

# **RFID Based Student Monitoring System Using GSM Card and PLX-DAQ**

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## **ABSTRACT**

Due to the easy accessibility and portability of internet for a large section of people, students or the youths are being extremely careless and clumsy in attending the classes or lectures. This project is for late comer students monitoring recorder system by using Radio Frequency Identification (RFID) technology. RFID based Parent SMS Alert and Monitoring System is a web-based application that will be developed to overcome this problem. The systems also have integrated with the RFID Database Handling System for a fully functional system. The information from RFID Database Handling System will be used for monitoring late comers students and for SMS Alert also. The RFID based Parent SMS Alert and monitoring System also interacts with parents using SMS system. Therefore, the system function does not only record the student attendance but also sends alert SMS to their parents. Basically, attendance is manually done and the record is maintained in files. We are trying to reduce manual work and to automate the monitoring system. The monitoring system is basically an embedded one. Here Arduino Uno Microcontroller controls all the hardware components. The microcontroller plays the vital role in the system. The main gist of the system is to recognize the latecomer student and thus consequently monitor the person. This can be done by the RFID (Radio Frequency Identification).

RFID system has RFID card (with unique ID number) and RFID reader as its essential components for its functioning. In this system, RFID reader works at 125 KHz. The PLX-DAQ used for storing the details has the capability of storing infinite person details on the computer. The PC can be used for storing all the details of attendance made and next day it will restart to store the attendance. This report provides a clear picture of hardware and software used in the system. It also provides an overall view of the detailed discussion of the operation of the system.

**Keywords-** Attendance, GSM card, Monitoring system, PLX-DAQ, RFID tag, SMS alert.

## 1.INTRODUCTION

The monitoring system for latecomer's student is basically an embedded one. Here, Arduino Uno Microcontroller controls all the hardware components. This system has the core or major component as microcontroller. Uniqueness or identity of a person is easily identified by this system. The capability of differentiating persons is defined by the unique product of this system. This is possible by RFID (Radio Frequency Identification). RFID system has RFID card (with unique ID number) and RFID reader as its essential components for its functioning. In this system, RFID reader works at 125 KHz. The PLX-DAQ used for storing the details has the capability of storing infinite person details on the computer. The PC can be used for storing all the details of attendance made and next day it will restart to store the attendance.

