Employee Tracking and Attendance Management System Using RFID

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Abstract: **RFID Based Attendance System is a system developed for daily employee attendance tracking in an organization. Employee's proper attendance management is till date a critical issue in many organization. The ability of system to uniquely identify each person based on their RFID tag (ID card) make the process of taking the attendance easier, faster and secure as compared to conventional method. To prevent fake entries by employees, we are developing a system which will be capable to track & accordingly generate the salary of employee. The functionalities of the system include senior authority tracking their associated employee, the salary message & email generation at the end of every month sent to the employee, calculation of working hours, warning message sent to employee if working hour's policy is violated. The employee only need to place their ID card on the reader and their attendance will be taken immediately. With real time clock capability of the system, attendance taken will be more accurate. The system can be connected to the computer through RS232 or Universal Serial Bus (USB) port and store the attendance taken inside database.**

Keywords: **RFID reader, RFID tags, Attendance management, Salary generation, Employee tracking**

1. Introduction

The employee attendance tracking is the vital part of the organization. The most common way of tracking the employee attendance in the organization is by using manual sign technique. There are tremendous disadvantages of using such system. For example, in large organizations it is difficult to track the attendance manually, there are more chances of fraud entries and even the chance of loss of the attendance sheet. The best way to overcome the drawbacks of traditional manual attendance tracking system is to develop a system that records the employee attendance using RFID (Radio Frequency Identification). The ability of RFID is to uniquely identify each employee based on their RFID tag (type of ID card). This process of taking the attendance easier, faster and secure as compared to conventional method. The employee need to place their ID card on the RFID reader and their attendance will be taken automatically. The purpose of this project is to develop an employee tracking and attendance management system to help in organization maintain the salary, regularity and punctuality of the employees. The RFID technology enables the organization management to avoid attendance sheet from damages such as tear, lost, and misplaced. More accurate arrival

and departure time can be recorded and even message can be send about the same using the real clock capability within the system. The recorded attendance can be stored into the database using the RS232 or USB connected to the system.

2. Literature Survey

A. An automatic attendance monitoring system using RFID and IOT using cloud

In this project, RFID tags embedded in student ID cards which possesses a unique id number tagged to that student. Using readers these id numbers are scanned and student attendance is recorded. A Wi-Fi adapter is used to transfer data from reader to cloud. Here cloud is used to store data because maintaining a computer for the server needs to be kept active always. Which increases the cost, so they use cloud for their database to decrease the maintenance cost. A real time video taken at the beginning of the lecture is used to extract a single frame from a continuous set of frames and compared with existing college database which already has student pictures stored. Image comparison is done using naive similarity algorithm.

B. RFID-based attendance management system

This paper gives an implementation of event attendance tracking using RFID technology. Here the RFID reader is installed at every room of a professional event and a server application on a laptop to collect and process information. The server tasks include collection and processing of information and displaying all data via GUI in real time and store data into Ms Excel Database for analysis by even organizers or other managers. A wireless router bridges all communications between RFID reader and server. This paper gives more information about the different hardware types that can be used to implement the system with less cost.

C. RFID based student monitoring and attendance tracking system.

In this paper, implementation is divided into 4 units which are main system, receiver, transmitter and GSM module. The main system includes an interface between the computer and the receiver circuit. It also latches the data. Receiver are placed in three different zones covering area of 15 feet suppose if the

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area is more than 15 feet's then 2 receivers can be placed in same zones. These receivers take the location of the I-cards. Transmitters are the I-cards which transmit their location. These are active RFID cards which tend to enable multiple tags to be within range of a reader by use of "handshaking" between tags and readers. These active tags are much faster than in passive tags. GSM module sends messages of the data entered. This module works on the AT-commands and these commands can be programmed in visual basics. GSM/GPRS Modules are alike to modems, but there's one difference: A GSM/GPRS Modem is outer equipment, whereas the GSM/GPRS Module is a module that can be integrated within apparatus. It is an embedded piece of hardware.

D. Smart attendance system by suing RFID

This paper mainly emphasizes on the GUI and optimality of the tracking system using the basic programming methodologies. There is a MySQL Database used to provide data support and backend is developed using PHP. All the functionalities can be achieved using the integrated RFID Database handling system. The SAS fetched the user data such i.e., the reader ID from RFID database and match with the tag run a set of queries and executes the attendance tracking process. Problems associated with this is that no proper mechanism to implement the RFID tag-reader module is given. The emphasis is more on the GUI and less on the actual working of the system

3. Proposed Work

In our proposed system, we are taking into consideration the need for improvement of an employee attendance management system by increasing its scope of functionality by using additional elements in the system. The enhancements are as follows:
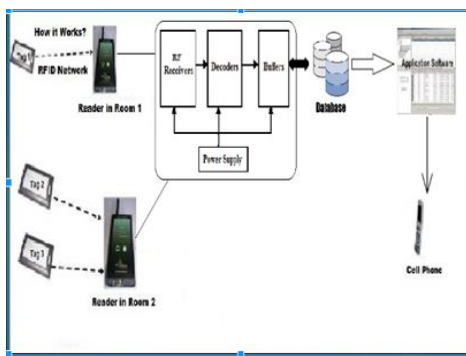

