

# Smart Attendance Monitoring System using IoT and RFID

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**ABSTRACT** - Maintaining the attendance of the students in an institution is a hefty task. Always there is a difficulty in handling attendance manually. This project aims at designing a smart attendance system that automatically monitors and manages attendance of the students in an institution efficiently. The whole system is developed with an Arduino uno microcontroller and RFID readers. Unique RFID tags can be deployed in students id card. Also, Wi-Fi communication modules are used to make convenient communication depend on the availability of the network. Database of students must be created. A GSM Module is used to send messages to parent's mobile about the students attendance status. A GPS module is used to detect the live location of the student. This system will reduce a lot of manual work of teachers and administrators of any institution. The proposed work comprises of two most popular trend in technology research; IoT and RFID.

**Keywords:** Smart Attendance, IoT, RFID, GSM, Arduino

## I. INTRODUCTION

Attendance plays a very important role in any organization. Attendance in many organizations, college and schools are paper-based. When paper-based attendance is considered, the chances of error are high. Using technology this issue can be solved and the papers can be avoided in this process. There are many technologies that support to solve this issue. But best among them is RFID (Radio Frequency Identification) as the names suggest it uses the radio waves to identify and track the object or individual. The communication with respect to RFID is wireless using an electromagnetic and electrostatic coupling, where a radio frequency of spectrum is used to communicate. For demonstrating the results, the system is built using RFID card reader module of the model RC522 RFID card reader and RFID cards/tags. The RFID system consists of RFID tag (or card) and RFID reader. The tag (or card) has a

unique ID which is initially stored in the database before assigning it to the user. The user has to place the tag at a specific distance from the RFID reader so as to log the attendance. The tag consists of a microchip that helps to store unique sequence number that is useful in identifying objects. The microchip includes micro circuitry and an embedded silicon chip. The tag has a rewritable and permanent memory which can be repeatedly programmed by multiple times. The RFID reader is the most fundamental part of the RFID system. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at frequency of 125 kHz and 12V power supply. RFID tag (or card) is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. It reads the raw data from the tag and transmits it to the middle-ware for processing. Tags at varying frequencies are interrogated by the reader. The reader is further connected to the computer for processing the data this can be done via a USB connector or any wireless connection. This type of simple system where scanning of the tag towards the reader makes the work quite easier and improves the rate of error. Also, the long procedure of attendance is cut short to a single move/step. The smart attendance management system removes the traditional way of registering the attendance. It also provides a secure, error-free method of attendance management. The administrators can be at ease by employing such a smart attendance system. The system is best suited for managing attendance of employees. It can also be used to record attendance for students at their hostels.

## II. LITERATURE SURVEY

[1] This work introduces a new paradigm of monitoring student attendance using Radio Frequency Identification (RFID) based on the

Internet of Thing (IoT). Educational institutes are concerned about student irregular attendance. Truancy can affect a student's overall academic performance. The traditional method of taking attendance by calling names or signing on paper is very time consuming and inefficient. RFID based attendance system using IoT system is one of the solutions to handle the problem. The proposed work comprises of two most popular trend in technology research; IoT and RFID. [2] If we talk about the current scenario of our education system than we found that we have lot of technologies to use but still we are following the traditional system. We if we talk about the attendance system in universities and schools, lecturers did that work manually. Lecturers took the attendance and update it manually in the database. If we talk about the technology than we found that there are lot of tools to use and reduce the burden of lectures. Using RFID is the one example of that. We if combine the RFID and IOT (Internet of Things) than we can do it automatically and there is no need to do it by lectures. Here we are planning to use the Cloud as storage for better performance. Using IOT and Cloud we can access it from anywhere and anytime which will provide us the better proficiency and flexibility. [3] Attendance is a must for students. Without the attendance process, the lecturer or teacher cannot assess the participation of a student. But in the process now, attendance is still done manually using paper. The first problem is the use of excess paper and the second problem is the difficulty for the administration to recapitulate student attendance results. This is because so many attendance papers must be analyzed by the administration. Therefore, a student attendance system is needed that can collect data quickly, efficiently and accurately. This student attendance system is done by conducting data collection, system analysis, system design, and system implementation. This system is created using the PHP and Java Android programming languages. The System is also using Ibeacon as classroom identifier. The purpose of this study is to make attendance system applications of students and class schedule notifications based on IBEACON, it is expected that the attendance process will be more efficient and can be easily monitored by lecturers and by the central administration.

### III. EXISTING SYSTEM

Biometric system that reads finger prints to monitor attendance in an institution. But these

systems aren't efficient and safe considering the post Covid pandemic. There are also several projects and existing models that uses barcode for this attendance tracking. Smartphones can also be used for this purpose but, it seems there are chances to make fraudulent access in the system. Many types of the research proposed video and image-based automated monitoring where it's not economically feasible and depend on location of the camera, the posture of the student and sometime it may fail when there are two or more students with similar facial features.