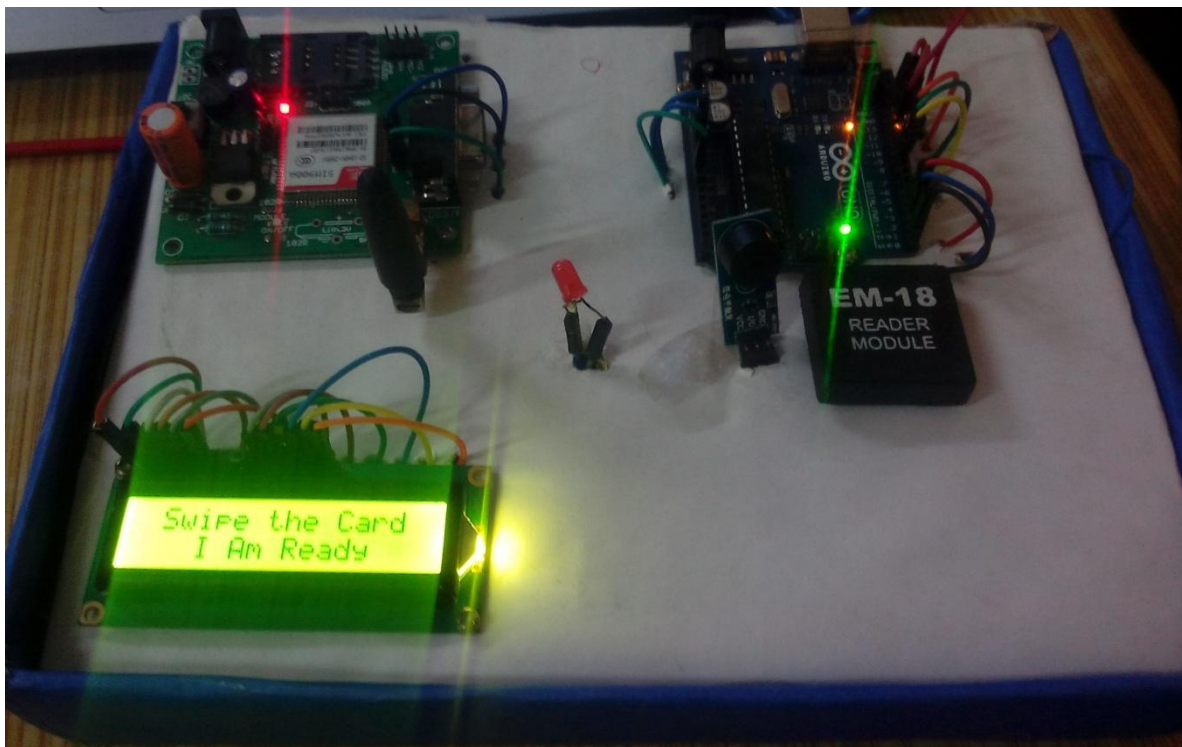


Fig -1.1 RFID based student monitoring system using Gsm

In this particular project, we show that how we provide an advance monitoring system with time management system. In this project, we use circuit with RFID reader interface RFID card for monitoring system. RFID reader system is connected to the PC via COM port. We install PLX-DAQ software on the computer to store the database on the computer. Every time when card enters into the range of RFID reader. The reader gets the data from the RFID card with the help of 125 KHz frequencies. The reader gets the data and transfers this data to ARDUINO UNO. Microcontroller immediate processes this data and transfers this data to the PC via com port. ARDUINO UNO compares this data in the program. PC gets this data and store database in excel file on the computer. In Arduino Uno, we already register the Passive card code number with the ID number. For every card, we issue a special ID number. Every time when we enter the card to the RFID reader then LCD display student name. If the card is not valid with the database, then LCD display shows an invalid card message and a buzzer start beeping. We register the new card. In timing, date and university roll no is stored in the excel file.

RFID, which is an acronym for Radio Frequency Identification, is not a new technology. It was first used in the late 1960's, but it has only become more widespread with advances in technology. RFID Systems contains of a transponder, which is basically a microchip connected into an antenna. A device named as Reader, communicates with tags through radio waves, considering with the necessity that the tag is placed to an item. It is Depending on the type of tag which is used, the reader receives details or it can receive data as an identification number. RFID is similar to barcode systems in which data, such as a price, is accessed when the barcode is read.

## II.ARDUINO UNO (ATMEGA328P-PU) Microcontrollers

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs). There are 6 analog inputs. There is a 16 MHz crystal oscillator and also a USB connection. There is a power jack.. There is an ICSP header and a reset button. It has everything needed to support the microcontroller; easily connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery. The Arduino Uno differs from all boards.

