



Student Monitoring and Security System over IOT

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Abstract: Present day world struggles a lot to provide security to students in the light of increasing child abusing and road accidents. We are here introducing, a student monitoring and security system in school bus which assist the parents to monitor their child anywhere from the world by using modern communication technologies and Internet Of Things [IOT]. By using a GSM-GPS module parents can track the child anywhere from the world. RFID module takes attendance and student details. It is then send to parents. Thus parents can keep record of their kid details. The security system prevents drunk and drive mechanism and over speeding.

Keywords: Short Message Service (SMS), Integrated Circuit (IC), Radio Frequency Identification (RFID), Global System for Mobile Communication (GSM), Global Positioning System (GPS)

I. INTRODUCTION

Safety and security are the major challenges faced by the children or school students in the present day world. School bus plays an essential role in carrying most of children everyday all over the world. While there are several problems that might disturb the parents with respect to the travel of school going kids; the paper aspires to look into initiating the safety with respect of school buses through bus tracking and security system that will help the school kids transportation in a protected and more secure way. The circumstance of forgetting kids on the bus is one of the problems suffered, that has risen considerably in recent years. This has often led to the demise of many students due to suffocation. An article [1] published in India says in every eight minutes a child goes missing as data published by national crime records bureau. Statistical report says that around 50,000 children go missing every year from which 42 percent children are not found. This system, through entry and exit recordings, intends to create an appropriate environment via following certain set of criteria of security and wellbeing for the school transport that will have a positive impact on the student and their family. Also drunken driving is a major factor for road accidents. Recently an article [2] was published in The Indian Express news-paper titled "Five children injured after drunk driver rams school bus into railing of bridge ".The driver of the bus was drunk. Police booked him for negligent driving. This shows that even school bus is not safe from the drunken drivers. Thinking of this, the system is also equipped with alcohol sensor which is integrated on the steering wheel and will sense the percentage of alcohol in the air. If the concentration of alcohol in air is found above some prescribed limit; then the ignition is cut off and the driver will not be able to drive the bus thus keeping the students safe. The paper also suggests a bus safety mechanism which is designed to count the entry/exit of students from the bus. The system does various tasks, such as recognizing unique information of each student using RFID tag, which will interchange the data with the RFID reader by means of radio waves or finger print sensor which will interact with the microcontroller and display each student's name on the screen .the parents will get message if their children entered the bus. Also they can track the bus location through a GPS-GSM module connected with the bus.

II. RELATED WORKS

The most related work regarding the issue intended by this project is presented in this segment. In [3], the author Saranya proposes a framework that traces location of youngsters using a child module that transmits the following data to a database and a cell phone. The drawback of this framework is that the module may not be suitable for children and wide-scale deployment is costly.

A paper [4], by Mori recommends a system that uses Bluetooth technology to form clusters and communicate among them using android terminals. The major failure of this technique is high deployment cost.



In paper [5] this kind of tracking units can be connected with a cell phone application which alarms the parents if their kid went outside a range defined by them. If the child walked outside this range, the unit will send an alert to the parents. In addition, the application sends the location of the kid by using a geographical map. One of the down sides of this type of applications is that they work in a limited scope.

Paper [6], presents a system using biometric features for e.g. the school children track biometric system, while entering into the bus pupils scan their palms across a palm reader. To replicate the palm's specific pattern, palm reader uses IR light. For cross-verification the results of scanned palms are sent against original patterns stored in secure database. The inconvenience is that it is manual and small kids feels difficult to place their palms correctly on the scanner.

A paper [7] titled "SMS Based Kids Tracking and Safety System by Using RFID and GSM" by Nitin Shyam proposes using two different modules for tracking the child with the help of RFID, GSM and GPS. One module is to be carried by the child and the other module is fitted in the bus. The problem with this system is it uses two different modules to keep track of the child. It increases the operational cost of the overall system and also it is not feasible for the child to carry an extra kit every time he goes to the school.

Khaleed Shaban in his paper titled [8] "Smart Tracking System for School Buses Using Passive RFID Technology to Enhance Child Safety" adopted RFID Technology to safeguard the children from wrong identification of their destination location, method to curtail the students sleeping in the bus its self without leaving to classes. This paper also focused to provide the security to the children from starting location to the destination point with applied RF technology. This seems to be a good solution for keeping a track of the child; but it lacked with some of the security mechanisms that should have been included like prevention of drunken people to drive the school bus.

