RESEARCH ARTICLE OPEN ACCESS

EMBEDDED BASED SCHOOL CHILDREN TRANSPORTATION AND SAFETY ENHANSEMENT USING RFID

L.SOWBHAGYA LAKSHMI[1],M.V.ROSHINI[2], M. TEJA SWAROOP KUMAR[3], M.VENKATA DASU[4]

1(Department of ECE, Annamacharya Institute of technology&Sciences,Rajampet
Email:sowbhagyalebaku@gmail.com)
2(Department of ECE, Annamacharya Institute of Technology&Sciences,Rajampet
Email:roshinimanchala@gmail.com)
3(Department of ECE, Annamacharya Institute of Technology&Sciences,Rajampet
Email:mamillateja@gmail.com)
4(Assistant professor, Department of ECE, AITS ,Rajampet
Email:dassmarri@gmail.com)

Abstract:

Now-a-days, school buses are important to transfer the children from home to school (or) school to home everyday. The parents of the children had been worried about the safety of their children whether they reached school safely or not and the critical issue is that if the child is forgotten in the bus and the bus is diverted from the actual route, it leads to make parents worried about their child. In order to remove this problem we are proposing a embedded based school children safety enhancement using RFID. This system is used to control the entry and exit of the students with advanced methodology. This system consists of RFID i.e., Radio Frequency Identification , GPS technology used to track the present position of the bus, GSM used to send notification to the parents about the student ,ultrasonic sensor with buzzer to detect the obstacle and to create special attention to drivers to avoid the accidents.

Keywords: Microcontroller, GSM, GPS, Ultrasonic sensor, Buzzer ,RFID.

Introduction:

In various countries around the world, school buses transfer millions of children daily from home to school and viceversa.

drivers to notice the entry and exit of the students from the bus. This project provides a suitable environment for security and safety of school children will create positive impact on student and their family.

Proposed Method:

This system performs several tasks like identifying personal information (for eg : name) of the student using RFID tag , which exchanges the data with the RFID reader through radio waves and displaying the student name into the LCD display. It also consists of GPS technology used to track the present position of the bus, GSM used to send notification to the parents about the student, ultrasonic sensor with buzzer to detect the obstacle and to create special attention to drivers to avoid the accidents.

Block diagram:

The block diagram consists of ultrasonic sensor, LPC2148,Global system for mobile, GPS, RFID ,buzzer and LCD display and it is as follows:

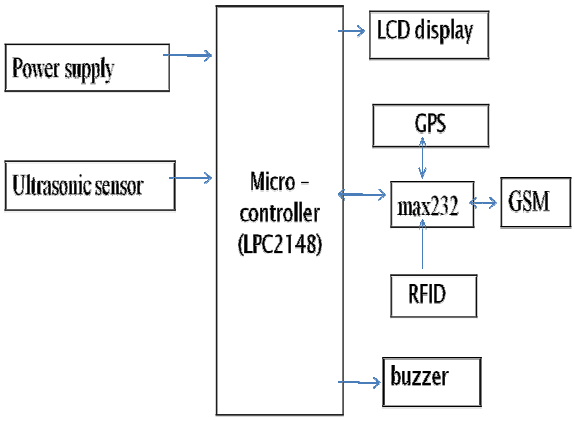


Fig 1.1: Block diagram

BLOCK DIAGRAM DESCRIPTION:

The block diagram consists of a power supply,ultrasonic sensor, RFID ,GSM, GPS, Buzzer and LCD display.

Microcontroller:

Here, we are using a LPC2148 controller which is a ARM7 based architecture.

ARM7:

ARM represents advanced RISC machine and it is a 32 bit RISC processor architecture developed byARM holdings. Many beginners sometimes misunderstood that ARM is a either controller (or) processor. But in reality it is an architecture which is used in many processors (or) controllers. ARM7 has many cores i.e.,ARM710 ,ARM7 TDMI etc.

LPC2148:

ARM7 is most successful and widely used processor, we use ARM7 TDMIbased NXP controller LPC2148. LPC represents low power consumption.

