Real Time Outdoor Safety Management Based on Embedded System

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Abstract— Safety is one of the most important factors for all beings in this world. To provide safety in the aspects of travelling for school students this project 'Real time outdoor safety management system' is proposed. It also intimates regarding accidents if occurred to nearby hospitals and authorities, also prevents drunk and drive situations by using the technologies like GPS, GSM, RFID, PIC and SENSORS. Once the student enters into the bus using the RFID reader intimation to their parents about the arrival and departure of their wards is sent through message using GSM. It ensures maximum safety and security to all beings. Thus the objective of the project is achieved rightly and successfully. An advanced vehicle monitoring and tracking system is designed for monitoring the school vehicle from any location A to location B at real time and provide safety environment to the traveler. The proposed system would make good use of new technology that based on embedded board namely PIC and its advanced feature. The proposed system works on Global Positioning System (GPS) and Global System for Mobile Communication (GSM) which is used for vehicle tracking and monitoring mechanism. For this purpose SIM908 Module is used which includes all the three things namely GPS GPRS GSM. The GPS gives current location of the vehicle; GPRS sends the tracking information to the server and the GSM is used for sending alert message to vehicle's owner mobile. The proposed system would place inside the vehicle whose position is to be determined on the web page and monitored at real time. In the proposed system, there is comparison between the current vehicle path and already specified path inside the file system of Raspberry pi. Hence if the driver drives the vehicle on the wrong path then the alert message will be sent from the proposed system to the vehicle's owner mobile and if the vehicle's speed goes beyond the specified value of the speed, then also the warning message will be sent from system to the owner mobile.

Key words: PIC, Embedded System, Sensors, GSM, GPS, Vibrational Sensor, Alcohol Sensor

I. INTRODUCTION

In today's world children are facing lots of difficulties in travelling. Parents are much worried about their wards. Time is most valuable factor in life. Wasting it by waiting for school bus is really tedious. This is avoided in this project by using an android application the bus route is being monitored continuously, so that the time is being saved. Accidents are frequently occurring nowadays and it is a major threat in society. To avoid and prevent accident due to drink and drive, an alcoholic detector is fitted in the vehicle. Advancement is made by providing a vibrational sensor it intimates regarding accident to the nearby hospitals and authorities. Hereby the safety and security of the being is assured.

II. PROPOSED SYSTEM

The proposed system would get controlled with the support of PIC controller which is placed in the vehicle. The following are some of the features of the project:

- The GPS/GPRS/GSM SIM900A module is connected to the controller.
- The RFID reader is fixed in the school bus, once the student entered into the bus the RFID tag which has unique code in it will be scanned and a message is sent to their parents.
- The latitude and longitude of the current path is monitored using the GPS module and is periodically updated with the help of GPRS in the webpage to their parents. This helps to safeguard the children from kidnapping, etc.
- The vibration sensor is used to intimate regarding accidents if occurred to the nearby hospitals and authorities. When a particular threshold exceeds it alerts the management by providing an alert message.
- The proposed system also prevents accident due to drunk and drive by fitting an alcoholic detector which does not allow the driver to start up the vehicle just by sensing the smell.

III. SYSTEM DESCRIPTION

The diagram given below is the block diagram for 'Real time outdoor safety management system.

In the fig:1, RFID TAG, GSM, GPS, Power supply and Vibrational sensor is given as input to the PIC controller and the LCD display, buffer, RFID reader and alcohol detector is taken as output from the controller. The block diagram of the project is shown below

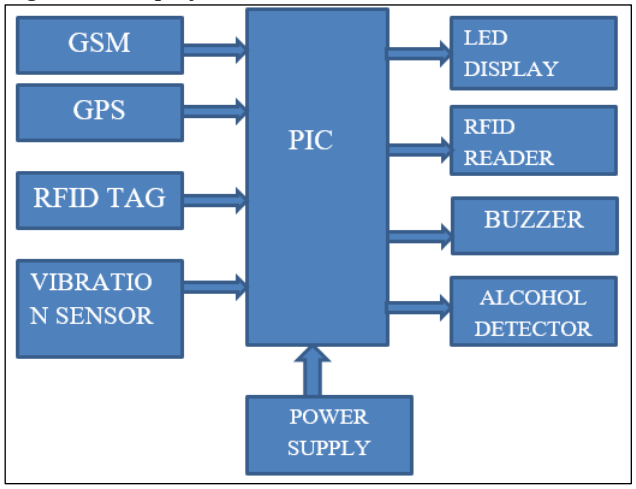


Fig. 1: System block diagram

In PIC controller PORT C is chosen for performing operations. The input of GSM, GPS and RFID is connected to the pin RC6 and the output is taken from the pin RC7, the

power supply is connected with the VCC. The system is also connected with a Step down transformer and relay.

