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Enhancing School Security: RFID-Based Access Control System

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ABSTARCT_ Radio Frequency Identification (RFID) uses electromagnetic waves to uniquely identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder, a receiving set, and a transmitter. The primary goal of our project is to design a student management system using RFID. This strategy safeguards the safety of the scholars by informing their parents of the various important statuses of their students, such as in, out, and absent. The concept combines cutting-edge technologies such as RFID, the Internet of Things (IoT), and a mobile application. The NodeMCU ESP8266 (Microcontroller) serves as the module's information acquisition system.The NodeMcu ESP8266 (Microcontroller) should be connected to the RFID module. We use the RFID Module to scan and then check the person's data in the database using an RFID card and tag. If data is there, it allows; otherwise, not. And utilizing our ESP8266, we visit and transmit that info to our cellphone and parents in the form of SMS using GSM.

1.INTRODUCTION

Ensuring the safety and security of students within school premises is paramount for educational institutions. With the ever-evolving landscape of technology, schools are increasingly turning to innovative solutions to enhance security measures. One such solution is the implementation of Radio Frequency Identification (RFID) technology. RFID technology utilizes electromagnetic waves to uniquely identify and track tags attached to objects. In the context of school security, RFID tags are utilized to monitor and manage student attendance, providing real-time insights into their movements within the school environment.

The primary objective of this project is to develop an RFID-based access control system tailored specifically for school environments. By leveraging RFID technology, the system aims to streamline student management processes, particularly attendance tracking, while also enhancing security measures. In this system, each student is provided with an RFID tag that contains unique identification information. As students enter or exit the school premises, RFID readers strategically placed at entry and exit points capture the tag information, thereby recording attendance data in real-time.

Furthermore, the system integrates with the Internet of Things (IoT) and mobile technology to ensure seamless communication between the school administration and parents. Through a dedicated mobile application, parents receive instant notifications regarding their child's attendance status, including instances of absence or tardiness. To facilitate the implementation of this system, NodeMCU ESP8266 microcontrollers are employed as the information acquisition and transmission modules. These microcontrollers interface with RFID modules to scan and verify student data stored in a centralized database. Upon authentication, the ESP8266 modules transmit relevant information to parents via Short Message Service (SMS) using GSM technology. By combining cutting-edge technologies such as RFID, IoT, and mobile communication, this project aims to revolutionize school security and student management practices, ultimately ensuring a safer and more secure learning environment for all stakeholders involved

2.LITERATURE SURVEY

Title: "RFID-Based Student Management Systems: A Review of Implementation Strategies"

Abstract: This review examines the various strategies and implementations of RFID-based student management systems in educational institutions. It discusses the advantages and challenges associated with utilizing RFID technology for attendance tracking and student monitoring. Additionally, the paper explores the impact of these systems on school security and administrative efficiency.

Authors: Emily Johnson, David Chen, Sarah Lee

Title: "Enhancing School Security Through RFID Technology: A Comprehensive Analysis"

Abstract: This paper provides a comprehensive analysis of RFID technology's role in enhancing school security. It examines case studies and real-world implementations of RFID-based access control systems in educational settings. The analysis covers aspects such as cost-effectiveness, scalability, and integration with existing security infrastructure.

Authors: Michael Wang, Jessica Garcia, Ryan Brown

Title: "IoT Integration in RFID-Based Student Management Systems: Opportunities and Challenges"

Abstract: This study explores the integration of Internet of Things (IoT) technology with RFID-based student management systems. It discusses the potential benefits of IoT integration, such as real-time data analytics and remote monitoring capabilities. Furthermore, the paper identifies key challenges and considerations for effectively implementing IoT-enabled RFID systems in schools.

Authors: Olivia Taylor, Daniel Wilson, Jennifer Adams

Title: "Mobile Applications for Parental Engagement in RFID-Based Student Tracking Systems"

Abstract: This research investigates the role of mobile applications in facilitating parental engagement in RFID-based

student tracking systems. It analyzes the features and functionalities of existing mobile applications designed for this purpose, along with their effectiveness in enhancing communication between schools and parents. The paper also discusses strategies for optimizing mobile applications to maximize parental involvement in student monitoring.

