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RFID based attendance system with SMS Alert

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Abstract

RFID technology is an automatic wireless identification system that works by the help of active and passive cards and a reader. In this work we have tried to ease the problem of manually taking attendance with the use of RFID technology. This system will help the authority manage the attendance system in a more organized, efficient and time saving manner. The proposed method has been implemented in a prototype system that has proved the effectiveness of the system in easing the chores of attendance taking as a result of the automation of the system using the RFID technology. The design of the system is simple, inexpensive and portable making it a good candidate for commercial and academic purpose

Introduction

Most institutional authorities are concerned by the laborious process of manually tracking staff attendance. Many applications on web and mobile have been deployed but still many manual signings attendance record exists at non-internet connections environment which documentation takes a long time and risky. The problem is some attendance records were missing while staff indicated that they have log in. Thus, an attendance monitoring using RFID has been proposed. This research has designed an RFID-based attendance tracking system that uses an RFID card to uniquely identify each employee or student's attendance with LED authentication. The method to develop the system is comprised of hardware and software components such as RFID cards, RFID reader model RC522, buzzer, and LED. Users' attendance record is collected whereby users touch the RFID card on the RFID reader. Data for three different locations was collected and analyzed. Result has identified that the RFID system is faster in 20 seconds which is 80% performance compared to manual attendance. This study is significant for attendance reporting which is automatically synchronized with a real-time clock and the attendance records is more accurate and would help the administration monitor the staff attendance at the non-internet connections environment [1].

Information Technology (IT) has played a significant role in developing several aspects in academic sectors and domains such as student monitoring and management systems [2].

Attendance or daily register of understudies has turned into a vital assessment perspective in the current instructive framework in both universities and schools. The conventional attendance monitoring framework has a few

impediments with the trend and the technology gap. For instance, passing the everyday attendance sheet to a huge number of students in a class is extremely risky and it hampers the consideration of the students in the class. It is waste of time as well as a student can deliberately enlist counterfeit attendance record in the day-by-day attendance sheet. On the off chance, if the teacher loses these documents, all the significant attendance records are lost without doubt [3].

Therefore, it is a critical subject to tracking and manages student's attendance in school, college, and university environment. Since it can be helped to urge students to attend on time, amend the efficiency of the learning, increase learning grade, and finally boosting and improving the education level. So, there is a need to manage the student attendance records automatically by using information technology management system in a faculty to assist the maintaining attendance. Biometrics techniques are used to verify identification through their characteristics like face recognition, signatures, fingerprint, voice recognition, irises, barcode, Bluetooth, Near-Field Communication (NFC), and RFID and so on [4].

RFID innovation has a tremendous task to carry out in the completion of the vision of associating objects around us to the internet. These items extend from huge structures, modern plants, planes, vehicles, machineries, any sort of merchandise, and explicit pieces of a bigger framework to people, animals and plants and even explicit body portions of them. The idea driving this is called Internet of Things (IoT) [5].

Literature survey

In this project, I did a literature review and took some paper for the reference as follows [6].

Attendance and Information System using RFID and Web-Based Application for Academic Sector.

Paper - 1 : Hasanein D. Rjeib. Nabeel Salih Ali, Ali Al Farawn, Basheer Al-Sadawi., Haider Alsharqi.

Journal & Published: Article in International Journal of Advanced Computer Science and Applications & January 2018

Findings: A student attendance and information system are designed and implemented to manage student's data and provide capabilities for tracking student attendance, grading student marks, giving information about timetable, lecture time, room number, and other student-related information. Also, the proposed system provides easiness for the staff where there is no need for extra paper works and additional lockers for saving data.

Research Gap: Much complicated being web-based application. Only students' data is involved, can be used for other staffs and faculties.

Paper – 2 : A RFID based (IoT) automatic attendance system: A survey analysis

By: RKAR. Kariapper1, MS. Suhail Razeeth.

Journal & Published: Southeastern University of Sri Lanka, Oluvil & April 2019.

Findings: Radio Frequency Identification (RFID) is a very advanced technology for automatic attendance system, and it provide very higher accuracy and speed than a traditional paper-based system. And it says that RFID is a best replacement of traditional method without any doubt.

Research Gap: Eventually from this study I got to know that each system we has its own advantages and disadvantages. Some characteristics are good for some system, and some 4 are not. To overcome this, a hybrid model is necessary, and which merely provide higher efficient system without any disadvantage.

Like this, a large number of papers were studied & here only the base papers are being presented.