IV. COMPONENT DESCRIPTION

A. Pin Controller

The PIC consists of 40 pins, 5ports(A,B,C,D&E) in which 33 pins are for general purpose input output and 7 reserved pins as 2 for supply , 2 for ground ,2 for oscillator and 1 for master clear. The operating voltage is 5V DC. The pins 25(RC6) and 26(RC7) is used for transmitting and receiving. The pin diagram of PIC16F877A is shown below in fig 2.

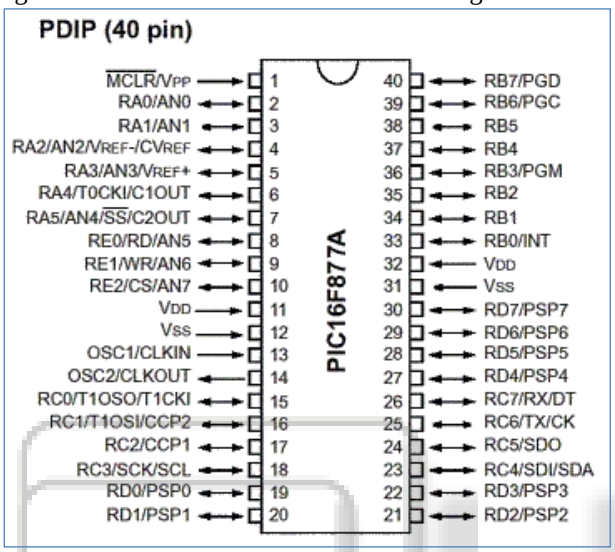


Fig. 2: PIC16F8774

B. GSM (Global System for Mobile communication)

The GSM SIM900A is used for communicating with the mobile to send messages and transmit information regarding the arrival and departure of the children. The operating frequency of GSMSIM900A is 900/950/1800 MHZ. The operating voltage is 12V. GSM/GPRS modem can be connected directly to your computers serial port for wireless GSM communications including sending and receiving text messages. It can also be connected to your remote RS232 serial equipment allowing you to "dial up" your system for remote management. This includes data loggers such as Data Taker and Pace Scientific. GPRS connectivity also allows you to integrate this modem in your applications for an "always on" remote management system. Available with a built-in TCP/IP stack and you can easily create software to interface to the modem over your standard internet connection.

1) Features:

- Tri-band GSM 850, 900, 1800 and 1900MHz
- Supports TCP/IP
- Accepts a standard SIM card
- Standard extended open AT commands
- Send/receive SMS text messages
- GPRS Class 10
- 5 to 12V DC supply
- Dimensions: 115 x 65 x 27mm

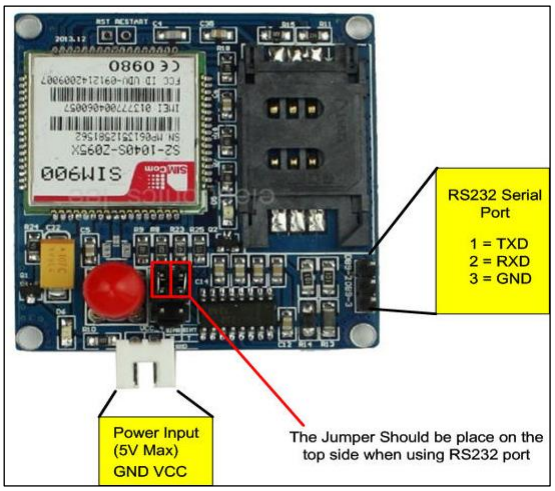


Fig. 3: GSM module

C. GPS (Global Positioning System)

The GPS is used for tracking and monitoring the vehicle by rendering the position with latitude and longitude. This is being updated in the web page and the location of the vehicle which is fed in the database is compared so that the location is displayed. The operating voltage is 5V. The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver. There are no subscription fees or setup charges to use GPS. A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the user's position has been determined, the GPS unit can calculate other information, such as speed, bearing, track, trip distance, distance to destination, sunrise and sunset time and more. GPS receiver is used here to detect the location of the vehicle and provide information to responsible person through GSM technology.