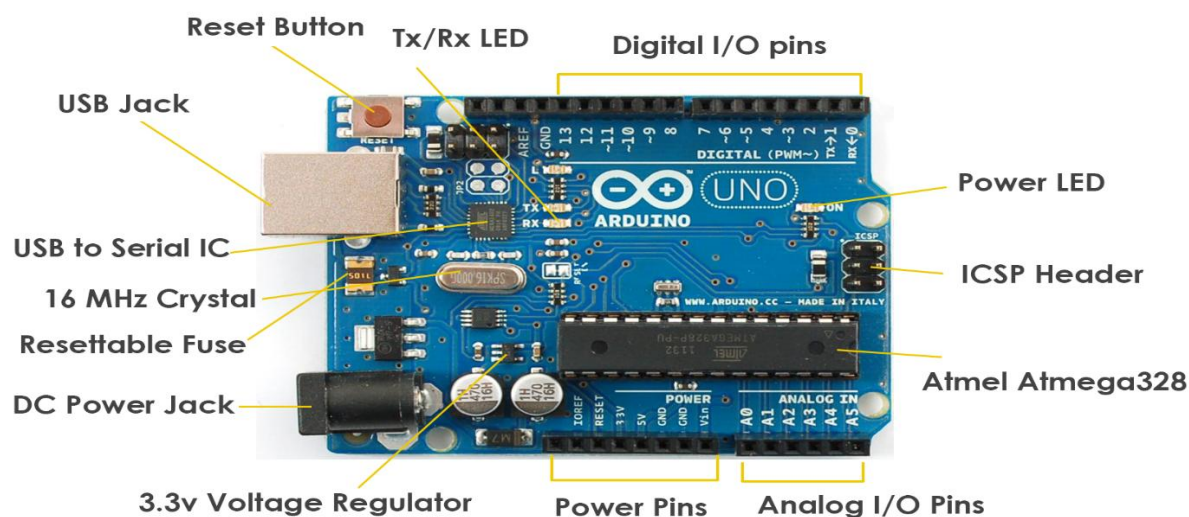


Fig -2.1 Arduino Uno

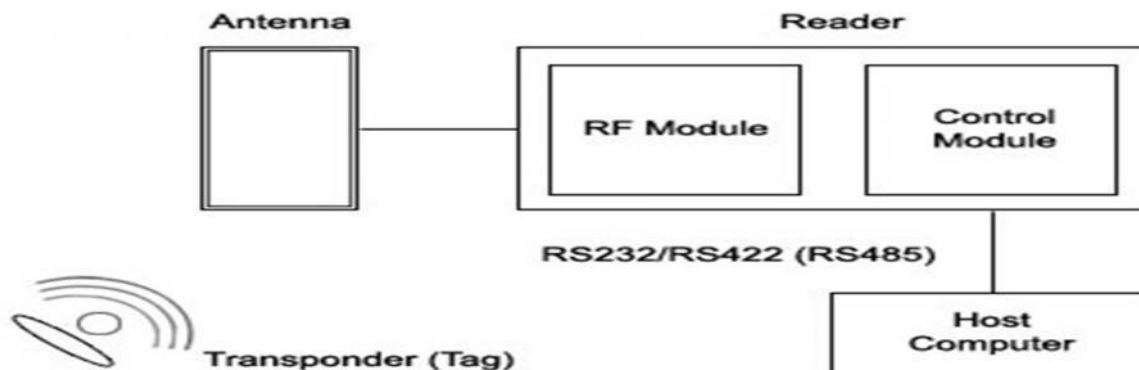
### 2.1. TECHNICAL SPECIFICATION

Microcontroller ATmega328 Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2kb
EEPROM	1kb
Clock Speed	16 MH

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

### III. RFID

The use of RFID will continue to rise in the coming years as far as advancement in technology is concerned. As RFID is to be as cost-effective as bar coding, but comparatively it would be more dominant in domains where bar coding and other optical reading technologies are ineffective. Categories RFID Tag the basic types of RFID tags are classified as read/write and read-only. The reading/write stored data on tags can be edited, or completely rewritten, this could be done only if the tag lies within the range of the reader. The stored data in read-only tag could only be read, can't be edited by any means. On comparison over cost the Read/write tags are much more costly than read only tags; hence read/write tags are not used for tracking the commodity items in most of the cases. RFID tags are further classified into Active tags that consists a battery which powers the microchip and permits it to transmit signal to the reader. Semi-active/semi-passive tags, that are contained with the battery to supply and run the circuitry of chip, but it should draw power from magnetic field which is created by virtue of reader as result to communicate with the reader. Passive tags, which mainly rely on the magnetic field produced by the radio waves transmitted out by the reader to create a current that could be received by the antenna within range of the passive tag. An RF-ID reader transmits out a radio frequency wave to the 'Tag' and the 'Tag' broadcasts back the stored data to the reader. The system solely works upon two antennas, one is the 'Tag' and the other one is the reader.