### IV. PROPOSED SYSTEM

An Arduino Uno (Atmega328p) is connected with MFRC522 Reader, a Wi-Fi module Node MCU ESP8266 and a GSM module. By enabling GPS module connection with the controller, the location of the RFID card which gets read by the reader and send location to the database. A Passive RFID card is read by the RFID reader and the data is sent to the database and software application for further data processing. The Wi-Fi module Node MCU ESP8266 is selected as a primary data transmission method. The data is transferred to the Google Server Cloud.

Database of students is designed using MySQLite and the details are stored by class, section and department wise. The student database is designed in such a way that the parallel attendance reader system can be used for attendance monitoring at the different entrance of an institution and never produce any redundant data in the cloud storage.

The Software Implementation is done using Python. The frontend is done using Tkinter and the Backend is done using MySQLite. This enables data collection, aggregation and processing faster. The system can send a notification to the professor with just a click of a button.

### V. HARDWARE AND SOFTWARE REQUIREMENTS

- Arduino Uno
- NodeMCU ESP 8266
- RFID Reader MFRC522
- RFID tags
- GSM Module
- Arduino IDE
- Embedded C
- PHP

### VI. BLOCK DIAGRAM

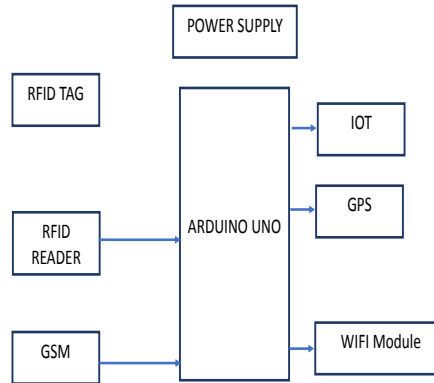
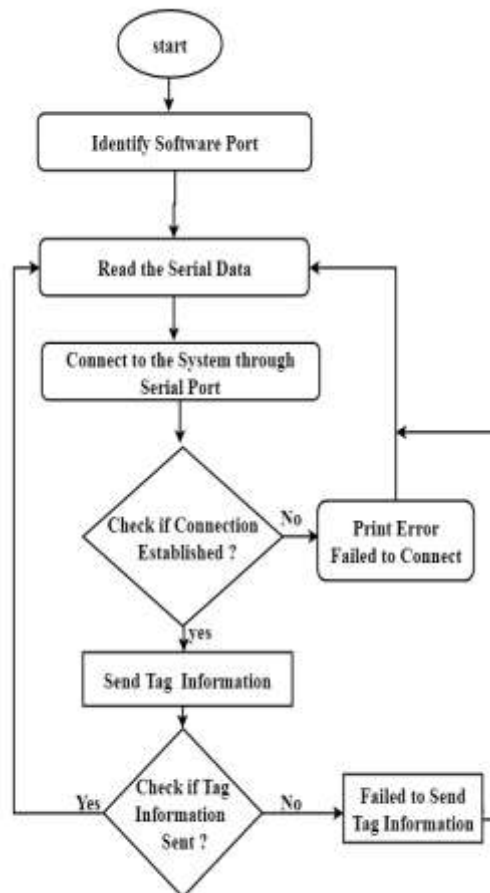


Fig 1. Block Diagram of the Proposed System

### Fig 2. Flowchart of Hardware



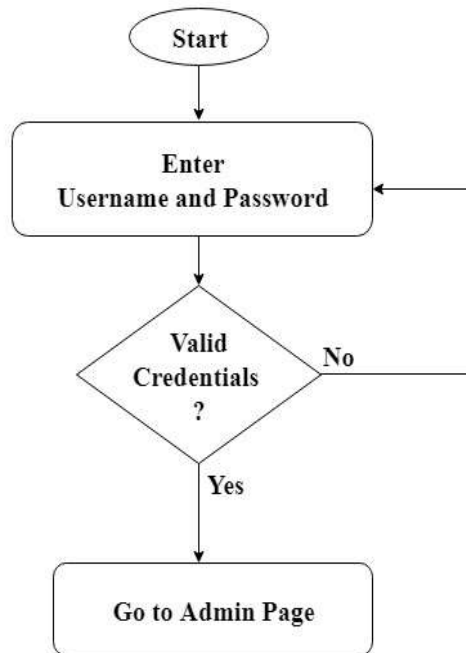


Fig 3.Flowchart of software implementation

**VII. SIMULATION RESULTS**

The simulation work of this project is done with embedded C to make sure that the logical works in a proper way and brings the

correct output the program for the Arduino was implemented using Arduino ide software.