Fig 1.2:LPC2148

Pin Diagram:

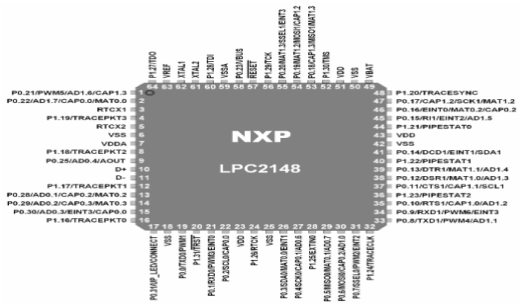


Fig 1.3 pin diagram

LPC2148 has two 32- bit general purpose I/O ports.

1. Port0

2. Port1

Port0:

- It is a 32 bit port and out of these 32 pins ,28 pins can be configured as either general purpose input (or) output.
- One of these 32 pins (p0.31) can be configured as general purpose output only.
- 3 out of these pins (P0.24, P0.26 and P0.27) are reversed .hence they are not available for use. Also these pins are not mentioned in pin diagram.

Port1:

It is also a 32 bit port . only 16 of these 32 pins (P1.16-P1.31) are available for use as general purpose input or output.

Almost every pin of these two ports has some alternate function available. For eg: The P0.0 can be configured as the TXD pin for UART0 (or) as PWM1 pin as well.

Pin function select registers:

Pin function select registers are 32 bit registers and are used to select (or) configure specific pin functionality.

There are 3 pin function select registers in LPC2148:

PINSEL0: it is used to configure PORT0 pins from P0.0-P0.15.

PINSEL1: it is used to configure PORT0 pins from P0.16-P0.31.

PINSEL2: it is used to configure PORT1 pins from P1.16-P1.31.

Ultrasonic sensor:

Ultrasonic sensors are transducers that converts ultrasonic waves to electrical

(or) vice versa. They can used for both transmit and receive and they also called ultrasound transceivers. They can both sense and transmit.

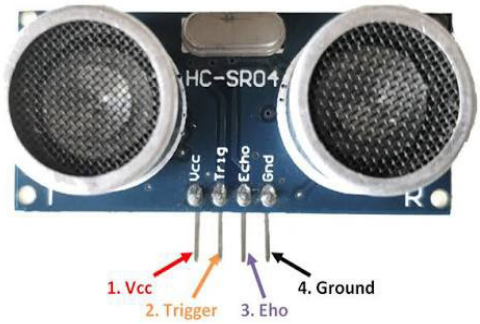


Fig 1.4 : Ultrasonic sensor

Ultrasonic sensors are used to detect an obstacle. It gives the information about the distance of an obstacle present. If an obstacle come the sensor is trigged and it emits ultrasounds, these echoes come back after hitting the target which is received by the receiver.

This analog input should given to the controller which internally converts analog data into digital as the LPC2148 consists of two A/D converters and stored in the microcontroller.

Features:

- Supply voltage: 5v(dc)
- Supply current:15mA
- Modulation frequency: 50Hz
- Distance:2cm -400cm
- Accuracy:0.3cm

RFID:

RFID stands for Radio Frequency Identification. These are mainly used to track the objects. RFID must consists a tag and a reader.

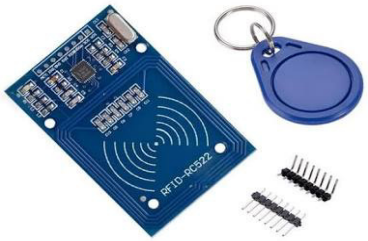


Fig 1.5:RFID tags and reader

There are two types of tags are present. They are 1. Active tag

2.Passive tag

Active RFID possess their own power source i.e., an internal battery that enables them to have a long duration of life as well as large memory banks. Active RFID tags that are powered by a battery can lasts between 3-5 years.

Passive RFID tags have no internal power source, the power is supplied by the reader. These have a life time period of 20 years or more. These are less expensive. Generally in small applications passive RFID tags are preferable.

Working:

RFID tags consists of mainly three parts: Tag, Reader,Antenna. Component on the tag have two parts:

(a) A microchip that stores and process the information

(b) An antenna to transmit and receive signals.