Objectives

- To provide very higher accuracy and speed than a traditional paper-based system.
- To provide security and easy tracking of data.

- Implement fully automatic process.

Problem Statement

The conventional methods of recording attendance of the student in most of the schools and colleges is majorly in the written form or hard document.

Hard copies are always not safe and the data of the student can be lost any time due to accidents that occur in school or college premises, in order to avoid all these types of problems an RFID Based attendance system could be a more viable option for any institution or organization to adopt this project module.

Mostly parents of students are much worried of about their children reaching the school. In order to remove such confusions in the parents the best method is to adopt an attendance system consisting of SMS alerts to parents of respective students would be the best idea. Whenever the student scans his/her RFID tag, the message directly reaches out parents and would give them a trust worthy message that his/her son/daughter is reached safely to the school.

Block diagram, Circuit Diagrams and Working principle, Algorithms, Flow-Charts & DFDs

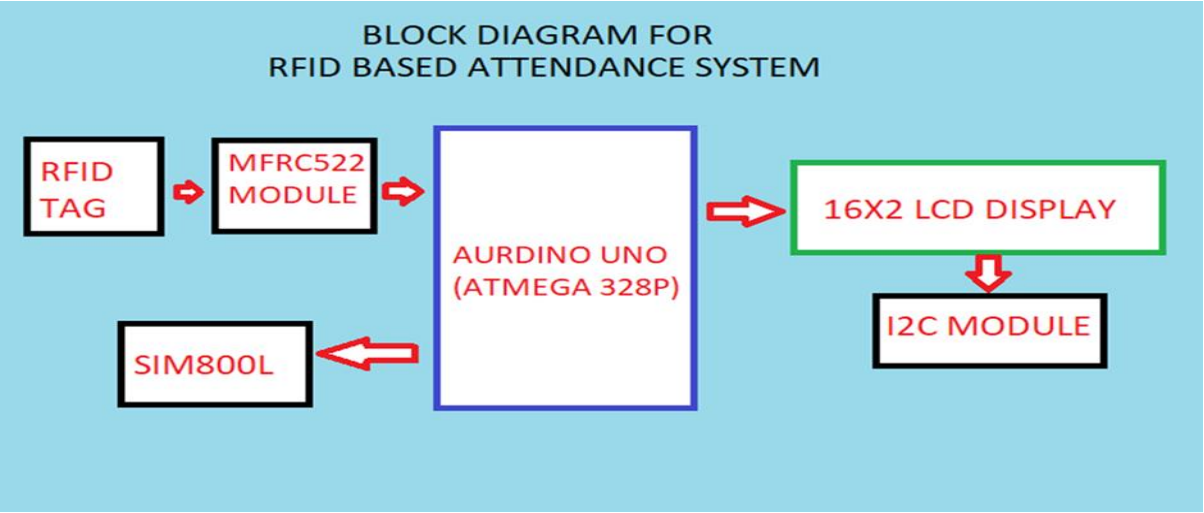

Fig. 1 : Block-diagram of the proposed methodology

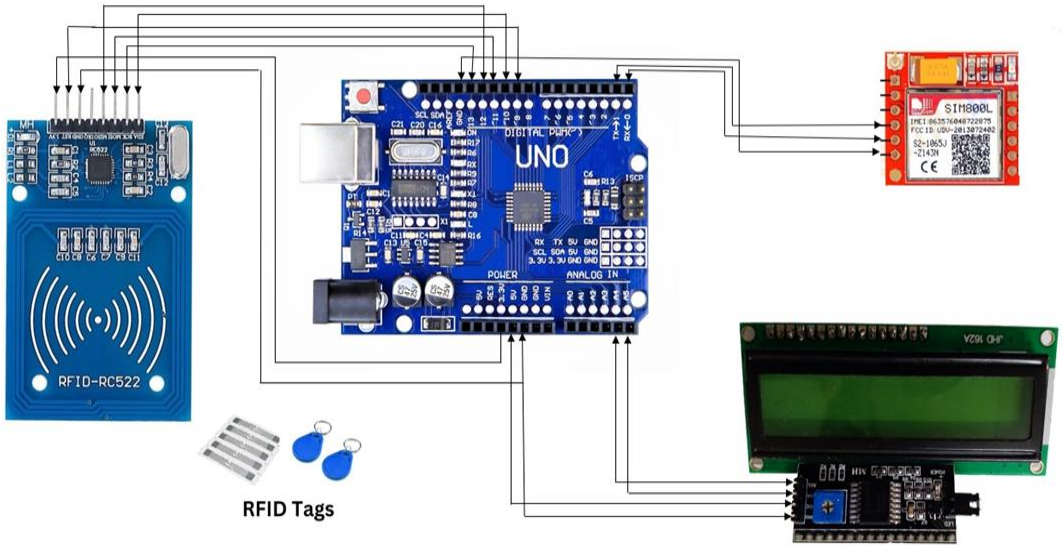