Finally, the prototype is developed and set up to transfer instance RFID readings to a webserver via the Internet. The data can be viewed in the server using login id and password.

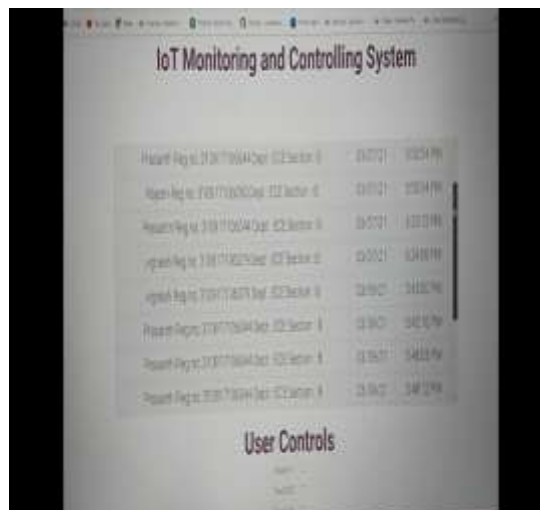
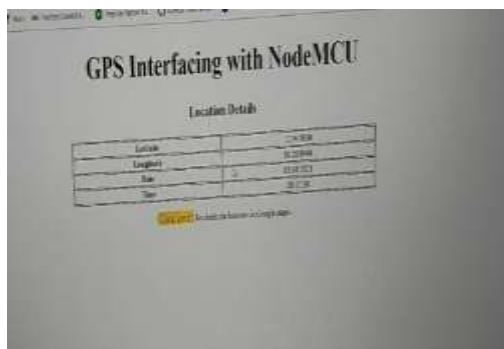


Fig 4. Value stored in the cloud (attendance report)



**GPS Interfacing with NodeMCU**

Location Details:

Latitude	12.9166
Longitude	77.6333
Alt	10.0000
Time	10:10:10

**Fig.5 Students data in web server**



**Fig 6. Module of the components before tag is placed**

When the RFID tag is placed on the RFID Reader the data is read by the reader and transferred to the Arduino uno. The RFID tag has unique information and details. The GPS module is used to get the real time location of the student and it is displayed in the web page as shown in fig 5.2. The data read is transferred to cloud using Node MCU. Also the SMS is sent to the parent's mobile using a GSM module. The administrator can check the attendance details of students by logging into the server using a password and a user name as shown in fig 4.

### VIII. CONCLUSION

Through the proposed IoT based smart attendance system using RFID the existing manual system of registering the attendance can be transformed into an efficient and error-free attendance management system. By employing this system information can be conveyed without a hitch. The proposed system will be of great help in schools, colleges and any organizations to monitor their students or employees. Although there are different methods of managing the student's or employee's attendance, the proposed system is easy

to handle and very convenient for any organization. The proposed system is time-saving, user-friendly and reliable to use.

### REFERENCES

- [1] P. Kovelan, T. Kartheeswaran, and N. Thisenthira, "Automated attendance system using IoT", International Conference on Advancements in Computing (ICAC), 2019.
- [2] Soumil Nitin Shah, AbdelshakourAbuzneid, "IoT based smart attendance system using RFID", IEEE Journal of Selected areas in Communication, 2019.
- [3] Muhammad Ayat Hidayat, HolongMarisiSimalango, "Students Attendance System And Notification Of College Subject Schedule Based On Classroom Using Ibeacon", International Conference on Information Technology, Information Systems and Electrical Engineering(ICITISEE), 2018.
- [4] MohdIkhsanMoksin, NorizanMohd Yasin, "The Implementation of Wireless Student Attendance System in an Examination Procedure", International Association of

