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RFID & GSM Based Child Security System

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Abstract: With the advancement of the crime rate security is having its alarming significance for school children. The safety mechanism to the children travelling from school to home and vice versa is very important. This project aims to provide total security for school children. Two counters are used at the entrance and exit location of the bus as well one at the entrance of school. The school children are required to scan their tags and the corresponding messages will be sent to their parent's cell phone. Thus child arrival and departure details will be regularly sent to parents using GSM technology.

Keywords: RFID, GSM Module, Child Security, Microcontroller.

I. INTRODUCTION

This project is aimed to build a system which can notify the Parent about their Child's status by using RFID and GSM technology. Radio Frequency Identification (RFID) Card Readers provide a low-cost solution to read passive RFID transponder tags up to 2 inches away. The RFID Card Readers can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics navigation, inventory tracking, payment systems, and car immobilization. The RFID card reader read the RFID tag in range and outputs unique identification code of the tag at baud rate of 9600bps.

The data from RFID reader can be interfaced to be read by microcontroller or PC. This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that use of its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. This project is built on 8051 micro controller which is interfaced with RFID and GSM module. An LCD is also interfaced in the project which displays the status of the system.

II. LITERATURE SURVEY

A literature review has showed that many studies made use of Radio Frequency identification (RFID) as a system that transmits the identity of an object using radio waves. James Brusey at el. (August 2003) in their Workshop on Reasoning with Uncertainty in Robotics at IJCAI. Ac apulco. Mexico stated that RFID stands for "radio frequency identification", and it's a technology that enables remotely storing and retrieving information by means of electromagnetic radiation

III. SYSTEM OVERVIEW

The main objective of the system is to uniquely identify and track a child. This requires a unique product, which has the capability of distinguishing different person. This is possible by the new emerging technology RFID (Radio Frequency Identification). The main parts of an RFID system are RFID Tag (with unique ID number) and RFID reader (for reading the RFID tag). In this system, RFID tag and RFID reader used are operating at 125 KHz. In this project, advance security system is provided. One hardware circuit with RF reader interface and RF 2 passive card for attendance system is used in this project.

A. Block Diagram and Explanation

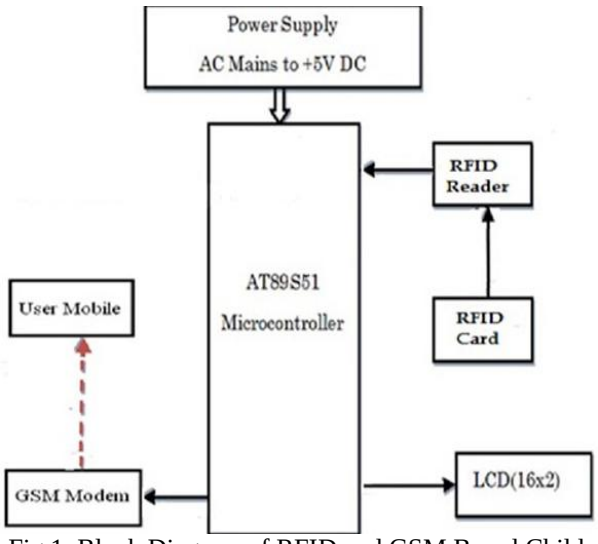

Fig.1. Block Diagram of RFID and GSM Based Child Security System

Whenever any card is shown to the hardware system then reader gets the data of RF card with the help of 125 KHz frequencies. Reader gets the data and transfers this data to microcontroller 89s51 immediately microcontroller process this data, identifies the child using internal alphanumeric code within the RFID tag and using a GSM modem it sends a message to the given phone number about the current location of the child. PC gets this data and compares the data with data base in access. Also other details such as IN/OUT timing of the child can be sent to the parents.

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In data base the Passive card code number with ID number is already registered. For every card we issue a special ID number. Depending on this code number we have to program the C language code, such that the unique code will represent a particular child. Every time when we show the card to the RF reader then LCD connected with the microcontroller show its name. If the card is not registered with the data base then LCD display show a sorry message. Then the new card entry with software any time can be registered.