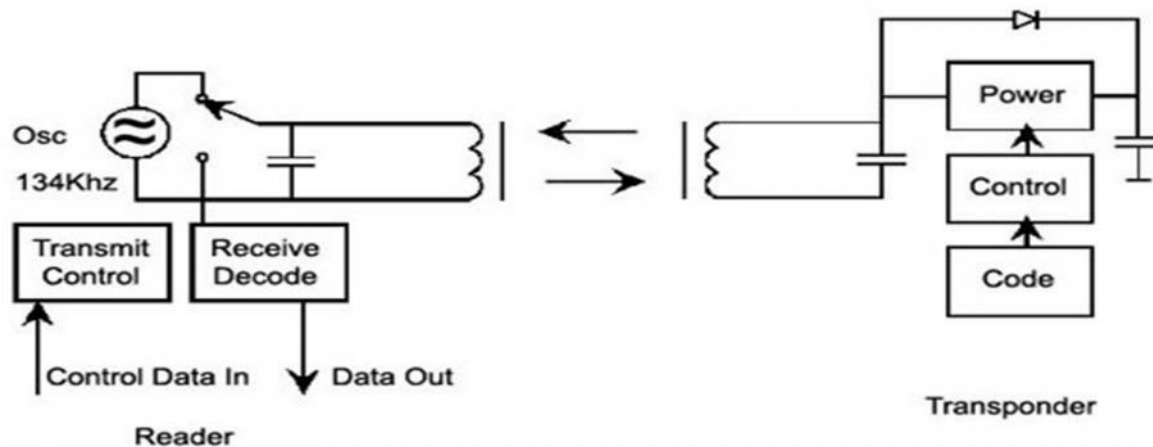
**Fig -3** RF-ID tag system

The data which is collected from 'Tag' can be sent directly to the host system through means of the standard interfaces, or it can be stored in a portable reader which can store the data for temporary purpose and later can be uploaded to the system for data processing. The automatic reading of the data is often called 'automatic data capture' and with an RFID tag system, which works just as effectively, robust, rugged in environments with ample amount of dirt, moisture and poor visibility, and assures you that it can overcome the limitations of other approaches with the automatic identification.

#### 3.1. How does the Low-Frequency Tag system work?

When the transponder, which is battery-free, is to be read, the reader transmits out a 125.2 KHz power pulse to antenna which lasts approx. 50msec. The magnetic field produced is 'accumulated' by the help of antenna in the transponder which is tuned for the same frequency. The received AC energy is duly rectified & stored with the help of tiny capacitor located within the transponder. As soon as the power pulse is exhausted, the data is transmitted back immediately by the transponder, by using the energy contained by the capacitor, as a DC supply.

In total 128 bits are transmitted (including error detection information) over the period of 20msec. This data is intercepted and picked up by the receiver antenna and it is decoded by the reader unit. Once all the data has been transmitted to the storage capacitor is discharged by resetting the transponder and making it prepared for the next read cycle to be read. The time period between transmission pulses is known as the 'sync time' and it can lasts between 20msec and 50msec depending on the system setup.



**Fig -3.1** RFID transmission technique used between the transponder and the reader

The transmission technique which is used between the transponder and the reader is the Frequency Shift Keying (FSK) with transmissions between 125.2 kHz. Comparatively this sought of approach has a good resistance to the noise generated and also being most cost effective for the implementation.

#### **IV. SIM 900A GSM GPRS Module**

This is an ultra-compact and reliable wireless module. SIM900A is complete within itself for Dual-band GSM/GPRS solution in SMT module that can be embedded to the customer application purposes. In regards of an industry-standard interfacing, the SIM900A provides GSM/GPRS 900/1800MHz performance for the voice, Text, Data, and even Fax in small form factor and with very low power consumption. Having the small configuration of 24mm x24mm x3mm, the SIM900A could fit in almost all of the required spaces in user applications, especially for the slim, and compact demand of design.

##### **4.1. FEATURES**

4.1.1. Dual-Band (900/ 1800) MHz

4.1.2. GPRS multi-slot class (10/8) GPRS mobile station of class B



- 4.1.3. Compliant to GSM phase ( 2/2) +Class 4 , 2W at (850/ 900 MHz)
- 4.1.4. Class 1 , 1W at ( 1800/1900MHz)
- 4.1.5. Control via AT commands (GSM 07.07, 07.05 and SIMCOM enhanced AT Commands)
- 4.1.6. Low power consumption 1.5mA (sleep mode)
- 4.1.7. Operation temperature 40°C to +85 °C
- 4.1.8. Status indicator (D5) It can flash continuously as the call arrives else it is left ON.
- 4.1.9. Network LED (D6) the led will blink every second indicating the GSM module is disconnected from the mobile network. As soon as the connection is established successfully, the LED would blink for every 3 seconds.