Paper [10] proposes RFID Based College Institute Student Identification all applicable (Attendance, Mark sheet, Fee) Management System that would allow fast transaction flow and benefits by adding properties of traceability and security. This system is based on RFID readers and passive RFID tags that are able to electronically store information that can be read with the help of the RFID reader. This system would be able to issue via RFID tags and also calculates the corresponding Student database using PC Maintain based IOT System through the Student Details Sent Parents Mobile Number SMS or MAIL and Alert System. This project is lacking the tracking facility for parents to track child location.

III. BLOCK DIAGRAM

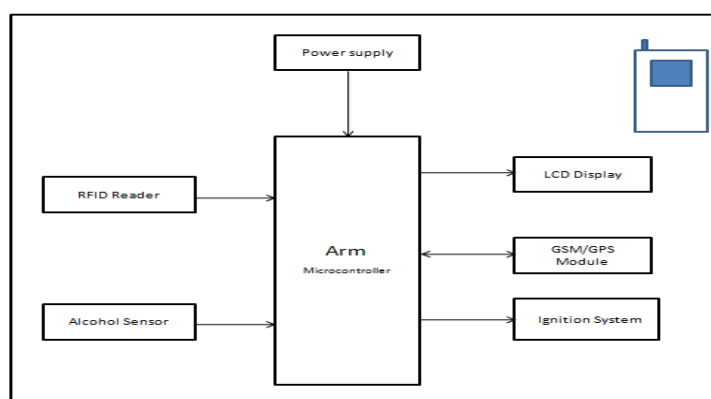


Fig.1: system block diagram

The system block diagram can be explained using fig.1. Arm microcontroller is the main component of this system which co-ordinates all the functions. A 5/3.3V supply is needed to energize Arm controller board. Sensors can be directly connected to the port of Arm controller. Alcohol sensor is connected in such a manner. Alcohol sensor on reading analogue signal, a digital signal is sending to arm controller. Driver of the bus is found alcoholic, if the concentration of alcohol is above the prescribed limit. Then the bus will not move forward. For this purpose controller has a control over vehicle ignition system using a relay. This relay will cut-off the ignition system. The RFID reader reads the RFID tags which stores electromagnetically the information of individuals. This then communicate with the controller. Each time when tag is read, student details are displayed in the LCD display. The GSM/GPS module communicates with controller using UART. SMS based communication is present between GSM module and mobile phones.