B. RFID Reader

Fig2 RFID Reader EM-18

Radio Frequency Identification (RFID) Card Readers provide a low-cost solution to read passive RFID transponder tags up to 10 cm away. This module directly connects to any microcontroller UART or through a RS232 converter to PC. It gives UART/Wiegand26 output. This RFID Reader Module works with any 125 KHz RFID tags.

RFID Card Reader can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics navigation, inventory tracking, payment systems, and car immobilization.

The RFID card reader read the RFID tag in range and outputs unique identification code of the tag at baud rate of 9600. The data from RFID reader can be interfaced to be read by microcontroller or PC.

[1]There are three types of Transponders or Tags. Tags can be Active, Passive, or Semi-passive Transponders. Here we use a passive RFID Tag. Passive Tags have no internal power source.

They draw their power from the electromagnetic field generated by the RFID reader. They have no active transmitter and rely on altering the RF field from the transceiver in a way that the reader can detect.

Since Passive Tags have no power of their own their range is lower than the Active Tag, but has the advantage of lower power consumption and low costs

TABLE I RFID READER SPECIFICATIONS

Sr. No.	Specifications	
	Terminology	**Ratings**
1.	Frequency	125KHz
2.	Reading Distance	10cm
3.	Baud Rate	9600bps
4.	Current	<50mA
5.	Power Supply	5V DC

C. GSM Module

[4]A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone.

From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network.

While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS messages.

Fig.3. GSM Module

TABLE III [5] GSM MODULE SPECIFICATIONS

Sr. No.	Specifications	
	Terminology	**Ratings**
1.	Power Supply	5-12V DC
2.	Current Consumption	1mA(sleep mode)
3.	Temperature	-20°C to +55°C
4.	SMS	SMS over GPRS
5.	Compatibility	Control via AT commands

