

Design and Implementation of Attendance Monitoring Using GSM And RFID

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Abstract: *The goal of technological improvements in schools and colleges is to improve student security. So, combining RFID and GSM, we suggest a novel alerting and automatic attendance marking system. This system will automatically take attendance and provide the results to the parents and the school administration. Each student and employee using the system will have a special RFID card. The student's RFID is compared to an RFID stored in the database using a microcontroller that is mounted to the classroom entrance. The system identifies and verifies the student when the user scans a card on the RFID reader. They must match for the door to open. In this case, the attendance system is computerized and based on RFID technology. Executives and parents are notified by SMS. By employing RFID cards to track attendance and notify parents when a student or staff enters and exits the building, this system automates the attendance system. With an RFID reader, LCD, buzzer, and GSM module, we use a microcontroller based circuit. The microcontroller and RFID reader are connected. The microcontroller continuously scans the ID to be scanned on the reader. If the card is already registered, the system detects it and checks the contact information given for that specific card. When the card is scanned again, an SMS is then sent to that specific number. The microcontroller sends the SMS message to a specific number using the GSM module.*

Keywords: *RFID reader, LCD display, PIC Microcontroller, buzzer, GSM module and Step down transformer.*

INTRODUCTION:

In the modern period, with the development of technologies and the popularity of the internet. Attending the lecture is less motivating for the students. Radio Frequency Identification (RFID) technology is being used in this project to streamline the attendance recorder system. It will be necessary to create a product that can identify various users. Utilizing RFID technology is feasible (Radio Frequency Identification). The hardware and software used in the system will be clearly outlined in this report. It will also provide an overall perspective of its functioning and operations.

In the past, attendance was typically recorded in registers. This method of recording attendance required a lot of time and is challenging to verify over time. A person must look for the data in several registers or notebooks if they wish to verify attendance for a specific date. Additionally, the registers needed to preserve records and used to take up space.

The 18F452 microcontroller has been used which belongs to the PIC family. It requires 5V DC power which is directly connected to the voltage regulator. This microcontroller is the main controller of this system means the whole system follows all the instructions or coding which is programmed by the programmer or user. This microcontroller is also interfaced with LCD and RFID reader.

Radio Frequency Identification Reader (RFID) is a device used to gather information from an RFID card, which is used to track the individual object. Radio waves are used to transfer data from the card to the reader. RFID technology uses digital data in an RFID card, which is made up of an integrated circuit containing a tiny antenna for transferring information to an RFID transceiver. The majority of RFID cards contain at least an integrated circuit for modulating and demodulating radio frequency and an antenna for transmitting and receiving signals. Frequency vary from low frequencies of 125 to 134kHz and 140 to 148.5kHz, and high frequencies of 850 to 950 MHz and 2.4 to 2.5 GHz. There are some features of RFID like it provides greater accuracy in sustaining data. The RFID card stores data in a long-lasting microchip, instead of paper or barcode labels which deteriorates over time and need replacement, and also provides better data security as the card cannot be cloned as easily as barcode or paper label.

GSM module is used to form communication between a computer and a GSM system. Global System for Mobile communication (GSM) is used for mobile communication in different countries. Global Packet Radio Service (GPRS) is an extension of GSM which have higher data transmission rate. This module is assembled with power supply circuit and communication interfaces for the computer. GSM/GPRS Module is a class of wireless

module devices that are designed for communication of a computer with the GSM and GPRS network. It requires SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network.

The liquid-crystal display has the advantage of having low power consumption than the LED. It is typically of the order of micro watts for the display in comparison to some order of milliwatts for LEDs. The low power consumption requirement has made it compatible with MOS integrated logic circuits. The other advantages are it is low cost, and good contrast. In this RFID based attendance system the LCD display is used for displaying the data or information about RF card scanning employees or students. The LCD display has 16 pins and requires 5V DC. Here, the LCD display is interfaced with a microcontroller.