Fig. 2 : Circuit Diagram

Pin No.	Pin Name	Description
1	V_{cc}	Used to Power the module, typically 3.3V is used
2	RST	Reset pin – used to reset or power down the module
3	Ground	Connected to Ground of system
4	IRQ	Interrupt pin – used to wake up the module when a device comes into range
5	MISO	MISO pin when used for SPI communication, acts as SCL for I2c and TX for UART.
6	MOSI	Master out slave in pin for SPI communication
7	SCK	Serial Clock pin – used to provide clock source
8	SDA	Acts as Serial input (SS) for SPI communication, SDA for IIC and Rx during UART

Table 1: RFID-RC522 Pin configuration

RFID	UNO
SDA	PIN 10
SCK	PIN 13
MOSI	PIN 12
MISO	PIN 11
IRQ	
GND	GND
RST	PIN 9
3.3V	3.3V

Table 2: RFID and UNO connections

I2C MODULE	UNO
I2C MODULE	UNO
VCC	5V
GND	GND
SDA	A5
SCL	A4

Table 3: I2C module and UNO Connections

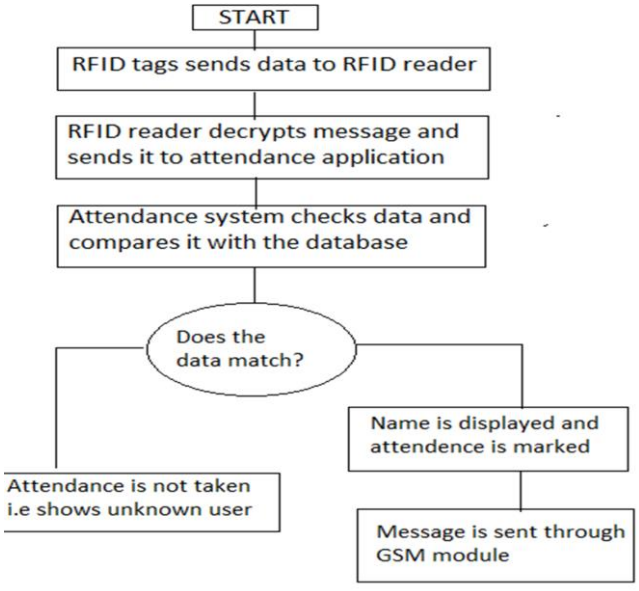

Fig. 3: Flow-chart of the methodology used

Hardware / Software tools Used

In this chapter, the hardware & the software descriptions related to the mini-project work is presented in brief here. Note that this is just a template & students can write on their own, the h/w & s/w used in one or two paras.

Hardware:

- MFRC522 RFID MODULE
- AURDINO UNO WITH CABLE
- GSM MODULE 800L WITH ANTENNAS
- RFID TAGS
- 16x2 LCD DISPLAY WITH I2C MODULE
- 3.7v, 2amp BATTERY WITH HOLDER.
- BUZZER

Software:

- AURDINO IDE

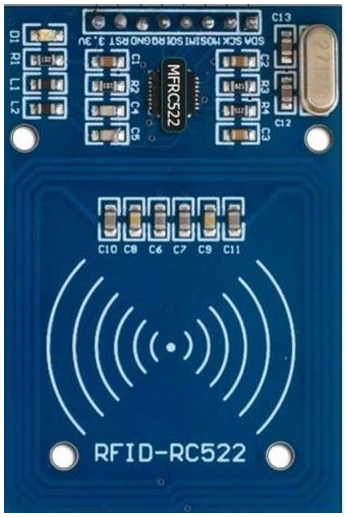

Fig. 4: Mfrcc-522

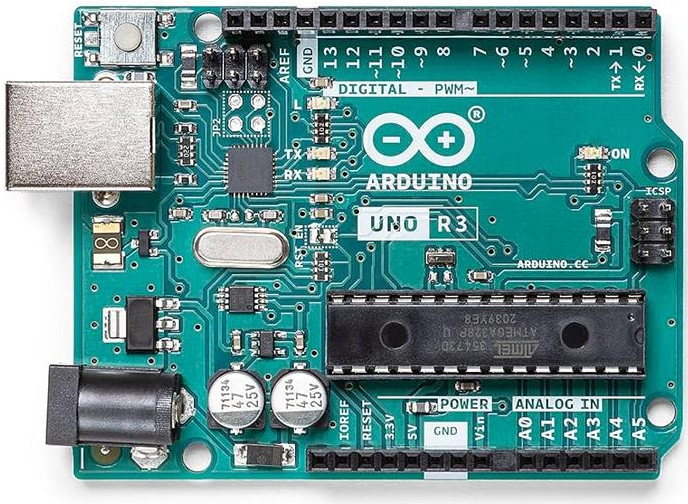

Fig. 5: Audrino Uno

Fig. 6: RFID tag

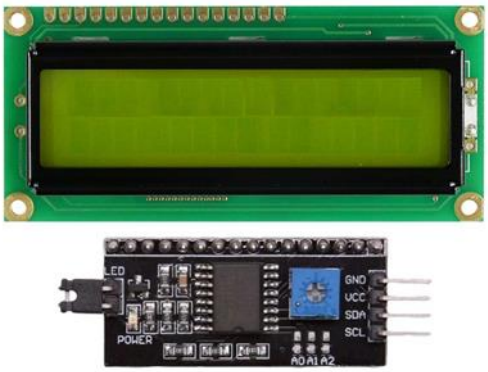

Fig. 7 : 16X2 LCD display with i2c module

Fig. 8 : Buzzer

Working

- Firstly, RFID module, LCD Display (with I2C module), buzzer, and GSMsim800L were connected to Arduino using jumper wires.
- The RX of Arduino is connected to TX of GSM module and TX of Arduino is connected RX of GSM module.
- GSM module is connected to 3.7v, 2Amp battery so that the module works well.
- If the LED of GSM module blinks every second then it is trying to register the network, once the network is registered it blinks after every 3 seconds.
- Once the network is registered the code is dumped into Arduino.
- Downloading of necessary libraries such as mfrcc522, software serial and gsmsim800l.
- Before dumping the code into Arduino, UID's of different RFID tags is identified using RFID reader and Arduino uno.
- Code consisting of student's data is dumped into the Arduino board.

- For GSM module, AT COMMANDS are used to communicate with Arduino UNO.
- Finally using different RFID tags the students data is checked and messages are sent to their respective parents.