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D. Circuit Diagram

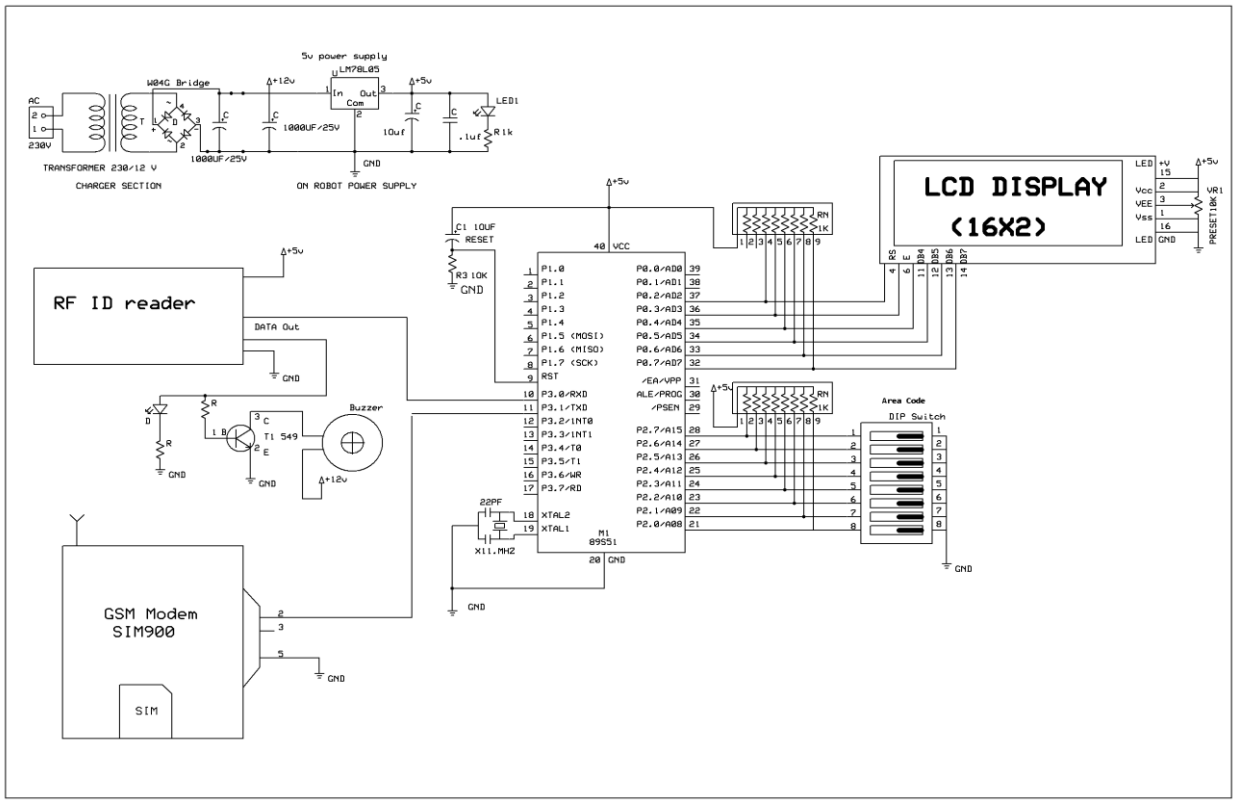

Fig.4. Circuit Diagram

E. LCD Display

Fig5. LCD Display

In this project 16x2 LCD Display is used to display the tag number of the card being scanned. LCD is interfaced with microcontroller 89c51 in a 4-bit mode, 8 bit data being sent twice using 4 port lines. Thus when the tag will be scanned the tag number will be displayed on the LCD and after a predetermined delay (programmable) the message will be sent to the parents using the GSM module

F. Microcontroller

[2]Microcontroller 89s51 being an 8-bit controller has 4KB of Flash Programmable and erasable read only memory. It can be erased and programmed to a maximum of 1000 times Out of the 4 ports, Port 0 is interfaced with LCD in 4-bit mode. Since a number of circuits are used e.g. at school entrance as well as at bus entrance/exit different area codes are assigned to each circuit. For e.g. the circuit at bus entrance will have area code 01 while the circuit at bus exit will have area code 02.

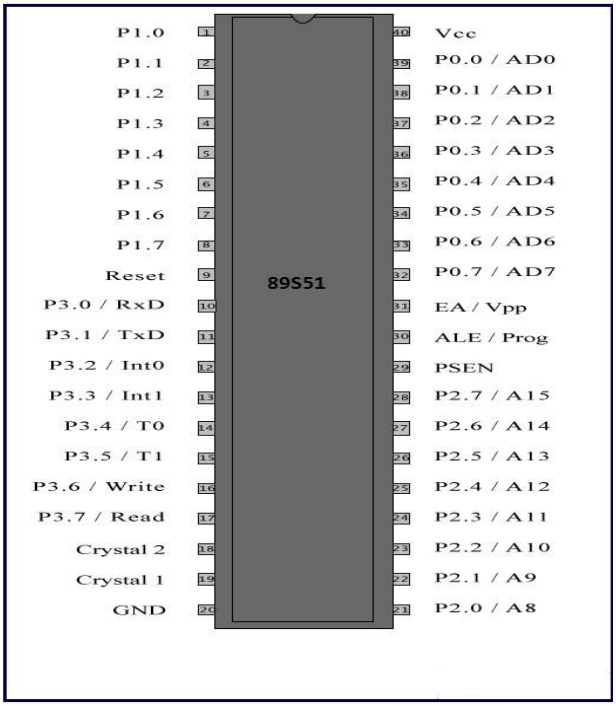

Fig6. Pin Diagram of 89s51

Thus all the pins of Port 2 are used for DIP switch to set up the area code. RxD(P 3.0) pin of 89s51 is connected to data out pin of RFID Reader to receive the 12 digit number stored in the passive tag. While the TxD(P 3.1) is connected to the RxD pin of GSM Module to send the AT commands required for sending SMS.