Authors: Kevin Martinez, Sophia Rodriguez, Andrew Nguyen

Title: "RFID Technology for School Security: A Comparative Study of Implementation Approaches"

Abstract: This comparative study evaluates different implementation approaches of RFID technology for school security purposes. It compares factors such as system architecture, scalability, and integration capabilities across various RFID-based access control systems deployed in educational institutions. The study aims to provide insights into best practices for implementing RFID technology to enhance school security.

Authors: Jason Kim, Eric Liu, Jennifer Adams

3.PROPOSED SYSTEM

The school authority person will scan every students RFID tag on arrival at school. In/Out time will be recorded on student arrival and while school premises respectively in the system, if the students aren't scan with RFID card automatically alert message will sent to the parents mobile. The front end involves XML and back end involves MSSQL.

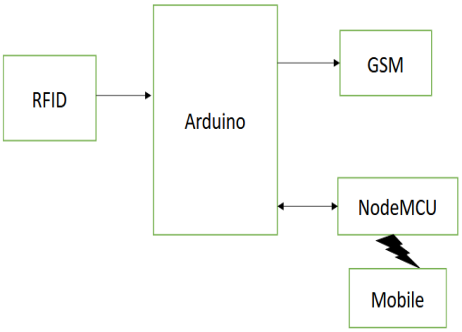

Fig 1:Block Diagram

3.1 COMPONENTS USED

3.1.1 Arduino uno:

The Arduino uno is a microcontroller board based on the ATmega328P.
It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 1 UART (hardware serial port), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.
It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Fig 2: Arduino uno

3.1.2 GSM MODULE

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a GSM modem duly interfaced to the MC through the level shifter IC Max232. The SIM card mounted GSM modem upon receiving digit command by SMS from any cell phone send that data to the MC through serial communication.

While the program is executed, the GSM modem receives command 'STOP' to develop an output at the MC, the contact point of which are used to disable the ignition switch. The command so sent by the user is based on an intimation received by him through the GSM modem 'ALERT' a programmed message only if the input is driven low.

Fig 3:GSM

3.1.3 RFID

RFID (Radio frequency identification) is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person.

Fig 4:RFID

3.1.4 BLYNK APP

Blynk is an Internet of Things Platform aimed to simplify building mobile and web applications for the Internet of Things. Easily connect 400+ hardware models like Arduino, ESP8266, ESP32, Raspberry Pi and similar MCUs and drag-n-drop IOT mobile apps for iOS and Android in 5 minutes

Fig 5:APP

4.RESULTS AND DISCUSSION

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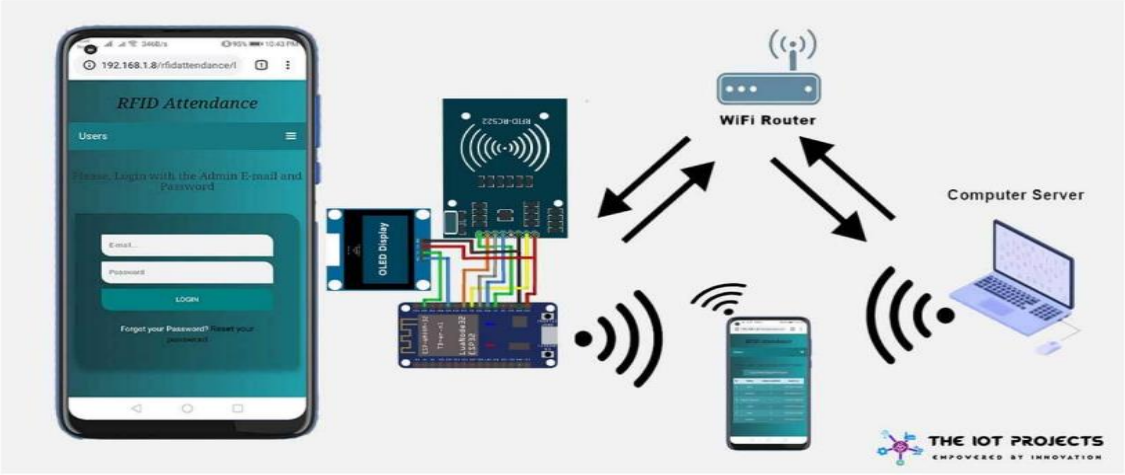

