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RFID-BASED SYSTEM FOR SCHOOL CHILDREN TRANSPORTATION SAFETY ENHANCEMENT

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Abstract— The aim of the project is to design a transportation safety system for school children based on RFID technology. Existing Systems: The existing technology over school transportation and child safety system do not exercise any advance technological in electronic devices that may acknowledge the child parent about the arrival of their child to school, the parents are unaware about the information whether their child has attended the school or not, so to eliminate this problem , we design a RFID Based System for school children transportation and safety enhancement that confer an acknowledgment message to the respected parents about the child's arrival to the school at the boarding point itself. The proposed system utilizes RFID Technology, GPS Technology and GSM Technology and all together integrated into a single system which results in advanced and sensible implementation. This system would be much flexible and reliable with respect to its functionality, since the design includes both RFID and GSM systems for communication

INTRODUCTION

This project aims at providing better safety to the school children by means of monitoring their boarding and departure from the transportation vehicle i.e. bus with the help of RFID detectors. This system can be used for providing assurance to the parents about the safety of their children from the schools. Discipline can be instilled in the school children during the transportation which at times is not possible through human supervision alone. The system should provide an economic means for the school transportation system to monitor and enhance the safety of school children during transportation. The paper proposed a bus safety system which was designed to control the entering/exiting of students from the bus. This system does several tasks, including identifying personal information (Eg. Name) of each student using RFID tag, which will exchange the data with the RFID reader via radio waves and displaying each student name into LCD display. This will let the driver to know the number of students inside the bus and the students who departed from the bus. Moreover, the system has an emergency system that will alert in case if there is a child inside the bus after the bus stops at the destination by sending an SMS to the school management via GSM modem. In addition, if the bus depart and arrive successful from the source to destination, it will inform the management through an SMS about its successful departure and arrival. The key novel feature of the proposed methodology is the use of energy efficient systems to support the tasks. Though not within strictly in the scope, the same data can be used to assess the time of departure and arrival, number of students travels each day.

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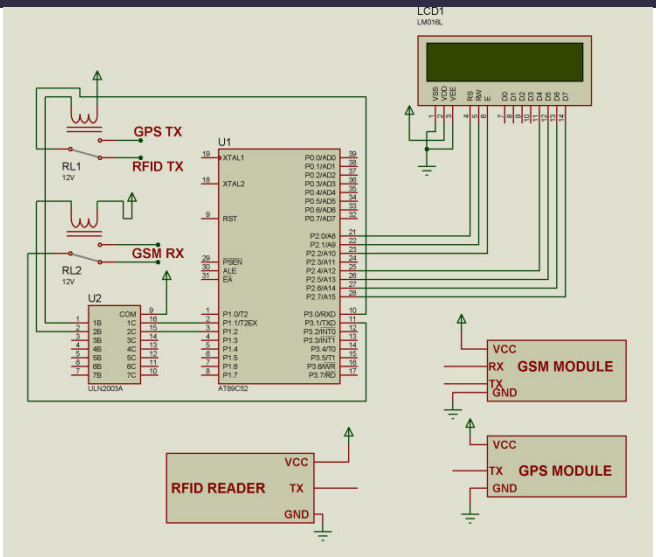

Definition of GSM:

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service).

GSM Frequencies

GSM networks operate in a number of different frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G). Most 2G GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas (including Canada and the United States) use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. Most 3G GSM networks in Europe operate in the 2100 MHz frequency band. The rarer 400 and 450 MHz frequency bands are assigned in some countries where these frequencies were previously used for first-generation systems.

Terrestrial GSM networks now cover more than 80% of the world's population. GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available.

Mobile Telephony Standards

Standard	Generation	Frequency band	Throughput	
GSM	2G	Allows transfer of voice or low-volume digital data.	9.6 kbps	9.6 kbps
GPRS	2.5G	Allows transfer of voice or moderate-volume digital data.	21.4-171.2 kbps	48 kbps
EDGE	2.75G	Allows simultaneous transfer of voice and digital data.	43.2-345.6 kbps	171 kbps
UMTS	3G	Allows simultaneous transfer of voice and high-speed digital data.	0.144-2 Mbps	384 kbps

LITERATURE SURVEY

The disadvantages of this system are that the module may not be convenient for children and wide-scale deployment is expensive. Authors in report a 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 [6]. 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 pre-registered 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.

