

Review on RFID based Student Monitoring and Attendance System

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ABSTRACT: An attendance is an extreme and forceful issue for students in colleges or schools and for employees in industries for in and out time. An ordinary method uses paper sheets which utilizes lots of paper as well as time. This system involves difficulties in maintaining attendance list over a long period of time as well as fake documentation, ignorance by students for signing. To overcome this problem RFID based system is designed for taking the attendance and maintaining the record. The system consists of RFID tags, RFID readers, RTC, GSM modem and LCD interfaced with microcontroller. Each student is provided with RFID tags having roll nos. as a tag number. When tag is placed in front of reader, because of radio frequency the information present in the tag gets transferred to reader and finally to microcontroller. Microcontroller compares the data with the database and maintains the record with date and time.

KEYWORDS: RFID tag, RFID reader, GSM, RTC, LCD.

I. INTRODUCTION

An attendance is a compulsory part of each and every education institute as well as industries or offices. Passing an attendance sheet in a class with large number of students is not only risky but it also reduces the concentration of students from study. The aim of the system is to design an automated system which records the presence of a student or employee. For this purpose RFID (Radio Frequency Identification) technology is used which consists of two parts RFID Tags and RFID reader.

RFID has three frequency ranges for transmission within electromagnetic spectrum: Low, High and ultrahigh frequency. In this system low frequency RFID is used whose frequency range is 125KHz and read range is 10 cm.

II. LITURATUR REVIEW

Bhaskar. M. and Srivignesh PSS designed a system which involves two steps for verification. In the first part student ID number is read by the RFID reader from RFID tag. If it is matched then it goes to second part, in which face is recognized and if it is match then attendance is marked in a database. [1]

Yashi Mishra et al developed a system which is based on RFID and Audio system. The system also contains SD card. When Student enters into the class he has to swipe his/her card. RFID tag is read and if it is matches with information in SD card then student has to use voice greeting, if this also matches then and then only door will open. [2]

N. Salih et.al designed a system in which RFID module is used to mark the attendance of the student. After that RFID reader information is passed to web server through Arduino and attendance is stored into the web server.[3]

R. Roy et.al implemented a system which consists of two step verification. In first, student's unique code is read by the reader from RFID tag and it is compared with database. If the first step is succeeded then fingerprint of the student is compared with database and then attendance is marked.[4]

C. M. New et.al developed an automatic student attendance system using RFID and fingerprint verification. Microsoft visual studio and SQL database is used to create database of students.[5]

M. B. Chaniago et.al designed a system which uses RFID tag and reader to verify the student's ID code which is stored into the database. Telegram messenger is used to send the message of presence of student to particular student's parents. [6]

