Attendance Monitoring System Based On RFID

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Abstract - The existing system of attendance monitoring is a manual system which can lead to data redundancy. In the existing system, attendance is carried out in handwritten registers. It is a very time-consuming process and as well as the human effort is more here. The retrieval of the information is not easy like the records are maintained in the manual registers. To overcome the drawbacks of the existing system, the proposed system has been evolved. Our project aims to reduce manual effort and save time.

Keywords – *RFID; Attendance Monitoring; LoRa; LoRaWAN; Control Units*

Introduction- Attendance Management System (AMS) is that the simplest way to help the school and therefore the lecture for this time-consuming process. The foremost common means of tracking student attendance within the classroom is by enforcing the scholars to manually sign the attendance sheet, which is generally passed round the classroom while the lecturer is conducting the lecture. as an example, lecturers with an oversized class may find the trouble of getting the attendance sheet being passed round the class and also the manual signing of attendance by students are burdensome and possibly distract them from teaching attendance sheet being passed round the class and also the manual signing of example, lecturers with an oversized class may find the trouble of getting the passed round the classroom while the lecturer is conducting the lecture. as an enforcing the scholars to manually sign the attendance sheet, which is generally foremost common means of tracking student attendance within the classroom is by help the school and therefore the lecturer for this time-consuming process.

Theory -The main goal of the system is to discover the presence or absence of any student/employee in an academic institute/organisation at the same time. RFID technology works chiefly with the assistance of a reader, referred to as RFID Reader, and RFID cards. The RFID cards have a singular number which is one amongst the most advantages of the system as this makes the system terribly reliable. RFID tags square measure created out of 3 pieces: a semiconductor unit (a microcircuit that stores and processes data and modulates and demodulates radiofrequency (RF signals), associate antenna for receiving and transmitting the signal and a substrate.   LoRa (from "long range") may be a proprietary low-power wide-area network modulation technique. it's supported unfold-spectrum modulation techniques derived from chirp spread spectrum (CSS) technology. Designed for IoT communications, LoRa devices modify the affiliation between remote finish nodes and low power wide space networks (LPWANs) for delivery to analytics applications. In all the previous works mentioned earlier, the system had one RFID reader placed for recording the attendance of all students or students of a selected department/year/class. In establishments that need assembling for each lecture, it'd be rather long for college kids to collect close to the reader and record their attendance. To at the same time record the attending of all student's gift within the category, we have a tendency to square measure proposing a model wherever battery battery-powered RFID readers square measure placed in every student's table and square

measure ready to record the attending of all students quickly while not the scholar having to induce up from their seat. By this implies, the time taken for attending would drastically cut back to many 10s seconds. We have a tendency to also attempt to implement ways that may facilitate in reducing proxy/false attendance.

Technologies involved and their working principles:

The complete system comprises and utilises many other technologies, either hardware or software, and each technology is based on its own set(s) of principles. The technologies that are integral part of this system are listed below:

- Radio Frequency IDentification (RFID).
- Use of microcontrollers for carrying out logical operations.
- LoRa module and LoRaWAN protocol.
- Database and Database Management System.

Systematic overview:

RFID based attendance monitoring system comprising three basic units such as.

- Entry Level Module.
- Master Control Unit (MCU).
- Student Control Unit.

Entry Level Module- This module basically looks like a credit card swipe machine having a LCD display panel at the top along with a keypad over its body. At the top part a RFID scanner is present along with a camera for facial recognition.
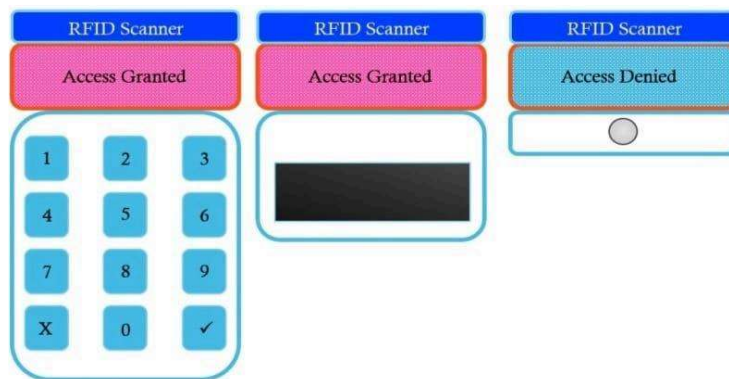

Fig:1. Different ways to implement Multiple-Factor Authentication

> i. *Number Pad based second-factor authentication*
> ii. *Biometric scanner based second-factor authentication*
> iii. *Facial recognition based second factor authentication*

MasterControlUnit   StudentControlUnit

Fig 2. 3D view of a classroom with smart attendance monitoring system

Master Control Unit- This Unit consists of a RFID reader on the side, a display panel at the top along with a keypad below the display where teachers have to enter their authorized key for activating all student units inside the classroom.