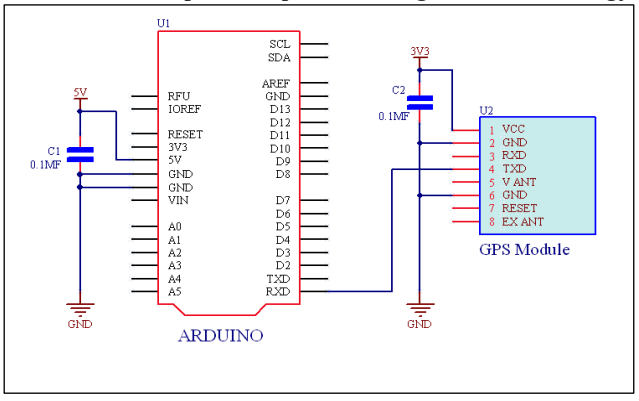


Fig. 4: GPS module

D. RFID (Radio frequency identification)

RFID uses electromagnetic fields to automatically identify and track tags attached to objects. The tag contain

electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source. RFID is one method for Automatic identification and data capture (ADIC).

E. GPRS (General Packet Radio Service)

GPRS is a packet oriented mobile data service on the 2G and 3G cellular communication (GSM).

F. 12V Step down transformer-4rectifiers, regulator to convert 12V to 5V DC

G. Vibrational Sensor

A buzzer will arise an alarm if the vibration exceeds the threshold and intimates regarding accident to authority and nearby hospital.

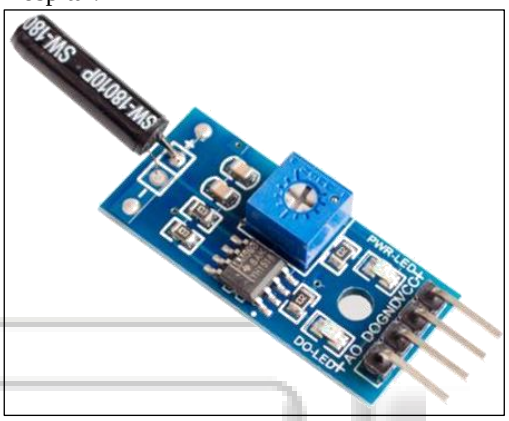


Fig. 5: vibrational sensor

ALCOHOLIC DETECTOR: It prevents the vehicle from starting by sensing the smell of the driver.

Fig. 6: alcohol sensor

V. CONCLUSION

In this paper, we have proposed a method that using GPS we are tracking the vehicle and the message is sent through GSM module and finally the student RFID TAG is read by the RFID reader and message is sent to their parents. This system also sends message before 5-10 minutes of arriving of the school bus. The vibrational sensor arise a pop up notification when the vibration exceeds the threshold to nearby hospital and authority. The alcohol detector sensor senses the smell and blocks the vehicle from starting up and prevents the driver from tough situations.

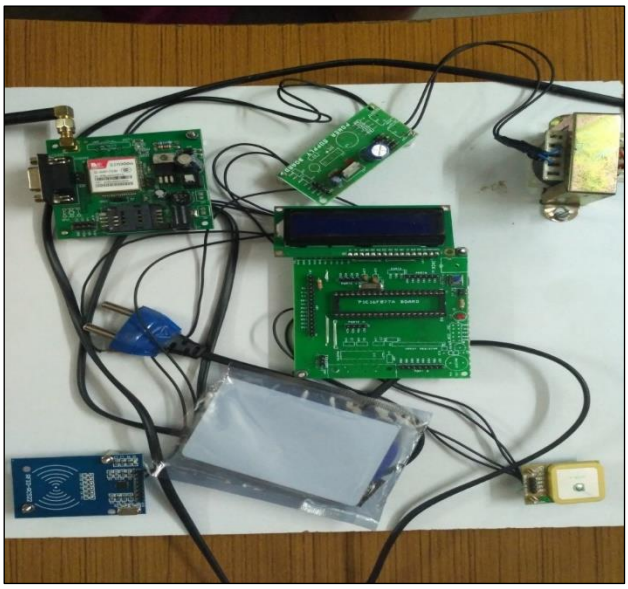
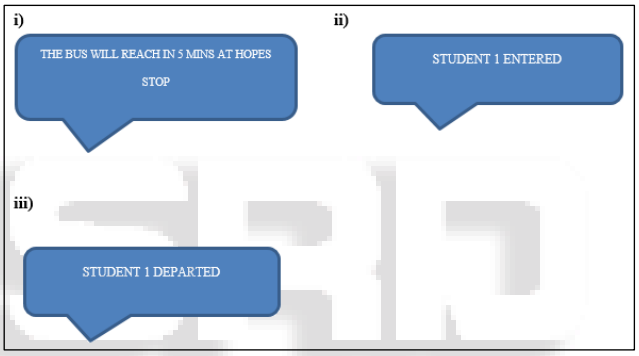


Fig. 7: final project kit

VI. RESULT



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