A specific serial number should given to a specific tag. To read the information , by using antenna reader emits the signal to the tag. RFID reader reads the tag using radio waves.

GSM Modem:

A GSM Modem is a particular type of modem which accepts a SIM card,and operates just like a mobile phone. It exposes an interface that allows applications such as it sends and receives the messages over the modem interface.

Fig 1.6:GSM modem

Through radio waves, it sends and receives the SMS (or) MMS. It is thin and compact , the main advantage of this is ,it has low power consumption. It is mainly used to send the text messages of the child to their parents and the server.

Features:

- Mobile to BTS (uplink): 890-91MHz.
- BTS to Mobile (downlink) : 935-960MHz
- Bandwidth: 2 * 25 MHz.
- Low power consumption:1.5mA .
- Operating temperature:-40^{0}c to +85^{0}c.

GPS:

GPS is a satellite based navigate system and it represents global positioning system that provides time information and location in all weather conditions.

Fig 1.7: GPS

Positioning system normally consists of Transmitter and Receiver. The transmitter's job is to track the location based on latitude and longitude position with the help of information given by the satellite. The transmitter of the GPS sends the signal to the satellite through which satellite reads the current position of the bus and sends to the GPS receiver ,and with the help of GSM the information is sent to the server.

Buzzer:

Buzzer is an audio signalling device and can be a mechanical, electro mechanical (or) piezoelectric .In this we

are using a elecromechanical buzzer to give attention to the driver when to start the bus.

Fig 1.8: Buzzer

LCD display:

In this we are using 16*2 LCD to display the information about student (or)distance of the obstacle. It is a 16 pin display and it is as follows:

*Fig 1.9: 16*2 LCD display*

Features:

- Operating voltage:4.7 to 5.3v
- Current consumption is 1mA without back light.
- Alphanumeric LCD display module represents it can display alphabets and numbers.
- Available in Green and Blue backlight.

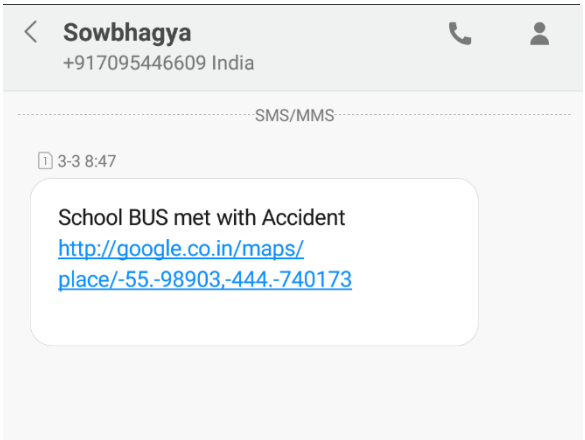
Circuit Description:

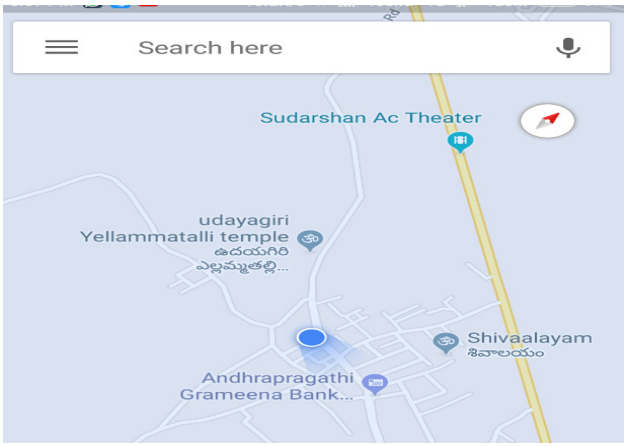
Since the microcontroller LPC2148 has two UART ports i.e., UART0 and UART1, the RFID reader should connected to one UART port (or) the transmitter and receiver pins which has initially stored the details of the students i.e., student name and mobile number. The ultrasonic sensor, LCD and buzzer should be given to any of the port pins of microcontroller. The GSM should be connected to the another UART port(or) transmitter and receiver pins of LPC2148 by using MAX232 to control the voltage fluctuations. The GPS should be connected to transmitter and receiver pin but we connected both GSM and RFID to those pins .so ,we connected RFID and GPS to the serial board. Through the serial board we give to transmitter and receiver pins.

