School Children Identification and Transport Tracking using RFID

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Abstract:

This project presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during the daily transportation from and to school. The bus unit the system is used to detect when a child boards or leaves the bus. This information is communicated to the parent that identifies which of the children did not board or leave the bus and issues an alert message accordingly. The system has a developed application that facilities its management and provides useful information about the children to authorized personal. A complete prototype of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for daily transportation safety.

Introduction:

School buses transfer millions of children daily in various countries around the world. While there many issues that might disturb the parents regarding the travel safety of school going children, the paper intends to look into introducing access safety in respect of school buses through bus tracking system that will help the school children's transportation in a secure and safer way.

The supervision of the regularity of students during their entry and exit from the bus is difficult to be controlled by drivers, which led to endangering child safety. The phenomenon of forgetting kids on the bus is one of the problems suffered by the children, which has increased significantly in recent years. This has often led to the death of many students on account of suffocation due to the lack of attention of derivers. This project, through entry and exit recordings, aims to create a suitable environment by following certain set of criteria of security and safety for school bus that will have a positive impact on the student and their family.

Existing system:

This section presents the most related work to the problem addressed by this paper. This system is proposed to track the children using a child module that transmits the tracking information to a database and a mobile device. The disadvantages of this system are that the module may not be convenient for children and wide-scale deployment is expensive. This reports tracking system that utilizes Android terminals that communicate among themselves using Bluetooth technology to form clusters. The clusters communicate the relevant information using WLAN. The major drawback of this system is that the deployment cost is high. There are commercial systems for tracking children such as Bluetooth-based tracking devices which are designed to be worn by children as a bracelet or a necklace. In this type of tracking, these devices can be connected with a mobile application and can alert the parents if their child went outside a

range specified by them. If the child walked outside this range, the device will send an alert to the parent. In addition, the application sends the location of the child by using a geographical map. One disadvantage of this type of applications is that they work only in a limited range. Other products may rely on biometric features such as the Kid track biometric system in which the children scan their palms across a palm reader when they enter the bus. It uses an infrared light to image the palm unique pattern. It uses green and red LEDs to ensure the scan works. Then, the scans are sent for cross-referencing against a secure database of preregistered users' patterns. Based on this, the administration can find the information of that bus, where and when it tracked the child, and where the bus was at that time. The disadvantages of this approach is that it is not automatic and difficult for young children to place their palms correctly on the scanner. This may lead to inaccurate data if the scanner did not detect a child's palm.
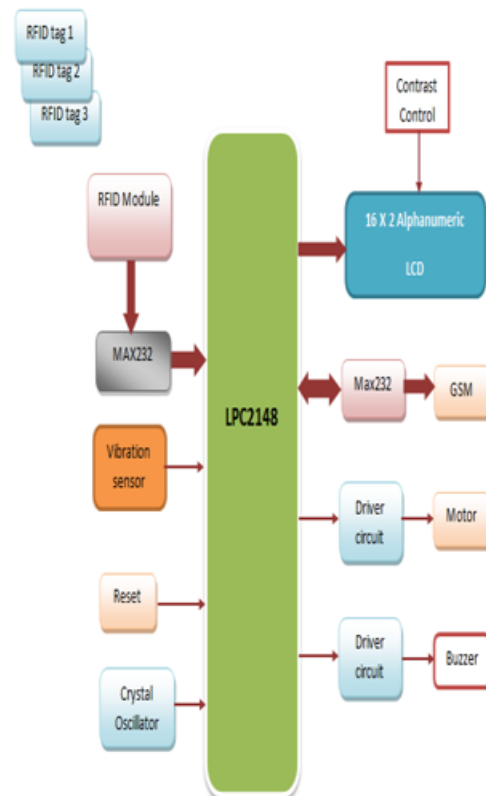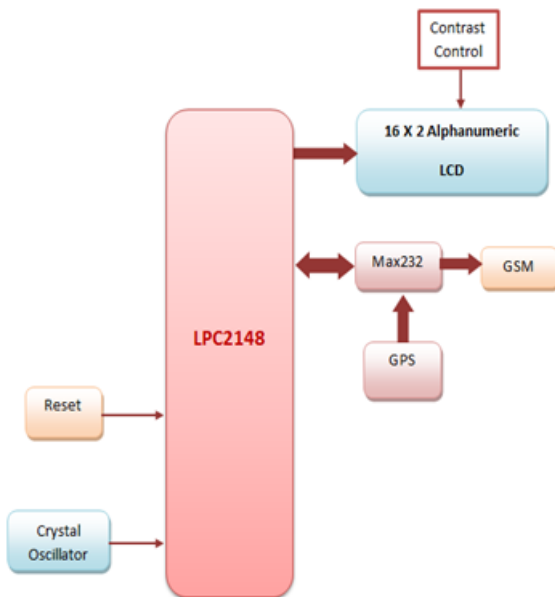
Proposed system:

The system has a developed application that facilities its management and provides useful information about the children to authorized personal. A complete prototype of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for daily transportation safety. This project is mastered with LPC2148 for which RFID module is interfaced to identify a child with unique ID card. Immediately an SMS will be sent to the parent while entering and leaving the bus when card was shown. So that parent can know the details of children's presence / absence with ease. Parent can also know about the bus location. Upon request an SMS will be sent to the parent about the bus location. Any accident occurred to the vehicle will also be identified using vibration sensor. In that case vehicle stops with a buzzer alert and SMS will be sent in this situation. Here the vehicle is represented with DC motor. This tracking system is composed of a GPS receiver, LPC2148 and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude.

The LPC2148 processes this information and this processed information is sent to the user/owner using GSM modem. This application is a low cost solution for automobile position and status, very useful in case of car theft situations, for monitoring adolescent drivers by their parents as well as in car tracking system applications. This can be used in other types of application, where the information needed is requested rarely and at irregular period of time (when requested).

BLOCK DIAGRAM:

Hardware module used in this project

LPC2148

Key features

- 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
- 8 kb to 40 kb of on-chip static RAM and 32 kb to 512 kb of on-chip flash memory.

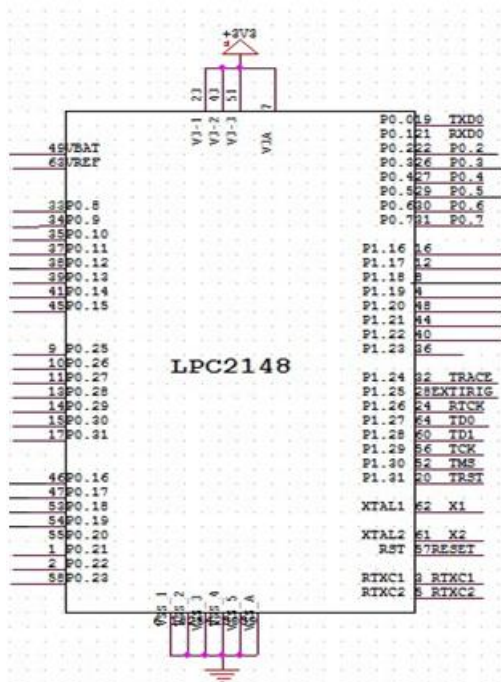- 128-bit wide interface/accelerator enables high-speed 60 MHz operation.

- In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader
- Software. Single flash sector or full chip erase in 400 ms and programming of
- 256 bytes in 1 ms.
- Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the
- On-chip Real Monitor software and high-speed tracing of instruction execution.
- USB 2.0 Full-speed compliant device controller with 2 kb of endpoint RAM.
- In addition, the LPC2146/48 provides 8 kb of on-chip RAM accessible to USB by DMA.
- One or two (LPC2141/42 vs. LPC2144/46/48) 10-bit ADCs provide a total of 6/14

RFID:

Radio-frequency identification (RFID) is the use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies).

GSM:

MODEM SPECIFICATIONS:

The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design.

- SIM900 is designed with a very powerful single-chip processor integrating AMR926EJ-S core
- Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm SMT type suit for customer application.
- An embedded Powerful TCP/IP protocol stack
- Based upon mature and field-proven platform, backed up by our support**&** service, from definition to design and production

GPS:

- The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations.
- GPS uses these "man-made stars" as reference points to calculate positions accurate to a matter of meters. In fact, with advanced forms of GPS you can make measurements to better than a centimeter! In a sense it's like giving every square meter on the planet a unique address. GPS receivers have been miniaturized to just a few integrated circuits and so are becoming very economical. And that makes the technology accessible to virtually everyone. These days GPS is finding its way into cars, boats, planes, construction equipment, movie making gear, farm machinery, even laptop computers. Soon GPS will become almost as basic as the telephone. Indeed, at Trimble, we think it just may become a universal utility.


Vibration Sensor:

A vibration sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, strain or force by converting them to an electrical charge. The prefix piezo- is Greek for 'press' or 'squeeze'.

Buzzer:

The piezo buzzer produces sound based on reverse of the pizeo electric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle. Most buzzers produce sound in the range of 2 to 4 kHz.

