology is a wireless Communication. For this unique RFID tag is given to every faculty member to scan the card after entering the classroom. This card consists of a Unique ID which is read by the RFID reader. Whenever the Faculty enters the classroom, she/he scans the RFID tag on an RFID reader module. Here we used the RFID reader for the purpose of reading the RFID tags. This RFID is an emerging technology that has its applications in various tracking sectors like vehicle tracking, agricultural tracking, inventory management, retail store etc. RFID reader is used for the identifying, tracking and monitoring the objects attached with the RFID tags. It reads the unique ID from the RFID tag and sends that data to the ESP32 Micro Controller. ESP32 stands for the Event Stream Processing. ESP32 is a microcontroller that acts as a central processing unit that receives the data from the RFID reader processes it and displays a result on an LCD Display. ESP32 is a chip that provides Wi-Fi and Bluetooth connections for the connected devices.

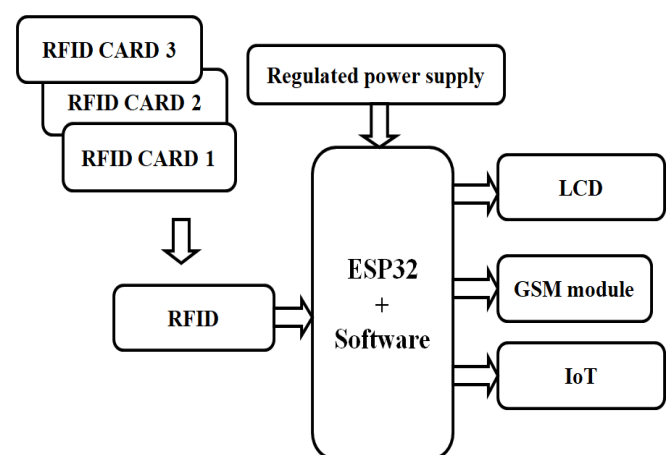
Here we used an application for storing the faculty data. This application stores the data of the faculty that means faculty name, subject name, IN and OUT time of the faculty. After successful scanning of the data on the unique ID card, it transfers that data to the IOT server and to the Android Application it stores the faculty name, corresponding faculty subject, IN time, OUT time of the faculty, and time with the date. A real-time clock is attached to the IOT system.

If there is no faculty entered into the classroom after the 10 minutes of class starting time then it sends an alert message to the higher authority through the GSM Module for the registered mobile number. GSM (Global System for Mobile Communication) is a module used for the purpose of the data transformation between the wireless devices, machine to machine communication and remote monitoring. It acts as an alert message for the administrators so they can arrange alternative faculty to the students. So that Higher Authority engages the faculty in the particular classroom. It enables real-time monitoring. In traditional methods faculty attendance tracking is risky, time-taking and prone to errors. In traditional methods one of the faculty attendance tracing method is pen and paper approach which means a

particular person has to go to the each and every classroom and note down the faculty attendance, which is very lengthy and time consuming process and maintenance of that daily attendance tracking papers also very difficult. So that the proposed system is introduced to overcome the all the disadvantages in traditional methods. It introduced the automatic faculty attendance tracking method. The advantages of the proposed system are real time faculty engagement, minimal human intervention, automatic attendance tracking, stores the all-time faculty data in the application so that data is stored and managed in safe manner, sends an alert message to the higher authorities.

## DISCUSSION

As shown in the below block diagram of real time faculty engagement system unique RFID cards are given to the each and every faculty in the university or college. RFID reader module is placed in every classroom. This reader module is used for the reading purpose. Whenever faculty enters in to the classroom, she/he scans the RFID card on the RFID reader. These RFID tags consists of the unique number that was linked with faculty name subject name etc.