In transformer which increases the voltage from primary to secondary is a step-up transformer. Conversely, a transformer designed to do just the opposite is a step-down transformer. In attendance monitoring system using RFID, the transformer is used to step down the AC voltage. This system is directly connected to the power supply which gives 220V AC but this system does not operate at 220V AC. These voltages are stepped down to 12V AC with the help of this step-down transformer, which consists of two windings primary and secondary.

A person has a greater possibility of making mistakes, and there is a considerable chance that attendance will be marked improperly. RFID tags are used in attendance systems using GRM and RFID, and each tag is personalized. Simply record your attendance by swiping your RFID card over the RFID reader, and the notification that your child is present in class will be transmitted to the parents based on that mark. It's easy to manage attendance using RFID and GSM. Each student receives a special card as a result. The RFID card is inserted into the card reader by a pupil. The reader takes in the student's information. The information will be displayed on the LCD screen before being passed to the GSM module, who sends the message.

Many industries, businesses, offices, retail establishments, schools, and institutions are using RFID-based attendance systems with GSM technology. To authenticate people, RFID readers, and RFID cards are used. When a reader is presented with an invalid RFID card, a buzzer will activate. One of the project's key components is the GSM module. For both legitimate and erroneous system access, SMS is issued. Therefore, the aim of this system is :

1. To mark the attendance of students and employees in universities and offices respectively.

2. Marks the enter time in premises and exit time also.
3. If someone scans their ID again then also it will detect and send the alert message to their parents or ID card holder.

Proposed Methodology and System Implementation:

The proposed system comprises of 5V dc supply to initially get started with devices like GSM, RFID, and PIC Microcontroller. Normally we have assumed an available voltage of 220V which cannot be given to the microcontroller directly as well as other devices we have used. So we have to decrease the value of voltage by stepping down the transformer. So we have used a 6V step-down transformer by which we can generate a 5V supply.

As we give 6V AC but we need DC as per the requirements of the PIC microcontroller. Therefore, 6V is first converted into DC by the use of two rectifier diodes along with a filter capacitor to remove the pulsation DC. Hence, we get 6V DC output. If it is given directly to the PIC microcontroller then it will get damaged. Hence, it is not given directly. It is first passed through regulator IC which works on Zener regulation circuitry. In Zener regulation circuitry even when we give 6V DC input it can provide 5V DC output to the PIC microcontroller. We can give input between 6 to 28V DC to regulator IC even though it will provide 5V DC output which can be used to drive the digital circuits. When the input voltage is 220V it will give 6V AC output but if the voltage will not be 220V it will get fluctuated.

If we give an input of 5V to the Zener diode the output will not be the same it reduces to 4.3V because the diode is a semiconductor device and if silicon is used it needs 0.7V to turn on. For the operation of the Zener diode minimum of 5.7V is needed as input to the regulator IC. If the output will reach below 5V and the microcontroller will get reset. So to avoid this condition 5V dc volt is stored in the storage capacitor, so even when the microcontroller will drop below 5V the value stored in the capacitor will make the microcontroller remain in on state. Memory is made up of flip-flop store and eraser one-bit data. Flip flop has one condition it requires clock pulses. The PIC has 1.2kbytes of ram, 1 byte 8 bit, $1.2 \times 1024 \times 8 = 49k$ flip flop is available. In 49k flip-flop sometime data may be stored or to be erased. Every erasing and storing is done by clock pulses. A crystal oscillator is used to generate a continuous clock pulse. The data is serially taken from the PIC pin. This pin of PIC is software generated. During serial communication two things to be considered:-

Communication is good and how many bit of data is to be communicated.

As a transformer has two winding if the input supply is given to one winding it will generate current i.e. magnetic field which is generated at a constant speed.

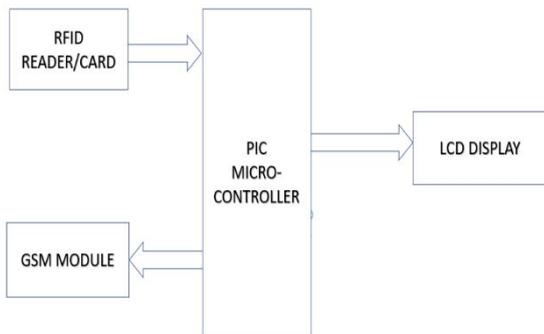


Figure 1:Block Diagram

Interface the RFID Reader to the microcontroller along with the GSM Module. First, the RFID reader sends the data to the microcontroller then it is wirelessly transmitted via GSM Module. This data is then displayed on LCD. After scanning of the card, it marks as present and adds the entry time of that person on the datasheet as shown in the Figure 2 flow chart. Along with that, a message is sent via GSM module to their parents and the manager.