IV. FLOWCHART AND ALGORITHM

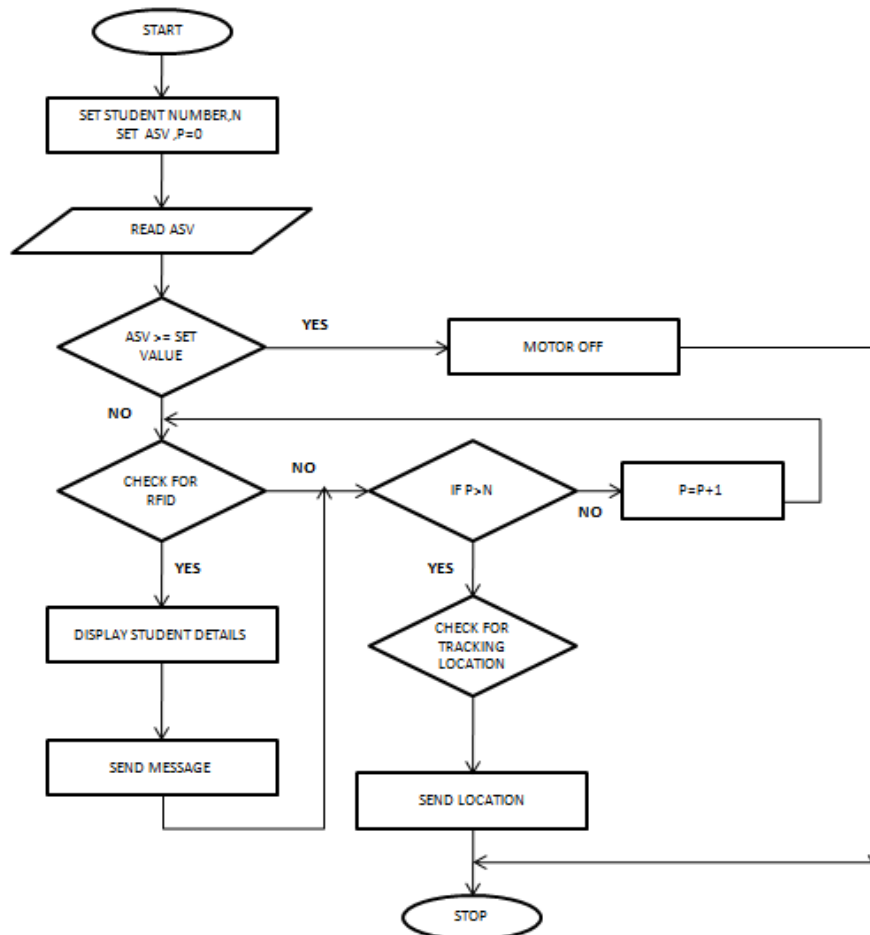


Fig. 2. System flowchart

ALGORITHM

- Step1: Start
- Step2: Set student number as N , Alcoholic Sensor Value (ASV) , initialize student number P=0
- Step3: Read Alcoholic Sensor Value
- Step4: Check whether ASV greater or equal to Set value
- Step5: If yes then put off the motor and go to step 13
- Step6: Check for RFID
- Step7: If no then go to step 10
- Step8: display student details and then send message to parents
- Step9: Check for P greater or equal to N
- Step10: If no then increment p
- Step11: Check for location tracking
- Step12: If yes send location to parents and go to step 13
- Step13: Stop

V. HARDWARE DESCRIPTION

The hardware of the technology is shown in fig.3. Alcohol sensor is placed on the steering wheel of the bus. It can sense even trace amount of alcohol. If alcohol content is Greater than .05mg/L Arm controller will send a signal to cut-off ignition of the bus. Thus bus will not get started. Bus will get started only if driver is non alcoholic. This will prevent drunk and drive mechanism and thus ensure security of students in the bus. RFID reader is placed near the entrance of



bus. Each time when student entering and leaving the bus, they need to swipe the unique RFID tag given as ID card to them. Each time when tag is read, SMS is send to registered parent's mobile phone and at the same time it is stored in the controller memory such that it can be used for future verification. LCD display will display student name and time of entrance/boarding of the student. GPS/GSM module sends SMS to parent's mobile number that their ward is present in the bus. Also it provides tracking facility to track the school bus. Thereby Parent's can ensure the safety of their child inside school bus.

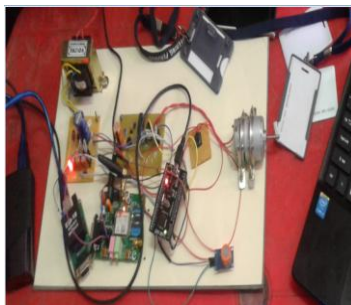


Fig.3: Hardware of the system

In this system we are utilising the benefits of IOT [Internet of Things]. The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Here controller to mobile phone communication using GSM module takes place without the help of human interaction and it is by using wide network connection. That is why parents can track their child anywhere from the world. In this paper major technologies used are RFID technology, microcontroller, alcohol sensor and GSM / GPS module. Radio-Frequency Identification is the use of radio waves to read, capture, and interact with information stored on a tag. Tags are usually attached to objects, and can be read from several feet away. Furthermore, the tag doesn't always have to be in the direct line-of-sight to initiate interaction. An RFID tag is an easy way to assign a unique identity to an object. In principle an RFID tag works as follows: the reading unit generates an electro-magnetic field which induces a current into the tag's antenna. The current is used to power the chip. In passive tags the current also charges a condenser which assures uninterrupted power for the chip. In active tags a battery replaces the condenser. The difference between active and passive tags is explained shortly. Once activated the tag receives commands from the reading unit and replies by sending its serial number or the requested information. In general the tag does not have enough energy to create its own electro-magnetic field, instead it uses back scattering to modulate (reflect/absorb) the field sent by the reading unit. Because most fluids absorb electromagnetic fields and most metal reflect those fields the reading of tags in presence of those materials is complicated. During a reading cycle, the reader has to continuously power the tag. The created field is called continuous wave, and because the strength of the field decreases with the square of the distance the readers have to use a rather large power. That field overpowers any response a tag could give, so therefore tags reply on side-channels which are located directly below and above the frequency of the continuous wave. Fig.4 shows the working of RFID technology.