## 4.2. BLOCK DIAGRAM

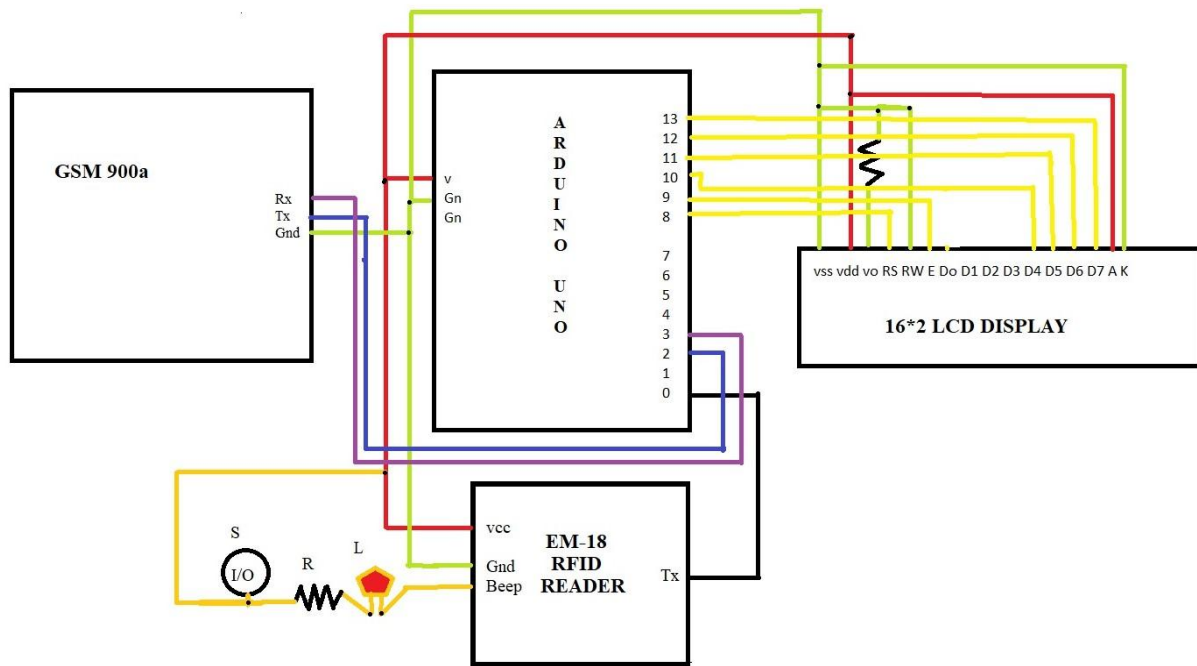


Fig-4.2 Connection diagram of the system

## 4.3. COMPONENT USED AND DESCRIPTION OF THE CIRCUIT

- 4.3.1. Arduino Uno
- 4.3.2. 1 EM-18 RFID Reader
- 4.3.3. 1 16\*2 LCD Display
- 4.3.4. 1 GSM Card
- 4.3.5. 1 Buzzer
- 4.3.6. 1 Light
- 4.3.7. Resistors
- 4.3.8. Jumper Wires
- 4.3.9. 3 RFID Cards

## V. CONCLUSION

In this project RFID (Radio frequency identification) based student monitoring system using GSM and PLX-DAQ is used the identification system that employees radio waves to retrieve data from a device which is called a TAG or Transponder. It can also be implemented and used for different applications like ID card, hostel student monitoring etc. Here, the RFID card is used for the ID card of the students of a college. Every student

will have an RFID card. The system is such that if any student arrives late to the college, he would have to swap the card at the entry gate. As soon as the student swaps the card, an automatic late SMS will be sent to the registered contact of the user corresponding to the student. Hence, the parents will get the notification of his/her student activity easily. After that, this device is connected via computer as the PLX-DAQ software is already installed on this computer.

The kit RFID based student monitoring system that uses GSM and PLX-DAQ consisting of three main components, RFID reader, GSM Modem and Arduino Uno microcontroller. The RFID reader consequently reads the number of the respective card, as the card is swapped. This number is conveyed to the microcontroller which tallies it from the pre-stored database. This database is already uploaded to Arduino Uno via Arduino program compiler. If the student matches, then the mobile number is searched and an SMS is sent on the number. A 16\*2 LCD display is there for the proper assistance to the user. After that, a record will be created in the computer in the form of Microsoft Excel sheet. This record contains Student name, University roll no, Date, Time. This system can be further upgraded and can be connected to the central database of any organization so that the student can be monitored easily inside the college also. It can also be used for Hostel students.

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## REFERENCES

[1]Shefali Chopra & Chitra Gaba, Microprocessor and Interfacing, *Manav Rachna Publishing House*

*Private Limited.*

[2]RAM BHAROSH RAUT, GHANSHYAM KUMAR, LOKESH MEHLAWAT, RAHUL BISHNOI,

RFID BASED ATTENDANCE SYSTEM USING GSM, *Manav Rachna International University,*

*Faridabad.*

[3]<https://ijesc.org/>

[4]<https://pdfs.semanticscholar.org/>

[5]<https://ieeexplore.ieee.org/document/7944103/>