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IV. SYSTEM IMPLEMENTATION

A. Flow Chart

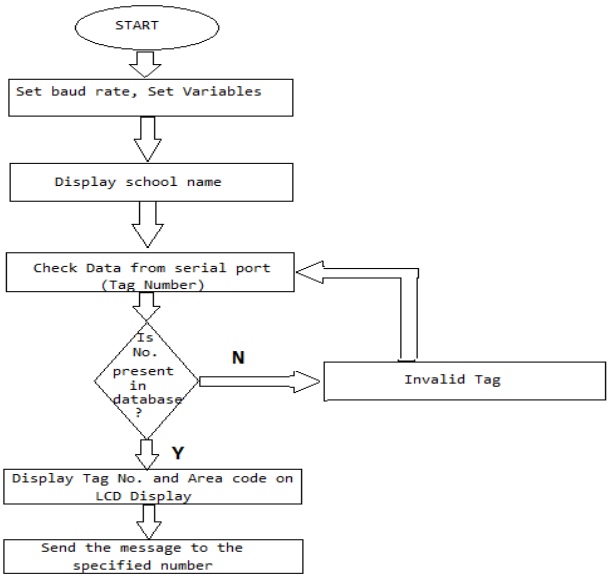


Fig7. Flow Chart for sending sms to parents

B. PCB Layout

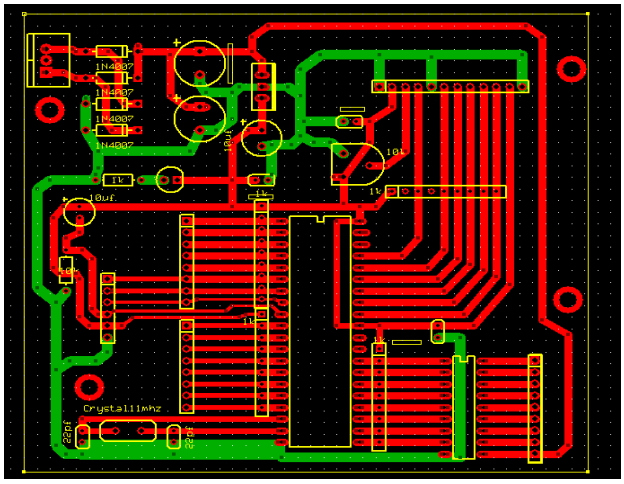


Fig8. PCB Layout on Express PCB Software

V. RESULTS

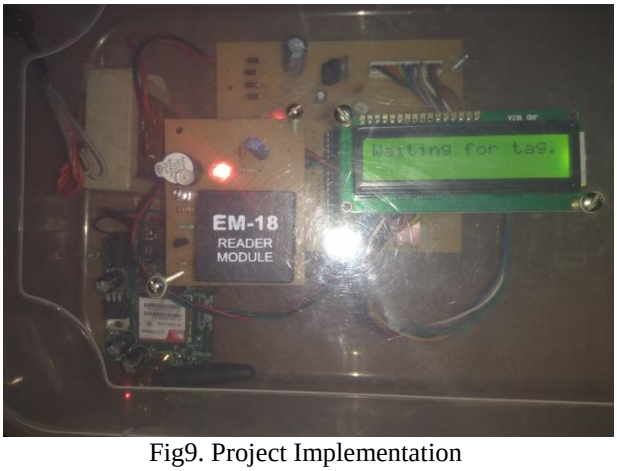
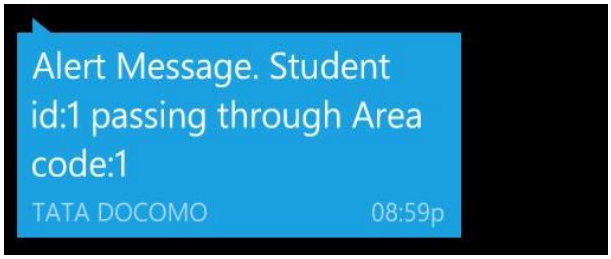


Fig9. Project Implementation



Fi10. Message status to parents

VI. CONCLUSION

Thus this paper proposes that RFID & GSM Based Child Security System will notify the status of child to the parents. Child's arrival and departure details will be regularly sent to parents with the help of RFID Tag and GSM Module. BASCOM 8051 software helps in simulating the code. The results can be viewed on the LCD emulator

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