Fig. 1. Proposed system architecture

In the above block diagram shows that there are 3 different tags and each tag is handed to the person as the ID card. Receivers are placed in three different zones suppose office area, canteen and entrance gate. Each receiver will cover the area of 15 feet's. When the person carrying the tag comes in the ranges of 15 feet's the receivers will record the data and sent the data to the decoder of the mother circuit. Then this data is given to buffer after going through the buffer the output of the

buffer is given to the parallel port. Parallel port is connected to the PC. PC is used for storing the record of all the tags also it is used to track the employee from one zone to another and also to calculate the time he/she was present in particular zone. The salary of each employee is calculated using the stored data in the database.

A. Main System

The RFID reader scan the RF signal from the RFID tags and transmit the resulting tag signal at fixed intervals. This signals are received by antennas and then sored and processed by the antenna. The Reader transmits the data from the antenna to a host computer. The host computer converts the data into appropriate from and stores it into the data warehouse. Data are archived in a data warehouse, such as an access database. Using the stored data the salary is calculated and message is sent to each employee.

B. Receivers

The signals transmitted at fixed interval are collected by the receiver and sored into the data warehouse for further use. The data stored in the data ware house are used to send messages to each employee about the arrival and departure time and accordingly calculate the salary of each employee at the end of the month.

C. Tags (Id-cards)

Active Tag systems require battery-powered tags. The battery powered tags has longer detection range of between 3 and 100 meters. These systems are able to locate the tags with higher accuracy than passive RFID systems. The active tags typically operate in the 400, 900, or 2440-megahertz bands. Active tags can connect multiple tags within the range of the reader so that each tag transmits its signal in turn. Active tags typically communicate faster than the passive tags.

D. System architecture

The overall architecture of the system is illustrated in Figure, where the three main components are shown. Each of these components will be described in the following sub-sections.
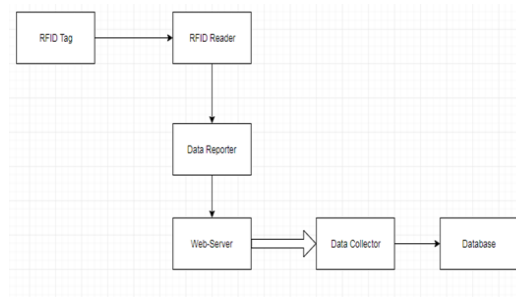

Fig. 2. Existing system architecture

E. RFID reader and Tag

RFID reader is the device capable of reading, storing and retrieving information stored inside the RFID tags. There are two types of RFID reader, which are the active and passive

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RFID readers. Active RFID reader can detect an active RFID tag from long distance while passive RFID reader can only detect passive RFID tag at a few centimeters away from the reader. The RFID reader is a low cost reader used in the system for detecting the RFID tags. It operates at 0~ 400C temperatures, 20~80% of humidity, 125 kHz frequency and 12V power supply. The reader has effective range of 5-8 cm. Each RFID tag has a unique serial number or ID. There are three types of RFID tags which are active, semi-passive and passive. The main difference between these RFID tags is that active and semi-passive RFID tags require internal battery while passive RFID tags do not use any internal battery. According to the work, the employee are given unique RFID cards that are the passive RFID tags, which do not require internal battery. When such cards are passed through the field generated by a compatible Reader, they transmit information back to the Reader [12]

F. Data Reporter

Data Reporter is a component that fetches all required data from the RFID reader such as the employee arrival and departure time after some interval. The collected data are then passed to the online server, which will record the data into the database. This component should always be kept running and needs to be automatically restarted each time the operating system reboots. [12]

G. Web server

The web server here refers to either hardware (computer) or software (application) that helps to deliver content through the Internet. It accepting requests from the user's browser and responds by sending back HTML documents (Web pages) and files. To enable the system dynamic functionalities, the web server hosts the data collector component, a database and the graphical user interface (GUI) pages enabling online interaction with the system users.

H. Data collector

The role of the online data collector is to continually listen to incoming data signals sent by the Data Reporter component. The received log data will then be inserted to the database for recording purpose [12].

I. Database

A database is an organized collection of data and tailored to our system, our database is employed to mainly store the data captured by the RFID reader. Secondarily the database is also used to store data gathered from the online web-interface and employee personal information. In offering more features to the

Table 1
Software

Processor	2 GHz Intel
HDD	180 GB
RAM	8 GB
RFID Reader & Writer	

Table 2
Hardware

Operating System	Windows XP Professional With Service pack 2
Programming Language	JDK 1.8
Database	Oracle 9

users, our online- system can manipulate the recorded employee attendance record by querying the database for complex data retrieval [14]. This includes automated operation, such as summarizing an individual employee attendance by calculating the attendance and calculating the salary.

J. Requirement analysis

The implementation detail is given in this section.

4. Conclusion

This paper presented the employee tracking and attendance management system using RFID.

Acknowledgment

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