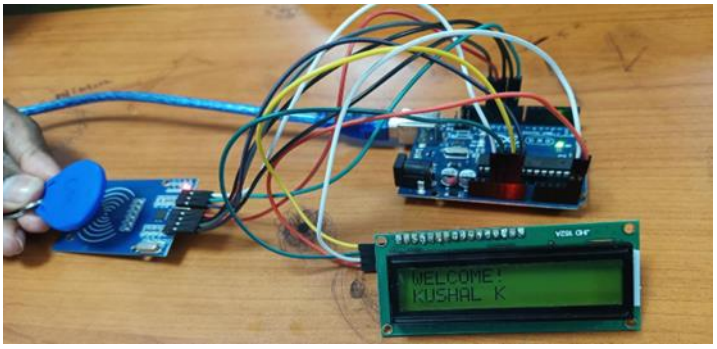

Fig. 9: RFID scanned for registered user

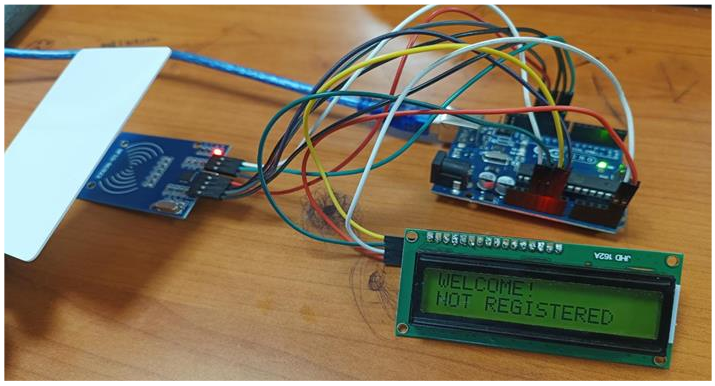

Fig 10: RFID scanned for unregistered user

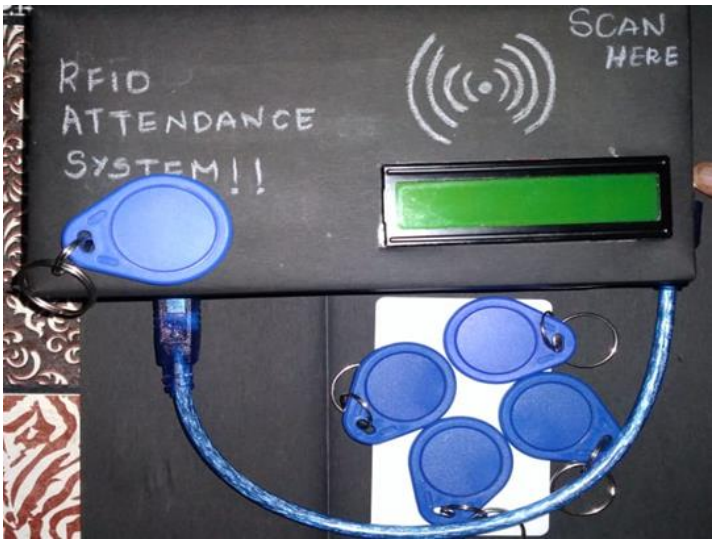

Fig 11: RFID attendance system

Results and Discussions

- As students walk into their classrooms, they carry RFID-enabled ID cards containing embedded RFID tags unique to each student.
- These tags serve as digital signatures, eliminating the need for traditional manual roll calls.
- As the students enter the classroom, RFID readers discreetly placed at the entrance scan their ID cards.

- The readers quickly capture the students' RFID tag data, which is then transmitted to a central database. This database is equipped with intelligent software that processes and logs attendance information in real-time and send SMS to respective parents.

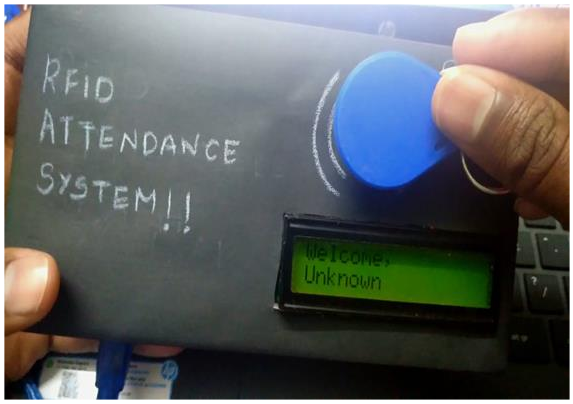

Fig. 12: Unregistered user

Fig. 12: Registered user

Applications, Advantages, Outcome and Limitations

Applications

- RFID attendance systems can be integrated with access control systems to manage entry and exit points in secure facilities. Only individuals with authorized RFID badges can access certain areas.
- Schools, colleges, and universities can use RFID attendance systems to automate attendance tracking for students and faculty members.

Advantages

- RFID systems provide accurate data capture, reducing the likelihood of mistakes in attendance records.
- Reduced paperwork, efficient attendance management, and accurate payroll calculations contribute to cost reduction.

Outcome

- A cost-effective attendance tracking system with RFID technology using a low-cost GSM module.
- Messages are sent to the respective student’s parents regarding their presence in college/school.
- This project module could be used in other spheres such as business meetings, healthcare institutions, gym or fitness center etc.

Limitations

- The one limitation of this project is that usage of this product should be in high network coverage area so that messages are sent instantly.
- Certainly, no other drawbacks are seen with the product.

Conclusions

In the rapidly advancing world of technology, traditional attendance tracking methods are being replaced by more efficient and accurate solutions. The RFID-based attendance system is a modern approach that utilizes Radio Frequency Identification technology to streamline attendance management across various sectors. This project aims to develop and implement an RFID-based attendance system that offers numerous benefits over conventional manual methods.

The RFID-based attendance system project represents a pivotal step toward modernizing attendance management. It harnesses the power of RFID technology to replace outdated methods with a highly efficient, accurate, and customizable solution. This system caters to diverse sectors, including education, corporate, events, and more, elevating the way attendance is tracked and managed.

By eliminating the limitations of manual tracking, the RFID-based attendance system empowers organizations to focus on more strategic tasks, optimize resource allocation, and enhance security measures. The project underscores the continuous drive toward innovation and improvement in various industries, ultimately contributing to streamlined operations and improved user experiences.

In the rapidly advancing world of technology, traditional attendance tracking methods are being replaced by more efficient and accurate solutions. The RFID-based attendance system is a modern approach that utilizes Radio Frequency Identification technology to streamline attendance management across various sectors. This project aims to develop and implement an RFID-based attendance system that offers numerous benefits over conventional manual methods.

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