After scanning the RFID tags, reader module sends that data to the ESP32 software which acts as an intermediate between these components. It is a central processing unit. After processing it sends data to the LCD which displays the messages to the user. It acts like a interface for the faculty. First it displays the introduction message to the faculty that means "SCAN THE CARD" . After

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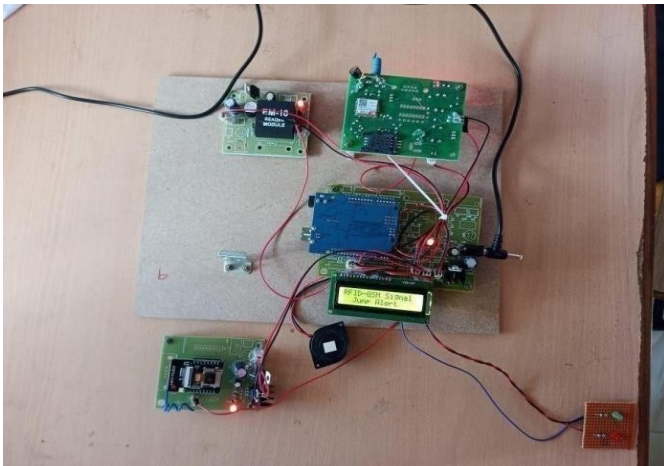
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scanning the card, it subject on the LCD display. If there is no faculty scanned the card it shows times up message and sends an alert message to the registered mobile number and all the data of the faculty is stored in the application which is available to higher authorities.

**STEP-2:**

Whenever the class time begins LCD display displays a message to the faculty that "scan card". For this unique identification cards are given to each faculty which are known as the RFID cards. Whenever faculty enters in to the classroom, she/he swipes the card. On the RFID reader device.



Real-Time Faculty Engagement System



User Interface

**Test cases on Project**

Here, there are two test cases are there. one testcase shows the actual working and implementation of the device if the conditions are pass and faculty enters into the classroom and another test case is for absence of the faculty and fail case.

**TEST CASE-1**

**STEP-1:**



LCD Display



RFID Tags



RFID Reader

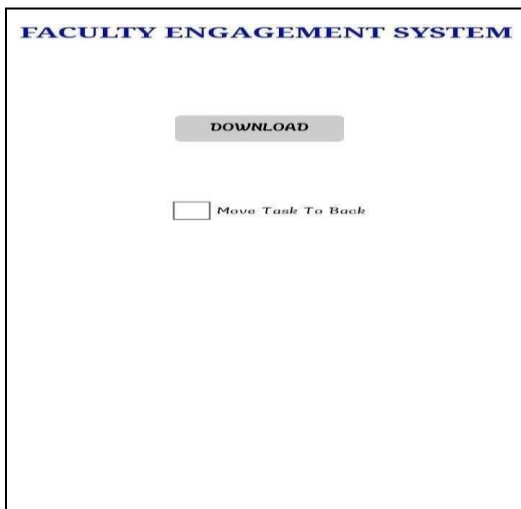
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**STEP-3:** On the LCD Display Also it shows a timer for the scanning the card that how much time is left to scan the card. So that the faculty comes to the class on time.



Timer to scan the card

**STEP-4:** After reading of the faculty card, it stores the in time and out time of the faculty in the app which is available to the HOD and they can download the excel sheet and see the in and out time of faculty.



APPLICATION

**TEST CASE-2:**After completion of the given time if no faculty is scanning the card, then displays a message on the LCD display that “Time Up” as shown in the below. And sends an alert message to the Head of Department to take the action.



RESULTS

The implementation of the IOT-based RFID Faculty Engagement System yielded several significant results, demonstrating its effectiveness and potential benefits. The following key results were observed:

The system significantly reduced the time and effort required to track attendance. Traditional methods, such as manual methods like roll calling by their names using their id’s and sign-in sheets, were time taken processes so we replaced it with an automated process. Faculty members simply scanned their RFID-tagged ID cards at RFID readers, and attendance was recorded instantly. This automation saved considerable time for both faculty and administrators, allowing them to focus on their primary tasks.

