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IoT based Attendance System

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***Abstract:** In this era of technology, there are still some domain areas where technology is not completely adapted. And one among these domains is the "education system". There are many problems in this domain and one among them is "attendance system", which leads to a lot of time waste (probably 15-25% of the total period time), despite wasting this amount of time, many times there causes error in the final attendance sheet. Attendance report is the legal proof of the presence of the student at a particular place and thus this makes the correct attendance report to be mandatory at any circumstance. The project proposed in this paper deals with attendance data of students, which is directly stored on the cloud, and which doesn't waste any precious minute of students and professors by maintaining 100% accuracy of the attendance data, after completion of total procedure, the professor can access the attendance report at the last minute of the class.*
***Keywords:** Nodemcu, RFID, attendance system, sensors, microcontroller, IoT, Cloud*

I. INTRODUCTION

In the present scenario, it is very much difficult to take attendance in schools and colleges [1]. Inefficiency while taking the attendance, proxy attendance and the difficulty to maintain the records till the end of the academic year, are the problems being addressed in the attendance management system [2]. Moreover the consumption of the time in recording the attendance during the class time leading to the technological solution development to maintain the attendance system.

The need for maintenance of attendance report plays a key role in the education system [3]. This project takes input data during the class whether the student is present in the class physically or not. After the completion of the class, during the end, the collected data responses are displayed on the screen along with their respective identification number and the status of their presence in that particular class on the screen provided in the class, so that professor can cross-verify it and submit the attendance accordingly that has to be considered.

II. EXISTING SYSTEM

In the present scenario, the system of attendance is taken manually with the professors or teachers in the schools and colleges, where it consumes much time to have the efficient attendance and also very much difficult to maintain the records of the attendance [4]. Some of the other ways of attendance management are done using the biometric system [5-6], where the fingerprint attendance system is used. But many fraudster attack and false attendance have happened with this system. The intelligent attendance management uses the technique of image processing to capture attendance [7-9]. But this system is costly and not much efficient to be used in all the required areas [10].

III. DESIGN IMPLEMENTATION

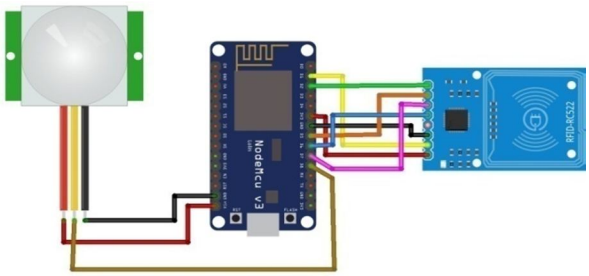


Fig1: Wiring for the main module to detect student presence

This is the circuit diagram of the project that should be placed inside a chair, where PIR sensor will be little exposed little bit outside to detect the student and RFID reader (RFID - RC522) is used to read the ID number of the student.

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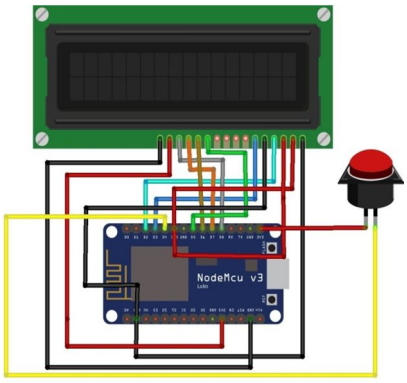


Fig2: Wiring for the screen to display attendance

This is the other part of the project which is can be accessed only by the teacher, the red button (push button), should be pressed to start the timer in all the chairs for the class attendance, and the final result which will be the list of the students who are absent would be displayed on the LCD.

IV. COMPONENTS USED

A. *NodeMcu*

This microcontroller board which includes an inbuilt firmware that runs on ESP8266 WiFi chip, this module is widely used for IoT applications, we have chosen this development board for its IoT application as we are dealing here with wireless communication [11].

The dimension of the board	48 X 22 X 5 (in mm)
Transfer speed	150 Mbps
Clock frequency	80MHz-240MHz
Wifi frequency	2.4GHz
Operating temperature	-40C to 85C
Operating voltage	3.3V
Operating current	12mA

B. *RC522 module*

Radio Frequency Identification technology is used in this project, for the student ID card identification which consists an RFID tag (every student has unique tag), and there will be an RFID reader in the chair to identify the tag ID [12].

Operating temperature	-20C to 8C
Operating voltage	3.3V
Physical dimensions	40 X 60 (in mm)
Operating current	13-26mA
Data transfer speed	10Mbps

C. *Passive Infrared Sensor*

This sensor suits the best to check the presence of a body in a financial way as well as accuracy wise [13].

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V. WORKING

There are two parts of the project, the displaying part which is common to the complete class and accessed only by the professor and the other part which is kept on every chair for the detection of the presence of student, the second part can be accessed neither by the teacher nor the student. The second part of the chair will be in each chair to check the presence of each student on the chair.



Fig3: Flowchart of working model

The student has to select a chair and show his identity card which consists of the student unique RFID tag, and the chair contains an RFID reader that reads the student I'd and allocates the chair to the student until another RFID tag is detected. Whenever the professor enters the class, they would press the push button, which is the part the first portion of the project (generally it should be near board), as the push button is pressed timer(timer length would be class time) starts in each of the module present in the chair, as the timer starts PIR starts detecting every minute till 59 seconds (as the class is of one hour), and if the PIR doesn't detect for more than 10 minutes (here 10 minutes are considered for student break, can be altered according to institution rules if any), after 59 minutes Ids of all the students who were absent would be showed on LCD which is near the board. A rechargeable battery of 5v and capacity 2200mah, which lasts for a long time, and this battery should be recharged by the peon and other people, as this battery can be charged within 2 hours which could be done easily after college premises for the betterment of attendance system.