III. BLOCK DIAGRAM

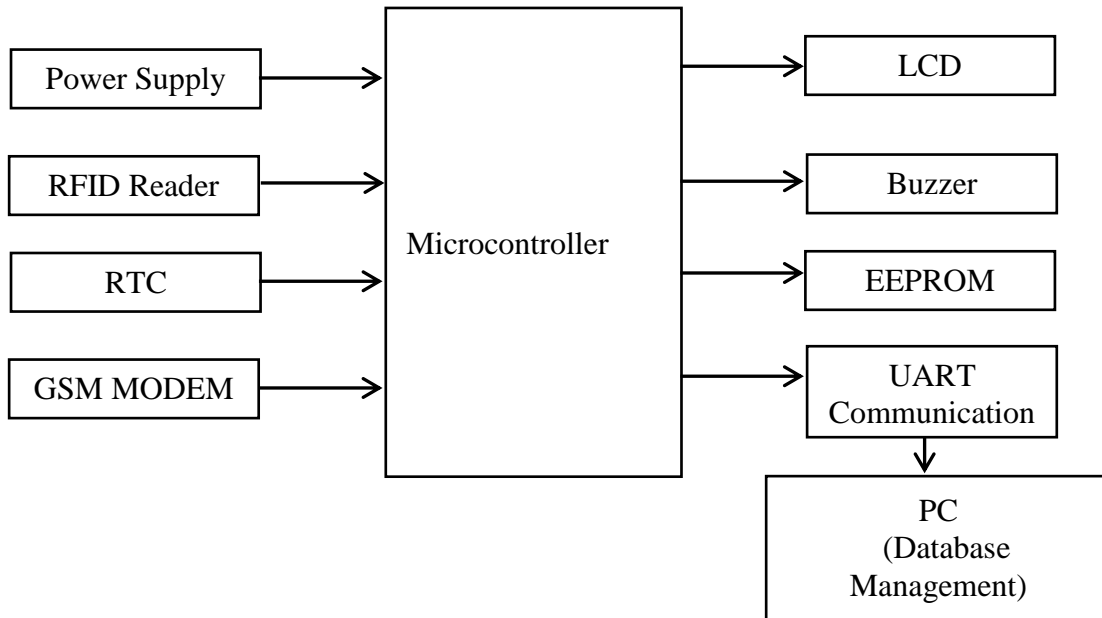


Fig. 1. Block Diagram of proposed System

Figure shows block diagram of RFID based attendance system. In this system attendance of the students are marked while entering into the college premises by using RFID. This system consist of 8051 microcontroller, RFID Reader, GSM MODEM , Real time clock , Power supply unit, LCD, Buzzer and EEPROM and database application installed in the PC. Microcontroller is heart of the system it takes the input from various modules and processes it and display the information on the LCD. The buzzer gives the indication whenever the students swipe their cards.

When the students swapped their card attendance of the students is updated in the database automatically through the microcontroller and the notification is send to their parents.

LCD is used to display student’s details such as student’s name, student ID number, in time along with the message.

When the student leaves the college and swipes the card second time than the system is recorded the out time and again the database is updated and notification is send to the parents.

IV. WORKING

In RFID based attendance system each student is assigned with a unique ID card having inbuilt RFID tag. When the students come first time into the college they have to swipe their ID card.

When they swipe their card that time their image is also captured by the web camera. Captured image and their unique ID number is then send to the microcontroller. Microcontroller compares both the information with the predefined data and stored image. If both are matching then only attendance of that particular student is updated in the data base. Student details such as ID number, Student name, in time is displayed on the LCD and buzzer will make a sound. When the students swipe their ID card notification is sent to their parents. If data is not matching then some error message is displayed on the screen and buzzer will make a sound continuously for some time. Database application is updated by the teacher for regular lecture and at the end of the day attendance report about each student is sent to their parents through SMS. Report will contain the information about in time, lecture and practical attended with time and out time etc. So that each parents will get the information regularly about their child. If any student is absent than absent report will sent to the parents. Database application is also accessible to the parents they can also login to the application and can see the detail information about their child.

Hardware description

A. RFID

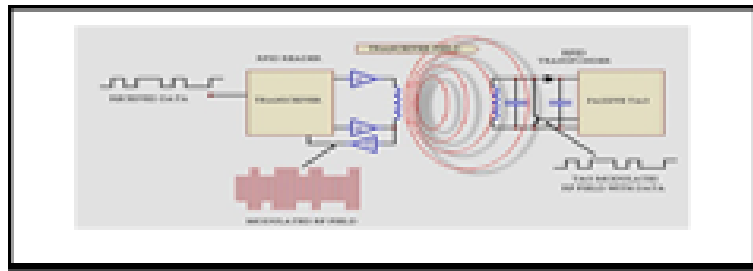


Fig. 2. RFID System

RFID stands for Radio Frequency Identification. It is a wireless technology which is used to identify any object, person or animal by using radio waves. RFID mainly consist of three parts and RFID Tag and RFID Reader, an antenna As shown in the figure RFID reader is a transceiver which can transmit or receive the signal. RFID tag is a passive tag which does not have its own internal power source. When tag comes near to the RFID reader it generates the electric field, this electric field interacts with the tag it gets powered up and transmit the stored information to the reader. There are three components of RFID.

1.1) Antenna : An antenna is conduits between tag and transceiver. It radiates electromagnetic waves generated by the reader and receives the RF signal from the tag.

1.2) RFID Tag : Tag is a microchip which contains unique identification number and an antenna which transmit this data wirelessly to a reader. The tag is also composed of a protective material such as durable plastic that holds the pieces together and shields them from various environmental conditions. RFID tags are embedded between the layers of plastic. RFID tags come in a variety of shapes and sizes. Tags can be attached to any object, persons or animals.