The RFID technology provided a high level of accuracy in attendance tracking. Each faculty member's unique RFID tag ensured precise identification and recording of attendance. The integration with the ESP32 microcontroller and the system's real-time clock functionality further enhanced data accuracy by ensuring that attendance records were accurately timestamped. This resulted in reliable and error-free attendance data.

	B	C	D
	FacultyID	Status	Date & Time
1			
2	1 ENGLISH	IN	2024-04-03 20:26
3	2 ENGLISH	OUT	2024-04-03 20:26
4	3 SOCIAL	IN	2024-04-04 20:03
5	4 SOCIAL	OUT	2024-04-04 20:05
6	5 SOCIAL	IN	2024-04-04 20:06
7	6 SOCIAL	OUT	2024-04-04 20:06
8	7 MATHS	IN	2024-04-04 20:06
9	8 MATHS	OUT	2024-04-04 20:06
10	9 ENGLISH	IN	2024-04-04 20:06
11	10 ENGLISH	OUT	2024-04-04 20:06
12	11 ENGLISH	IN	2024-04-04 20:06
13	12 ENGLISH	IN	2024-04-04 20:40
14	13 ENGLISH	OUT	2024-04-04 20:40
15	14 ENGLISH	IN	2024-04-04 20:43
16	15 ENGLISH	OUT	2024-04-04 20:43
17	16 ENGLISH	IN	2024-04-04 20:45
18	17 ENGLISH	OUT	2024-04-04 20:45
19	18 ENGLISH	IN	2024-04-04 20:48
20	19 ENGLISH	OUT	2024-04-04 20:48
21	20 ENGLISH	IN	2024-04-04 20:50
22	21 ENGLISH	OUT	2024-04-04 20:50
23	22 ENGLISH	IN	2024-04-04 21:09
24	23 ENGLISH	OUT	2024-04-04 21:09
25	24 SOCIAL	IN	2024-04-04 21:10
26	25 SOCIAL	OUT	2024-04-04 21:11
27	26 ENGLISH	IN	2024-04-04 21:13
28	27 ENGLISH	OUT	2024-04-04 21:13
29	28 ENGLISH	IN	2024-04-04 21:16
30	29 ENGLISH	IN	2024-04-09 20:30
31	30 ENGLISH	OUT	2024-04-09 20:30
32	31 ENGLISH	IN	2024-04-09 20:30
33	32 ENGLISH	OUT	2024-04-09 20:30
34	33 ENGLISH	IN	2024-04-09 20:30

Application Data

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The GSM module enabled real-time monitoring and notifications. Administrators received SMS alerts if faculty members were not present in their designated locations on time. This feature improved accountability and allowed for immediate action to be taken if a faculty member was absent or late. The real-time notifications also facilitated better communication between faculty and administration, ensuring smoother operations.

The system's data analysis capabilities provided valuable insights into attendance patterns and behaviors. Advanced algorithms identified trends, such as frequent late arrivals or absences, which helped administrators understand and address underlying issues. The data insights enabled informed decision-making and the development of targeted interventions to improve faculty engagement and attendance.

The system's modular design proved to be unique and easy to use which means user friendly. It could be easily adapted to different environments, including schools, universities, and workplaces. The ability to add new RFID readers and tags without significant changes to the existing infrastructure allowed the system to grow with the institution's needs. This scalability ensured that the system remained a long-term solution for attendance tracking.

The LCD display provided a user-friendly interface, enhancing the system's accessibility and ease of use. Faculty members could quickly verify their attendance status, and administrators could monitor the system's operation at a glance. The clear and legible display made the system intuitive and easy to use, reducing the learning curve for new users.

The implementation of the system required technical expertise for proper installation and configuration of hardware components. Once installed, the system operated reliably, with minimal maintenance required. Regular updates and security measures were implemented to ensure the system's continued performance and data integrity.

Robust security measures were put in place to protect the collected attendance data. Data transmissions were encrypted, and the database was secured against unauthorized access. User authentication protocols ensured that only authorized personnel could access the system. Compliance with relevant data protection

regulations further ensured the responsible handling of personal information, maintaining user trust.