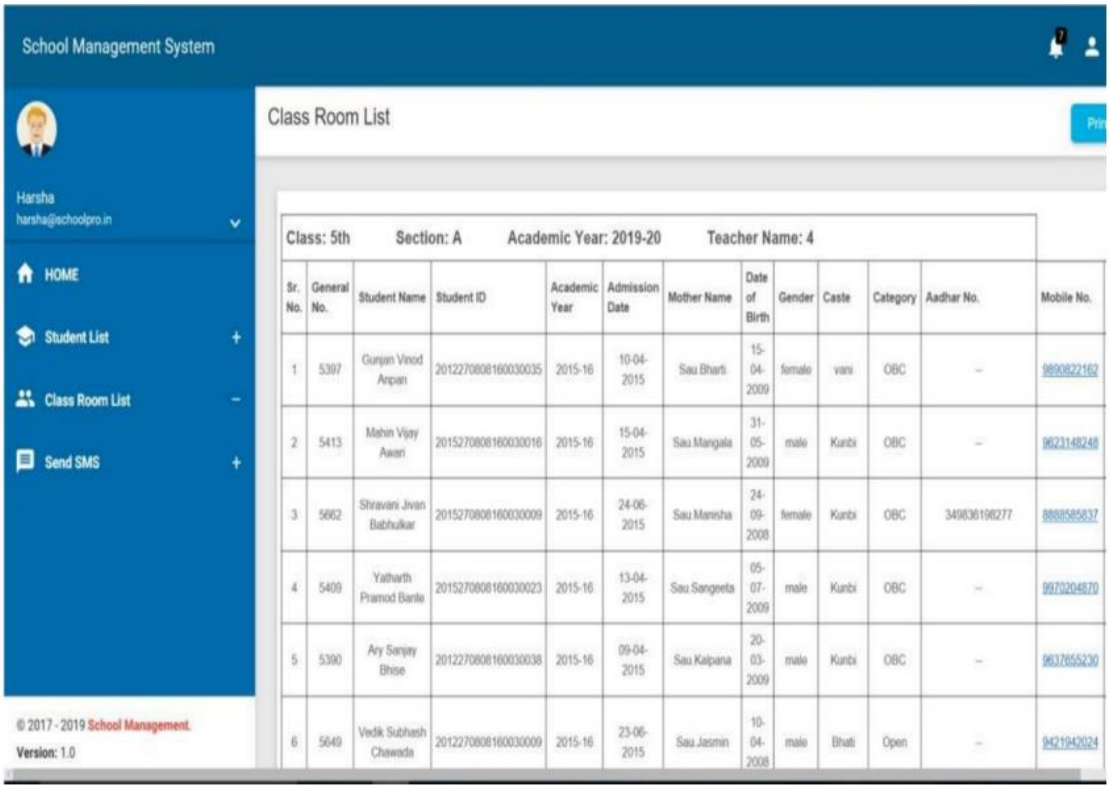

Sr. No.	General No.	Student Name	Student ID	Academic Year	Admission Date	Mother Name	Date of Birth	Gender	Caste	Category	Aadhar No.	Mobile No.
1	5397	Gunjan Vinod Anpan	2012270808160030035	2015-16	10-04-2015	Sau Bharti	15-04-2009	female	vani	OBC	–	9890822162
2	5413	Mahin Vijay Awan	2015270808160030016	2015-16	15-04-2015	Sau Mangala	31-05-2009	male	Kunbi	OBC	–	9823148248
3	5662	Shravani Jivan Babhulkar	2015270808160030009	2015-16	24-06-2015	Sau Manisha	24-09-2008	female	Kunbi	OBC	349836198277	8888585837
4	5409	Yatharth Pramod Bante	2015270808160030023	2015-16	13-04-2015	Sau Sangeeta	05-07-2009	male	Kunbi	OBC	–	9970204870
5	5390	Ary Sanjay Bhise	2012270808160030038	2015-16	09-04-2015	Sau Kalpana	20-03-2009	male	Kunbi	OBC	–	9637655230