Fig. 3. RFID Tag

1.3) RFID reader:

RFID Reader has transceiver which generates a radio signal and transmits it through antenna. This signal itself is in the form of energy which is used to activate and power the tag. When RFID tag comes in range of signal transmitted by the reader, transponder in the tag is hit by this signal. A tag draws power from the electromagnetic field created by reader. Then, the transponder converts that radio signal into the usable power. After getting power, transponder sends all the information it has stored in it, such as unique ID to the RFID reader in the form of RF signal. Then, RFID reader puts this unique ID data in the form of byte on serial Tx (transmit) pin. This data can be used or accessed by PC or microcontroller serially using UART communication. This system uses EM-18 RFID reader it operates at 125KHz having on chip antenna. It uses +5V power supply. The range is around 8-12 cm. It provides 12 digit output which is transferred to 8051 using serial communication. The output of EM-18 RFID reader is in 12 digit ASCII format. Out of 12 digits first 10 digits are card number and the last two digits are the XOR result of the card number.

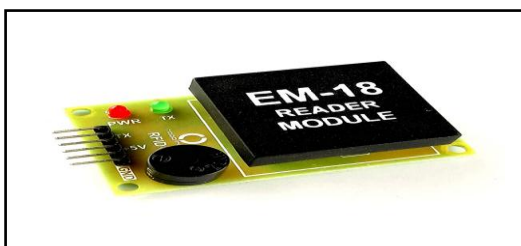


Fig. 4. RFID Reader

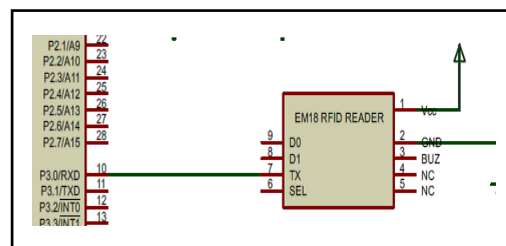


Fig. 5. RFID Reader interfacing with microcontroller

B. RTC

RTC stands for Real Time Clock which is used to track the current time and date. It is generally used in LAP TOP, Mobile or in embedded system to display current date and time. 8051 does not have inbuilt RTC so we have to connect externally to the controller. This system uses DS1307 as a RTC Module.

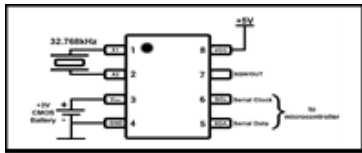


Fig. 6. RTC module

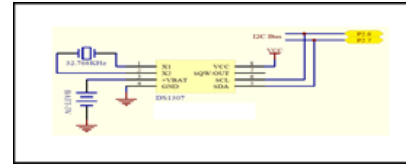


Fig. 7. RTC interfacing

- Figure shows DS1307 RTC module it is 8 pin IC. It uses external crystal of frequency 32.768 kHz, so crystal of 32.768 kHz is connected between X1 and X2 pin.
- CMOS battery of 3V is connected to Vbat pin. An inbuilt mechanism is used to detect 5 volt VCC, if external 5 volt VCC is not there, then it takes the supply from 3 volt CMOS battery.
- The SDA (Serial Data) and SCL (Serial Clock) pins are I2C serial communication pins which are used to connect with microcontroller's I2C pins.
- When RTC is used first time we have to set current time and Date and after that it keeps on updating these values in seconds. The user can set this time and date in the Timekeeper Register. After setting time and date value, RTC DS1307 keeps updating it in seconds.

C. GSM

It is a Global system for mobile communication. It is a digital cellular technology used for transmitting voice and data services. GSM interfaced with 8051 using UART serial communication.



Fig. 8 GSM Module

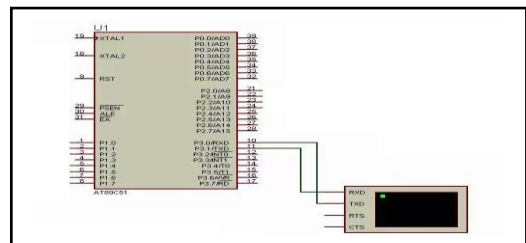


Fig. 9 Interfacing of GSM

D. POWER SUPPLY

8051 requires +5V regulated power supply. It consists of step down transformer, Bridge rectifier, Filter and 7805 regulated IC. 230V, 50 HZ line voltage is applied to the step down transformer it step down the voltage to 9V AC then it is applied to bridge rectifier. Output of rectifier is pulsating DC then it is applied to capacitor filter to get pure DC. Output of filter is not constant, hence output of filter is applied to IC 7805 which is a 5V regulator. It provides constant 5v to 8051.