While the initial investment for implementing the IoT-based RFID system was higher than traditional attendance tracking methods, the long-term benefits justified the expense. The system's efficiency, accuracy, and data insights provided a significant return on investment. Institutions that implemented the system reported improved attendance management and operational efficiency, highlighting the cost-effectiveness of the solution.

The results also highlighted opportunities for future enhancements. Integrating additional sensors, such as biometric scanners or facial recognition, could further improve accuracy and security. Developing mobile applications for real-time attendance tracking and notifications could enhance accessibility and convenience for users. Continuous innovation and adaptation to emerging technologies would ensure the system remains relevant and effective.

The results of the IoT-based RFID Faculty Engagement System demonstrated its effectiveness in improving attendance tracking in educational institutions and workplaces. The system provided significant benefits in terms of efficiency, accuracy, real-time monitoring, and data insights. While challenges in implementation and maintenance were addressed, the long-term benefits made it a worthwhile investment. The system's versatility, scalability, and potential for future enhancements ensured that it could meet the evolving needs of its users, ultimately contributing to improved organizational efficiency and engagement.

## CONCLUSION

The IOT-based RFID system for tracking attendance has done a great job at making things easier for Faculty. With RFID technology and an LCD display, accuracy has definitely improved a lot. Bye-bye to old-school manual methods that needed too much time and effort - this system lightens the load and boosts efficiency. Testing has shown that it's reliable, accurate, and super fast with real-time data updates. This means administrators can stay on top of attendance data like never before.

People love how easy this system is to - no hassle, no contact needed. Plus, it's flexible enough to work in

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schools, offices, or any event. Thanks to the IOT tech, RFID tags, GSM module, ESP32 microcontroller, and LCD display, keeping track of attendance is a breeze - even alerting if there's an error.

Even though this system is a game-changer compared to old ways of tracking attendance, there are some glitches to watch out for. Sometimes RFID tags might not read right because of interference or where they're placed. But these hiccups are opportunities for future improvements like better error detection.

The IOT-based RFID system is top-notch for keeping tabs on attendance accurately and efficiently. With all its benefits, this system could seriously reshape how we manage attendance in different places. We're ready to make it even better by ironing out those kinks and adding new features - so keep an eye out for what's next!

To keep track of attendance with the system connected to the computer through RS232 microcontroller & collect data from RFID readers sounds smart! And using GSM service for remote monitoring when faculty aren't in class is genius. With C language software ensuring real-time data sync into the database.

## REFERENCE

[1] In a book by Daniel M. Dobkin and Steven M. Weigand, they talk about how the environment can affect RFID tag antennas. This book was published by Bulis Press in California back in 2010.

[2] Another interesting read is "Automated attendance management software" by AmirjanBin Nawabjan from the University of Technology in Malaysia. This thesis was completed in 2009.

[3] If you're curious about biometrics, Gordon.N. Withtaker has written a book called "Introduction to biometrics technology" published by Dint and Sons Limited in 2002.

[4] For more information on human RFID implants, you can check out an article on <http://www.theregister.co.uk> from back in 2004.

[5] Mary Catherine O'Connor wrote about Sun Microsystems trying out RFID tagging for financial customers in the United States. Her article was published by Preston Press in 2009.

[6] In the journal Volume 262 from 2008, Markus Hansen and Sebastian Meissner discuss how the Electronic Product Code on RFID tags can be used for identifying and tracking individuals and social networks.

[7] At the IET International Conference on Wireless, Mobile and Multimedia Networks in January 2008, Prof. Y. B. Thakare, Prof. S.S. Musale, and Prof. S.R. Ganorkar shared a technological review of RFID and its applications.

[8] Klaus Finkenzeller's "RFID Handbook" is a great resource that covers fundamentals and applications of contactless smart cards and identification technology. This second edition was published by Wiley in 2002.