Attendance system Using RFID

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ABSTRACT

In many educational institutions, teachers traditionally record student attendance manually in a register and later enter it into a computer system to calculate attendance percentages. This manual process results in repeated work and increased human effort. Recently, student attendance has gained importance as a significant factor that impacts academic performance and overall institutional efficiency. Traditional attendance systems are. This IoT-based project aims to minimize human involvement by automating the attendance system, making it highly beneficial for schools, colleges, and workplaces.

Keywords — Arduino, I2C module, GSM module, RFID Reader, 16x2 LCD Display, Buzzer, Power Supply.

1. INTRODUCTION

One of the newer technologies that has joined the Internet of Things (IoT) ecosystem is radio frequency identification, or RFID. RFID provides a more sophisticated and effective method of wirelessly identifying and tracking items, even if it has certain similarities to conventional barcode systems. It works by transmitting data through radio waves between two key elements: the RFID reader and the RFID tag. The tag, which has an embedded chip and a tiny antenna, keeps important data and transmits it when the reader requests it. The reader then captures this information, making it possible to track individuals or items in real-time without direct contact. IoT, in a broader sense, refers to a network of physical devices that are connected through the internet or private networks, allowing them to send, receive, and act on data. These devices include sensors, processors, and communication modules, enabling automation and smart decision-making. Importantly, IoT devices don't always need internet access—they just need to be uniquely identifiable and connected to a network. In this project, Arduino plays a central role as the microcontroller platform. Known for being affordable, open-source, and beginner-friendly, Arduino allows us to interact with hardware components like sensors and modules to build useful automated systems. By combining RFID with Arduino in an IoT framework, we can design a smart attendance system that simplifies daily tasks, reduces manual errors, and enhances efficiency in schools, colleges, or workplaces.

2. LITERATURE SURVEY

Paper 1 Author:

A.A. Olanipekun et (2022) have implemented a system called RFID Based Automatic Attendance systems.

Description:

The database (Microsoft Access) and VB.net were used in the development of this attendance system program. Every student's student ID card includes an RFID tag attached to it. In order to connect RFID to the computer system, a serial connection between the computer and RFID reader has also been maintained. The lecture hall door is where the RFID reader is located. Every time a student enters the lecture hall, an RFID reader scans their RFID tag, stores all of the student data (name, entry time, etc.) in a database via a serial connection, and keeps the system up to date. In contrast to a traditional system, the administrator of this one can easily retrieve information from the database and view all documents using the software interface.

Paper 2 Author:

Hasanein D.Rjeib (2023) implemented an attendance system with the combination of RFID and Web-Based system.

Description:

In order to track students' attendance and identify specific pupils, this system makes use of an RFID tag and reader. After that, the reader connects to an Arduino microcontroller, which uses an Arduino shield to send the RFID reader response to a web server. PHP and MySQL are then used to store the student attendance data in the web server. By logging in to this specific web-based program, the system administrator can examine all student documents. They can also view the student's details utilising LCD displays.

Paper 3 Author:

Srivignessh PSS(2024) Found a system that, RFID and Pose Invariant Face Verification for automatic attendance system.

Description:

This system is subject to two-factor authentication. Students must use RFID tags, which are read by RFID readers, in the first phase. If the first step is successful, the student advances to the second verification phase; if not, they fall into the unrecognised group. Face verification is the second phase; if the face matches the specific RFID tag, the attendance is recorded in the database. The algorithm detects the fraudulent students when they fail to read the two readings mentioned above. Identity theft for attendance purposes is less common because to this two-factor automated mechanism.

Paper 4 Author:

Moth Myint Thein et (2020) Chaw developed a Students' Attendance Management System Based on RFID and Fingerprint Reader.

Description:

Additionally, this system functions as two-factor verification. Students must use their RFID tags when they enter the classroom. An RFID reader reads the tag and verifies it by consulting a database; if the tag is accurate, the next step of verification begins. The student's fingerprint is validated in the second phase. Attendance will be recorded on the server if it matches. The system can be seen, edited, and deleted by the admin. Teachers can also act as administrators and have authentication to utilise this system. This technology is incredibly safe (finger print) and fast (thanks to RFID). In the event that someone else uses the tag, two factors prevent problems, ensure that attendance is automatically recorded correctly, and prevent fraud.

Paper 5 Author:

Srinidhi MB et (2022) proposed a system that web based attendance using four-tier architecture by using RFID and Biometrics.

Description:

The RFID codes of both teachers and students will be stored in the database of this system. If and only if the first level is successful, the second level verification will be permitted. The second phase in the system is fingerprint verification; if the student's fingerprint matches the database, the attendance will be recorded and saved there; if not, there is no student attendance. The fingerprint verification is only active for ten minutes, which includes five minutes prior to and following the scheduled start time of class. If a student is late, their attendance will be denied, but they can still attend lectures and learn. Lastly, an SMS informing the parents of the specific student's attendance will be sent. This system is focused on time.

3. METHODOLOGY

Problem Identification and Definition

Identified Problem:

Conventional manual attendance systems are often inefficient, time-consuming, and susceptible to human errors. These systems typically lack the ability to provide real-time updates, resulting in delays in record management and analysis. Additionally, manual methods require repetitive tasks and increased administrative workload, especially in institutions with a large number of students or employees.

Objective:

The main objective of this project is to design and implement an automated attendance system that leverages RFID technology integrated with an Arduino microcontroller. The goal is to create a reliable, real-time solution that minimizes manual intervention, enhances accuracy, and streamlines the overall process of attendance tracking.

Issue 1 – Lack of Real-Time Attendance Monitoring:

In traditional systems, attendance data is usually recorded on paper and later entered into digital systems, which introduces delays and increases the chance of data entry errors.

Proposed Solution:

Integrate the RFID-based attendance system with a cloud-enabled database that allows real-time synchronization of attendance records. Additionally, develop a mobile or web-based application that enables administrators and faculty members to monitor and manage attendance instantly from any location.

Issue 2 – Proxy Attendance (Buddy Punching):

Manual and barcode-based systems are vulnerable to fraudulent practices such as proxy attendance, where individuals mark presence on behalf of others.

Proposed Solution:

To address this security issue, the RFID system can be combined with biometric verification methods such as fingerprint or facial recognition. This dual-layer authentication ensures that attendance is marked only when both RFID and biometric validations are successful, thereby eliminating the possibility of impersonation.

4. References

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