- Computer Science and Information Technology, 2010.
- [5] A.Kassem, H.Hamad, Z. Chalhoub, S. El Dahdaah, "An RFID Attendance and Monitoring System for University Applications", International Journal of Science , Engineering and Technology Research(IJSETR), 2010.
- [6] G.T.Bharathy, S.Bhavanisankari, T.Tamilselvi, G.Bhargavi "Analysis and Design of RF Filters with Lumped and Distributed Elements" International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277 - 3878, Volume-8, Issue-2S5, July 2019, Pages 38 – 42, Retrieval Number: B10090682S519/2019©BEIESP DOI:10.35940/ijrte.B1009.0782S519
- [7] D. Mane, "Importance and Analysis of RFID in Attendance System," International Journal of Emerging Science and Engineering (IJESE) no. 9, pp. 90–92, 2013.
- [8] Z. Al-Shammari, "Developing a technology attendance tool based on CAMTs and CARs to improve student attendance at university classrooms," 2009 3rd International Conference on Signals, Circuits and Systems (SCS), Madeline, 2009, pp. 1-3.
- [9] G.T.Bharathy, S.Bhavanisankari, T.Tamilselvi, G.Bhargavi "An Energy - Efficient Approach for Restoring the Coverage Area During Sensor Node Failure" © Springer Nature Switzerland AG 2020 , S. Smys et al. (Eds.): ICICIT 2019, LNNS 98, pp. 594–605, 2020, ISSN 2367-3370, E-ISSN 2367-3389. [https://doi.org/10.1007/978-3-030-33846-6\\_63](https://doi.org/10.1007/978-3-030-33846-6_63)
- [10] Z. Hualin, W. Qiqi and H. Yujing, "Design Fingerprint Attendance Machine Based on C51 Single-chip Microcomputer," 2018 IEEE International Conference of Safety Produce Informatization (IICSPI), Chongqing, China, 2018, pp. 536-539
- [11] M. M. Islam, M. K. Hasan, M. M. Billah and M. M. Uddin, "Development of smartphone-based student attendance system," 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), Dhaka, 2017, pp.230-233. doi: 10.1109/R10-HTC.2017.8288945
- [12] D. Dressen, "Considerations for RFID technology selection," Atmel Appl. J., pp. 45–47, 2004.
- [13] K. Domdouzis, B. Kumar, and C. Anumba, "Radio-Frequency Identification (RFID) applications: A brief introduction," ScienceDirect: Adv. Eng. Informatics, vol. 21, pp. 350–355.
- [14] D. Dressen, "Considerations for RFID technology selection," Atmel Appl. J., pp. 45–47, 2004.
- [15] A. Digital and R. Technology, "Classic RFID module products," no.April, 2008.
- [16] G. T. Bharathy, V. Rajendran, T. Tamilselvi and M. Meena, "A Study and Simulation of Spectrum Sensing Schemes for Cognitive Radio Networks," 2020 7th International Conference on Smart Structures and Systems (ICSSS), Chennai, India, 2020, pp. 1-11, doi: 10.1109/ICSSS49621.2020.9202296.
- [17] Bharathy G.T., Rajendran V., Meena M., Tamilselvi T. (2021) Research and Development in the Networks of Cognitive Radio: A Survey. In: Karuppusamy P., Perikos I., Shi F., Nguyen T.N. (eds) Sustainable Communication Networks and Application. Lecture Notes on Data Engineering and Communications Technologies, vol 55. Springer, Singapore. [https://doi.org/10.1007/978-981-15-8677-4\\_39](https://doi.org/10.1007/978-981-15-8677-4_39)
- [18] B.Thangalakshmi, G.T.Bharathy Review of Cognitive Radio Network, International Journal of MC Square Scientific Research Vol.7, No.1 Nov 2015, pages 10 - 17. <https://doi.org/10.20894/IJMSR.117.007.001.002>
- [19] B. Thangalakshmi, G.T.Bharathy "Matched Filter Detection Based Spectrum Sensing In Cognitive Radio Network" International Journal of Emerging Technology in Computer Science and Electronics, Volume 22 Issue 2 – MAY 2016, Pages 151 - 154, ISSN:0976-1353.
- [20] D. Mane, "Importance and Analysis of RFID in Attendance System," International Journal of Emerging Science and Engineering (IJESE) no. 9, pp. 90–92, 2013.
- [21] A. Kassem, M.Hamad, Z. Chalhoub, and S. El Dahdaah, "An RFID Attendance and Monitoring System for University Applications", 17th IEEE International Conference on Electronics, Circuits and Systems-2010
- [22] SumitaNainan, Romin Parekh, Tanvi Shah, "RFID Technology Based Attendance ManagementSystem", IJCSI International Journal of Computer Science Issues, Vol. 10 -January 2013
- [23] T.S. Lim, S.C. Sim and M.M. Mansor, "RFID Based Attendance System", IEEE

- Symposium on Industrial Electronics and Applications (ISIEA 2009), October 4-6, 2009, Kuala Lumpur, Malay-2009
- [24] H. K. Nguyen, M. T. Chew, “RFID-Based Attendance Management System”, 2nd Workshop on Recent Trends in Telecommunications Research (RTTR)-2017
- [25] Van-Dung Hoang ,Van-Dat Dang , Tien-Thanh Nguyen, DiemPhuc Tran, “A solution based on Combination of RFID tags and facial recognition for monitoring systems”, 5th NAFOSTED Conference on Information and Computer Science (NICS) – 2018
- [26] Mahesh Sutar, Mahesh Patil, Sachin Waghmare, “Smart Attendance System Using RFID In IOT”, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 5, Issue 4-April 2016.