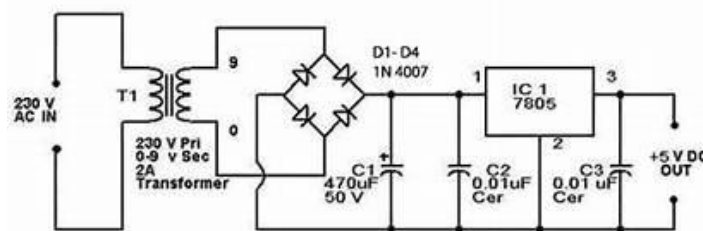


Fig. 10. Power Supply

E. LCD

LCD stands for liquid crystal display it has two rows and 16 column to display the information. It is interfaced with 8051 to display students and employee details such as ID number, name along with message. If RFID number matches with the database then all the information displayed on the LCD along with welcome message. If RFID number is not matching then ERROR message is displayed on the LCD. LCD has 8 bit data bus and three control signals such as read and write, chip select and enable. All these bits can be directly connected to the ports of 8051.

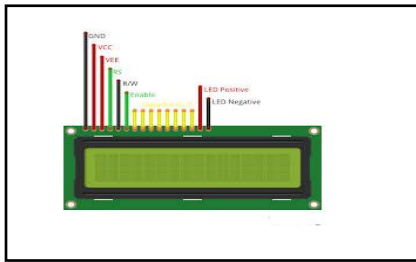


Fig. 11. LCD Pin Diagram

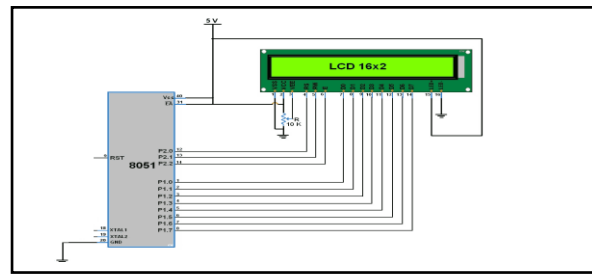


Fig. 12. LCD Interfacing with microcontroller

F. EEPROM

EEPROM stands for electrically erasable programmable read-only memory it is used for read as well write operation. It can be erased and reprogrammed repeatedly through the application of higher than normal electrical voltage. It is non-volatile memory which is used to store data permanently such as username and password. It can be easily interface to 8051 by using I2C communication protocol. I2C bus consist of 2 active wire SDA and SCL. SDA and SCL both are bidirectional these lines can be connected to the different devices. Each device has unique device address. The data can be read or write depending upon the functionality.

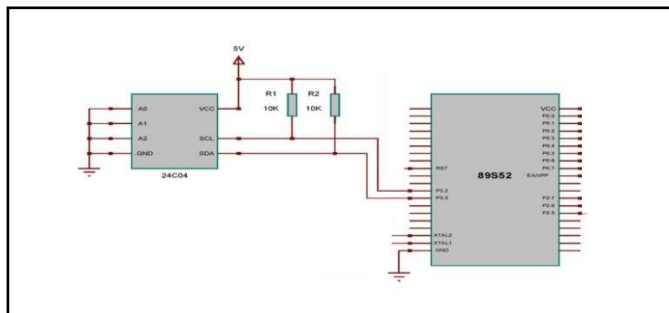


Fig.13. Interfacing of EEPROM

G. DATABASE MANAGEMENT

This system uses VB for designing database. This system designed with student login and teacher login. Student login has two field Student ID Number and Password through which student can login. After login student scan view their attendance details with date and time. Similarly teachers can also login through teacher ID Number and Password after login teacher can view student attendance details and update their attendance lecture wise as well as can view report month wise and send SMS to the parents.

V. CONCLUSION

The proposed system provides easy accurate and less time consuming student attendance system. This system helps the teacher to maintain proper attendance as well as it is easier for the parents to keep track on attendance of their child. This system provides benefits over the traditional system. This system helps to maintain proper record of the attendance of students and parents are get proper notification time to time. This system using 8051 is cost-effective and less power consumption



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