Interfacing Diagram:
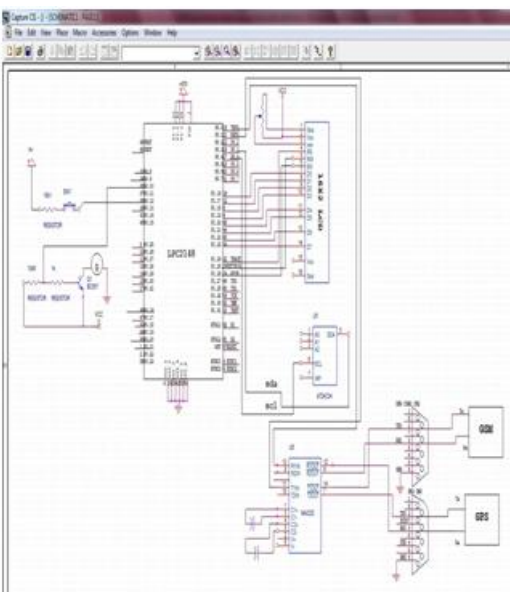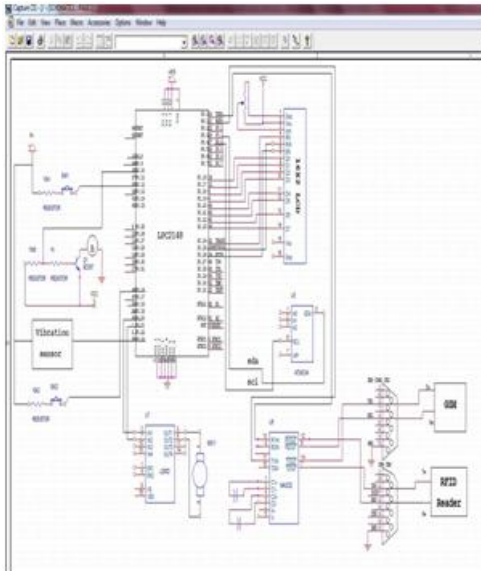
Software Tools:

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.
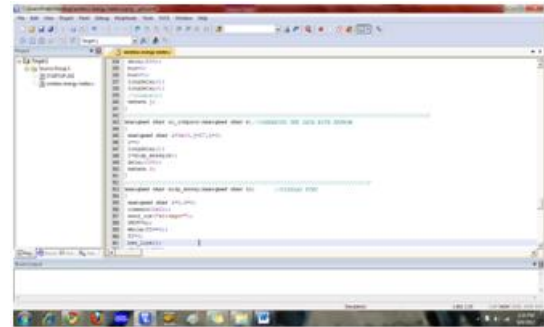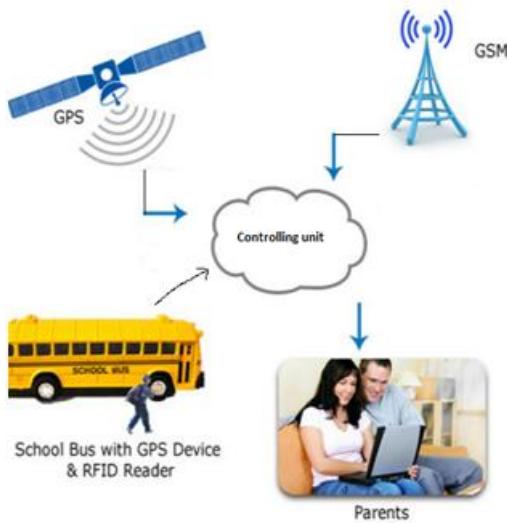

Flash Magic:

Flash Magic is a tool which is used to program hex code in EEPROM of micro-controller. It is a freeware tool. It only supports the micro-controller of Philips and NXP. It can burn a hex code into that controller which supports ISP (in system programming) feature. Flash magic supports several chips like ARM Cortex M0, M3, M4, ARM7 and 8051.

Applications:

- Industries are using finger print modems for access control, Stores, attendance recording, and machine operation authentication.
- Banks and ATM
- Voter Identification and electoral enrollment

School Bus with GPS Device & RFID Reader

Results:

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Conclusion:

In this project work, we have studied and implemented a complete working model using a Microcontroller. The programming and interfacing of microcontroller has been mastered during the implementation. This work includes the study of GSM,GPS & RFID modules.

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[1] C. Kumar, "RFID based embedded system for vehicle tracking and prevention of road accident". International Journal of Engineering Research-, Vol.1, No. 6, pp3-5, 2012.