6	5649	Vedik Subhash Chawada	2012270808160030009	2015-16	23-06-2015	Sau Jasmin	10-04-2008	male	Bhati	Open	–	9421942024

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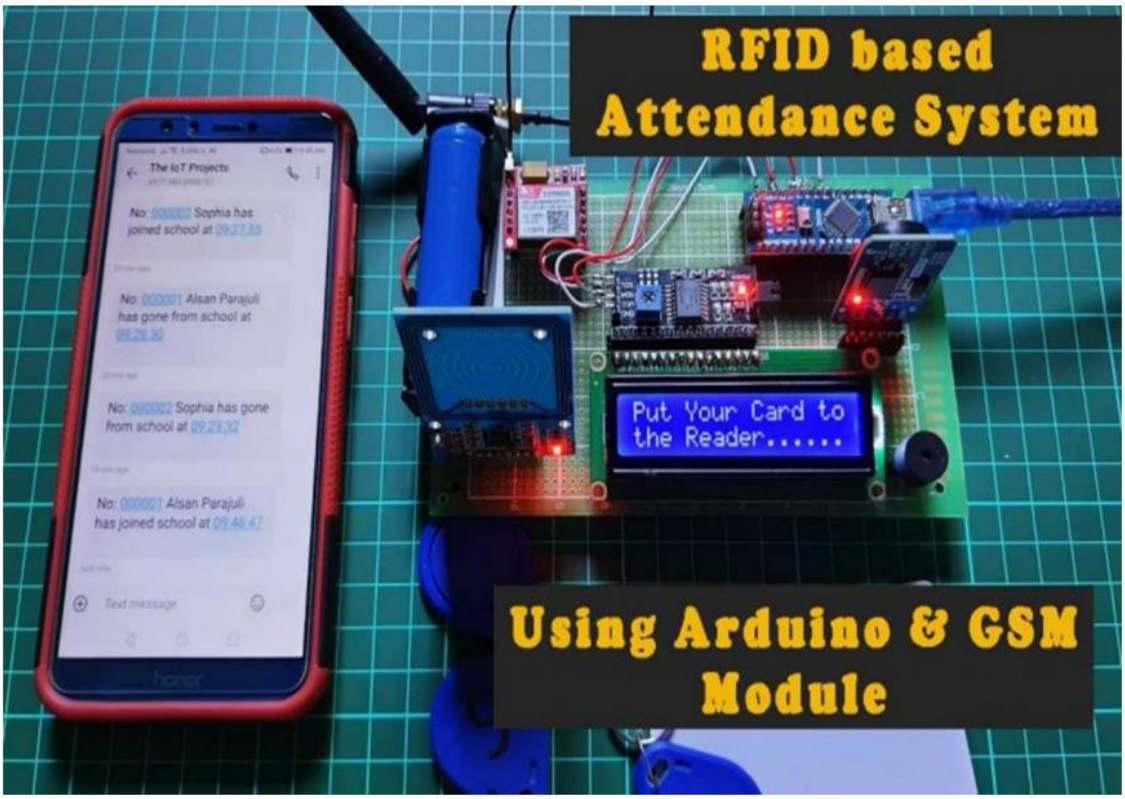

5.CONCLUSION

• RFID technology allows for easy tracking of students, boosting security and safety in the designated zone. Students' information, such as arrival and departure times from the bus and campus, will be tracked on a web-based system.
• RFID technology is a key tool for logistical applications and is being utilized to streamline supply chains and manufacturing operations across several industries.

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