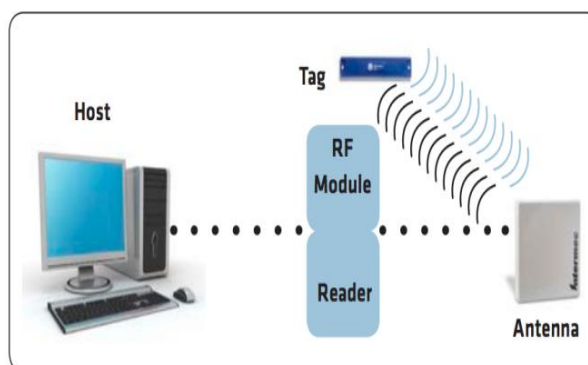


Fig.4. Working of RFID Technology

Sometimes referred to as an embedded controller or Microcontroller Unit (MCU), microcontrollers are found in vehicles, robots, office machines, medical devices, mobile radio transceivers, vending machines and home appliances



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among other devices. Brain of microcontroller is named as CPU. CPU is the device which is utilized to gather information, translate it and at the end finish the assigned task successfully. With the assistance of CPU all the components of microcontroller is connected into a single system. Guidelines given by the programmable memory is decoded by the CPU. A microcomputer is nothing but a computer having microprocessor as CPU, besides I/O devices. In this project, ARMLPC2148 microcontroller is used. LPC2148 has 32kB on chip SRAM and 512 kB on chip FLASH memory. It has inbuilt support up to 2kB end point USB RAM also. This huge amount of memory is well suited for almost all the applications. LPC 2148 has two I/O Ports each of 32 bit wide giving us total 64 I/O Pins. Ports are named as P0 and P1. Pins of each port are labelled as PX.Y where X stands for port number, 0 or 1 where else Y stands for pin number 0 to 31. Each pin can perform alternate functions also. The pin diagram is shown in fig. 5.

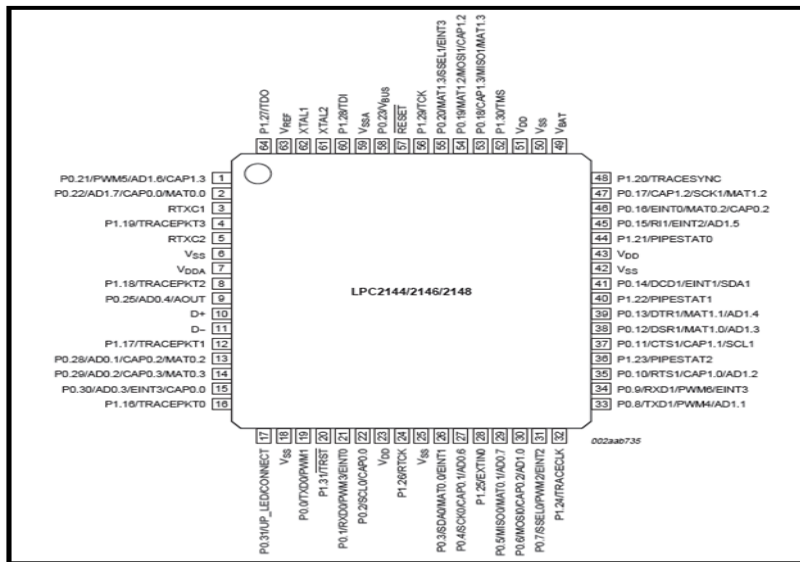


Fig.5. Pin Diagram for ARM Microcontroller

MQ 3 alcohol sensor is suitable for detecting alcohol concentration of breath. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO₂, whose conductivity is lower in clean air. It's conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. This module provides both digital and analog outputs. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, and Raspberry Pi etc. It have good sensitivity to alcohol gas , long life, low cost and simple drive circuit. SIM808 module is a complete Quad-Band GSM/GPRS module which combines GPS technology for satellite navigation. Fig.6 shows the Sim808 module. The compact design which integrated GPRS and GPS in a SMT package will significantly save both time and costs for customers to develop GPS enabled applications. Featuring an industry-standard interface and GPS function, it allows variable assets to be tracked seamlessly at any location and anytime with signal coverage. It has high GPS receive sensitivity with 22 tracking and 66 acquisition receiver channels. Besides, it supports A-GPS that available for indoor localization, and it also supports for Bluetooth 4.0.



Fig.6:Sim808 module



VI. CONCLUSION

Present day world is getting unsafe for children. Many cases of kidnapping and child abuse are reporting day by day. In light of this, our proposal is very suitable for monitoring students on their way to school and back. Modern technologies like RFID suitably controlled and data's are sending to mobile phones of parent by utilizing IOT. This proposal eliminates the need of supervising and tracing the pupils during their drive to and from school. In addition to this, a drunk and drive prevention mechanism ensures safety to child inside school bus and safe and smooth ride in roads. Also this system can be made practical cost effectively.

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