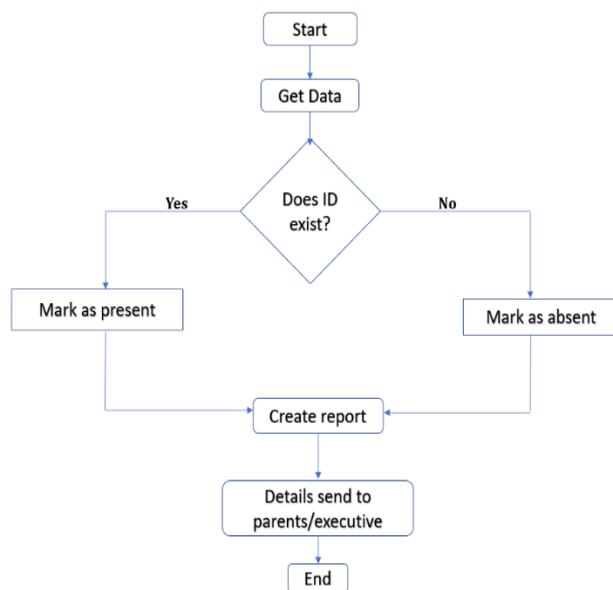


Figure 2: Flow Chart

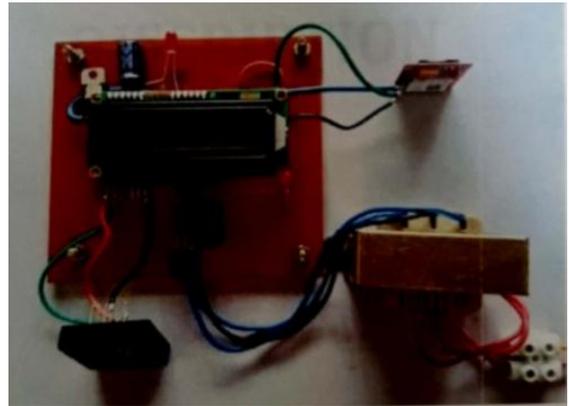


Figure 3.1 Experimental setup



Figure 3.2: LCD display

RESULT AND ANALYSIS:

The test proved that the data getting from RFID Reader is proper while sending the data via GSM Module. Each student has an RFID card. A predefine program is stored in this card for Student ID. Whenever the student or employee enters the premises, he needs to swipe that RFID card near RFID Reader that is attached externally to our microcontroller. At that moment the reader will check whether the information of the students is correct or not and then it will decide whether the student is permitted to enter or leave. The student Details will be indicated on the LCD display and sent through GSM SIM 300 Module to parents to display whether the student is present or not.

The hardware is compact with all parameters and the GSM module is interfaced with it as we can observe in figure 3. The main part to understand is that wireless communication is there with very little error and with a wide range of application attached to it. The wireless GSM techniques is easy to handle for such application.

CONCLUSION AND FUTURE SCOPE:

The system proposed is capable of organizing the data. The Attendance Monitoring system is reliable and provided high efficiency. The method used in this system is convenient method of attendance marking compared to the traditional method of attendance system. This system is also friendly as data manipulation and retrieval

can be done via the interface, making it a universal attendance system. Therefore it can be used in an academic institution or in organizations.

The range of the RFID reader can be increased, so the reader can detect the card from a distance. RF transceiver modules cannot be used for long-distance communication to transfer data. The transfer data can be saved to store in a computer as a database using specific software. Timely attendance can be monitored, i.e., time in and time out can be bar-coded using RTC (real-time clock) and can be stored in the database. The proposed system can be used in academics or offices.

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