Student Control Unit- This unit consist of three layers and an outer covering:

Upper Layer – This layer contains a RFID reader which is used to read the data sent from the Identity card. This data is then processed by the control unit.
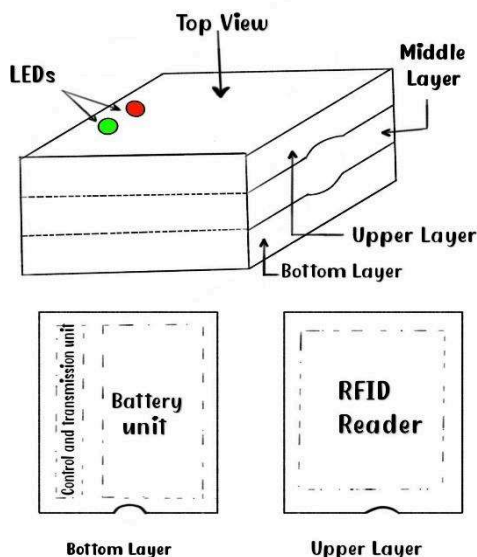
Middle layer- In this layer a gap is made where students have to insert their RFID tag for attendance which basically contains a unique ID and other relevant data like student name, roll, dept, class/semester, etc.

Bottom Layer- This layer contains a battery unit which provides power to the CAT unit and the reader to read data from the RFID tag. It also contains a Control and Transmission Unit (CAT Unit). This unit retrieves the data from the RFID reader and sends this data to the MCU through LoRa.

Casing- The casing is the outer cover of the Student unit which holds all the three layers together and contains two indicative LEDs (one red and one Green LED) on topside.

Fig:.3. Diagram of student control unit

Fig: 4. (i) Outer appearance of Student ID card (ii) Internal representation of RFID tag inside the ID Card

Systematic process flow inside the classroom:

- It is assumed that students are already inside the classroom and seated in their seats before the teacher enters the classroom.

- Once the teacher enters the classroom, the teacher places his/her ID card over the MCU's RFID reader.
- The MCU reads the teacher's ID card and temporarily stores the data inside the MCU.
- Then the MCU sends a signal to all the Student units present in the class.
- Upon receiving the signal, all the Student units get activated and the RED indicative LED glows for all student units irrespective of whether a student is seated on that table or not.
- Each and every student is now advised to provide their attendance. Now the students place their ID cards inside the provided slot.
- The RFID reader on the student unit scans the Identity card of that student and if an ID card is present, it temporarily stores the data in the Student unit.
- This data is then transmitted to the MCU by each student unit.
- The MCU combines the teacher's and the student's data and sends it to the server.
- The server stores all the necessary data.
- The server then sends back only the student data back from the database (The student data in the server is kept intact).
- The MCU receives the student data back from the server and sends this data to all student units.
- If a student unit receives a signal,
  - It checks if the value is equal to the stored value.
    - If it is equal, then the GREEN indicative LED glows and the RED indicative LED turns off.

- If a student unit does not receive a signal from the MCU, it waits for a definite period of time (say 30 sec) to get a signal from the MCU.
  - If it still does not receive a signal in that specified period of time, then the student unit shuts down.

The attendance taking process is then completed.

Advantages

1. It saves time as compared to the traditional method of attendance registering process.
2. Easy to operate and efficient.
3. The communication network and protocol used, LoRa, is very robust, immune to interference, secure, provides long battery life and suits the requirements for this process.
4. Since the system is designed to be active only when required as well as it consists of a power saving communication system, the system maintenance required is very low and it is speculated to have a long lifetime.
5. It helps minimize human induced error(s).
6. The data is stored in an organised manner which helps to resolve any conflict that may arise.
7. The system is reliable and secure, hence protecting the date of any ID card holder.

Limitations (if any)

Although steps have been taken to ensure that chances of fake attendances are reduced, it cannot be guaranteed that it can be completely eliminated. Even though a student needs to be present in the institutional/organisational premises, at the time of attendance it may happen that a student poses as another student to fake an attendance.

During the attendance registering process, the system is not aware if the ID Card holder is using his/her ID card for registering that particular attendance. The system, currently, is not able to check this.

This problem can also be tackled but requires more sophistication and complex designing as well as some manual effort.

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