VI. RESULTS



Fig4: Implementation of circuit on chair

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These circuits would be placed in each of the chair such that each PIR sensor can detect the student, these modules would be placed inside the chair with the battery placed back of the chair.

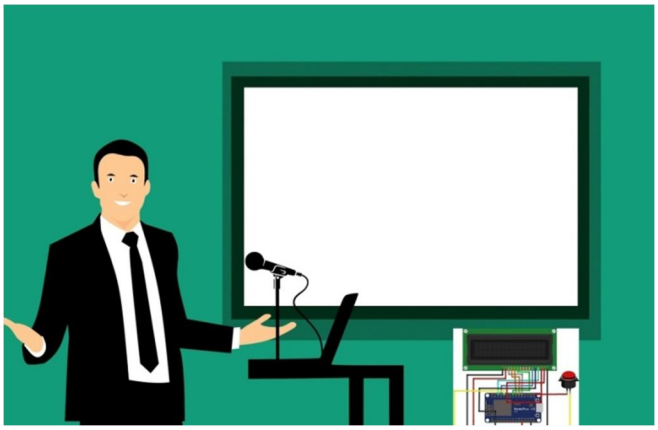


Fig5: Implementation of circuit at the teaching board

The other part would be placed near the board, the red button would be pressed to start the class, and at the end ID's of the absent students would be shown in the list.

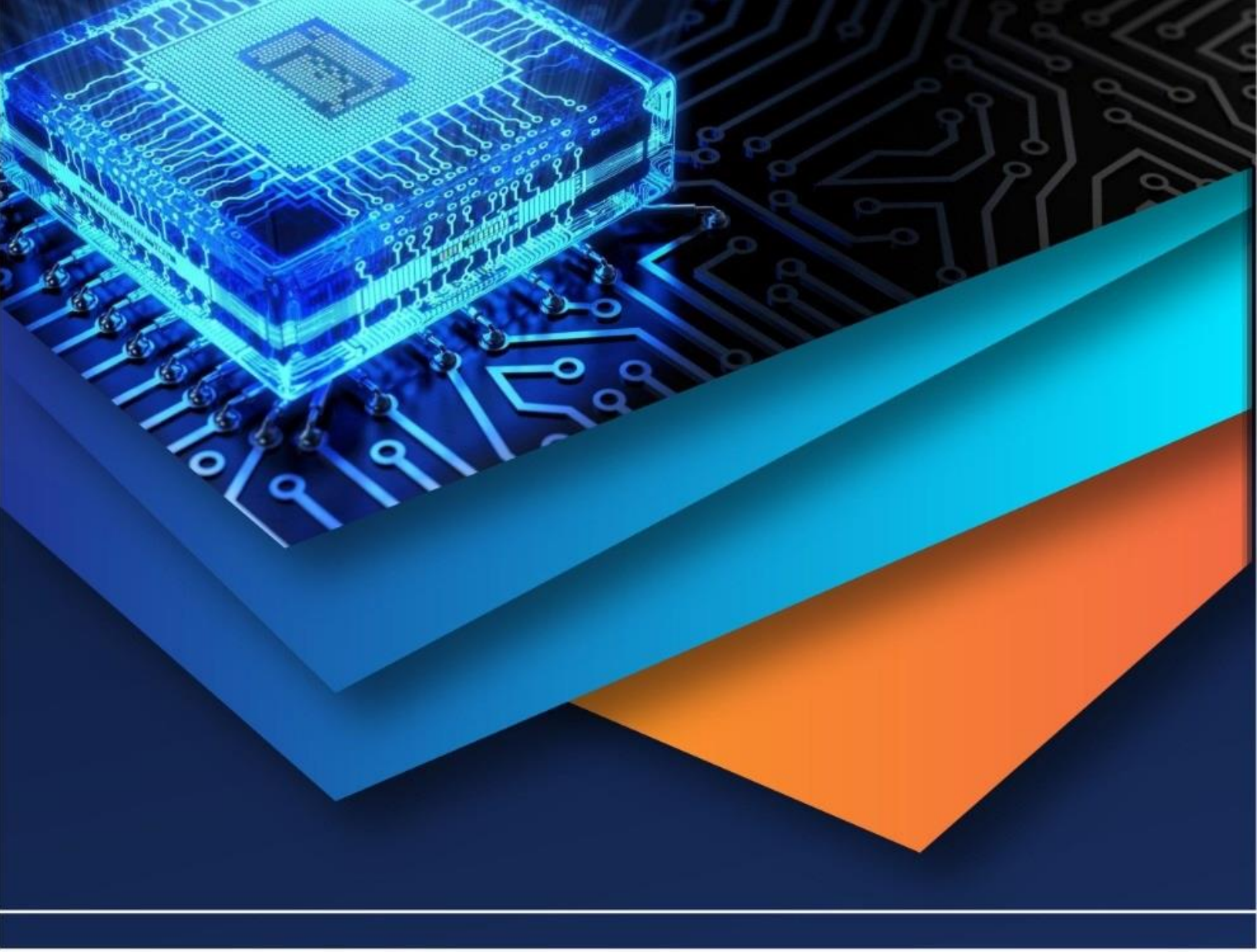
VII. CONCLUSION

The proposed solution of attendance management system using the RFID technology and the student presence detection can be implemented at the low cost and this solution is efficient compared to the existing solution. This project is reliable and the components used are durable and runs for a longer time with fewer maintenance services ensuring high efficiency. This concept of the project runs with less energy and can also be implemented with renewable energy sources to ensure eco-friendly. This project will also provide the proper maintenance of the attendance records in the database. Thus, this proposed project is scalable to be good in all the specifications for the implementation with efficient output.

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