Initially each and every student should be given by RFID tags. When the students place the tag closely to the reader the reader reads the data from the tags and synchronize the data with the data present in the reader will be stored in the microcontroller and is displayed in the LCD. Through the GSM, the information about the student is sent to the server as well as their parents. During transportation if an obstacle came the ultrasonic sensor detect the obstacle and this information is processed by the microcontroller and at the same time the electro mechanical buzzer gives a beep sound to give intimation to the driver and the distance is displayed in the LCD.

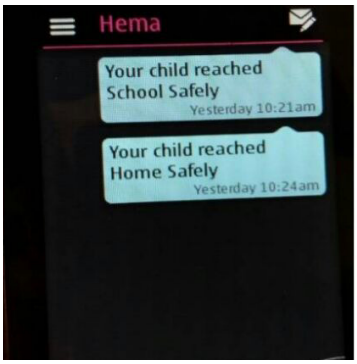
Experimental results:

The result will be displayed in the phones of the parents and the link that are given below has showing the current location of the bus.

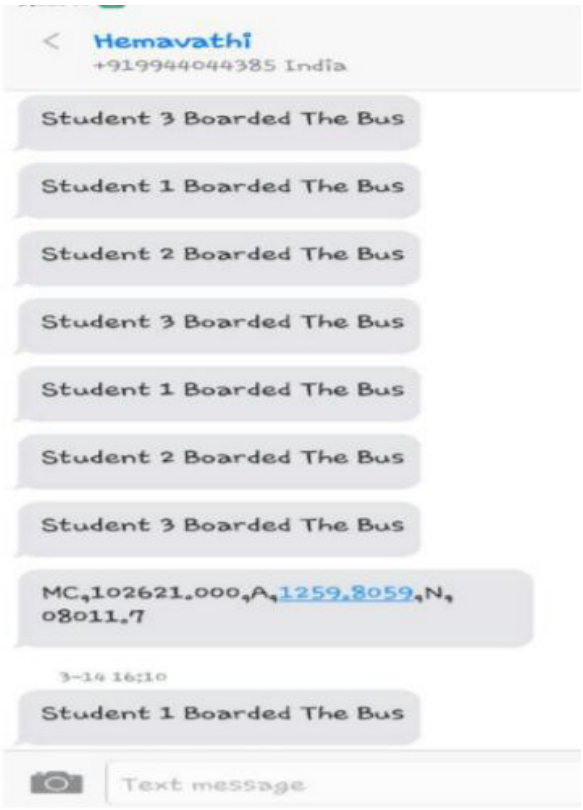




The location is seen here by using GPS.



When the children arrived to the school these message will be send to the parent phones



When the child boarded into the bus these message will send to the management of the school

Conclusion:

This system is used to detect the children while enter(or) exit from the bus, updates the attendance during daily journeyof children to and from the school by sending SMS to parent and school server using GSM. By using ultrasonic sensor we prevent the occurrance of accidents.

References:

1) Kohno, E.; Kojima, H.; Inoue, S.; Ohta , T.; Kakuda, Y.; Ito, 2011 10th International Symposium on , vol., no., pp.339,342, 23-27 March 2011,Autonomous Decentralized Systems (ISADS), "A Self-Configurable New creation Children Tracking System Consisting of Android Mobile Terminals Based on Mobile Ad Hoc Networks," .

2)Selvakumar ,J .Saranya, J., "Implementation of children tracking system on android mobile terminals,", 2013 International Conference on, vol., no., pp.961, 965, 3-5 April 2014,Communications and Signal Processing (ICCSP).

3) Melanie Ganzhorn, J. P. Frederik Diederichs, B- etina Weber, (2011)"Experimental assessment of ITST based School Bus Stop Notifications".