RELATED WORK

RFID (Radio Frequency Identification):

Radio Frequency Identification (RFID) technology has been attracting considerable attention with the expectation of improved supply chain visibility for both suppliers and retailers. It will also improve the consumer shopping experience by making it more likely that the products they want to purchase are available.

What is RFID?

RFID (Radio Frequency Identification) is a method of identifying unique items using radio waves. Typical RFID systems are made up of 2 major components: readers and tags. The reader, sometimes called the interrogator, sends and receives RF data to and from the tag via antennas. A reader may have multiple antennas that are responsible for sending and receiving the radio waves. The tag, or transponder, is made up of the microchip that stores the data, an antenna, and a carrier to which the chip and antenna are mounted.

RFID technology is used today in many applications, including security and access control, transportation and supply chain tracking. It is a technology that works well for collecting multiple pieces of data on items for tracking and counting purposes in a cooperative environment.

Is All RFID Created Equal?

There are many different versions of RFID that operate at different radio frequencies. The choice of frequency is dependent on the requirements of the application.

Three primary frequency bands have been allocated for RFID use.

Low Frequency (125/134 KHz):

Most commonly used for access control and asset tracking.

Mid-Frequency (13.56 MHz):

Used where medium data rate and read ranges are required.

Ultra High-Frequency (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz): offer the longest read ranges and high reading speeds.

How Will RFID Affect Our Industry?

RFID is expected to provide huge advantages to manufacturers by offering the tools to better plan production and respond more quickly to market demand. It will facilitate automation of inventory counts and speed shipping and receiving at the distribution level. For retailers, it will help to reduce stock-outs, enable product tracking and potentially reduce theft and streamline the POS function. RFID will also open other merchandising opportunities and help with the overall consumer buying experience.

The Electronic Product Code (EPC)

The EPC is a number made up of a header and 3 sets of data as shown in the figure below. The header identifies the EPC version number – which will allow for different lengths or types of EPC later on. The second part of the number identifies the EPC manager – typically this would be the manufacturer of the item the EPC is attached to. The third part is called object class and refers to the exact type of product– most often the stock-keeping unit (SKU). The fourth series of numbers is the serial number that is unique to the item. (The second and third sets of data are similar in function to the numbers in UPC barcodes.)

Above is an example of a 96-bit EPC. It will allow sufficient capacity for 268 million companies. Each manufacturer will have the ability to create up to 16 million object classes with 68 billion serial numbers in each class. The following are some of the issues that require close scrutiny when investigating RFID:

Tag Cost – This should not to be confused with chip cost. Although the goal is tobring the cost of the tag (chip and antenna) down to 5 cents, this

goal is in the future since it both assumes manufacturing breakthroughs and is predicated on consumption in the billions of tags per year.

Tag Size – Tag size is dependent on the read range desired. Although the chips arevery tiny, they will not operate without being mounted to an antenna. The size of the antenna will determine the read distance performance of the tag so understanding the size of the antenna needed for the application is more important than the size of the chip alone.

Infrastructure Cost – Much focus appears to be placed on the tag cost since it is arecurring expenditure. Reader cost and infrastructure costs for implementing RFID must also be looked at very closely as well.

Read Distances – Read distances for RFID are very much dependent on thefrequency chosen for the application. Tag orientation also affects the read range as the range diminishes as the tag is rotated frombeing perpendicular to the path to the reader.

Government Regulation – Governments around the world regulate the use of thefrequency spectrum. Different countries have already assigned certain parts of the spectrum for other uses and as a result, there is virtually no part of the spectrum that is available everywhere in the world for use by RFID. This means that a RFID tag may not work in all countries

Anti-Collision – This is an important feature of RFID chips/readers since it will allowmultiple tags to be read while grouped in one reader field. It is not available on all RFID tags but is an important feature if you are planning to use RFID for inventory counts, shipping and receiving where multiple tags need to be read at the same time.

CONCLUSION

This project is based on using RFID-basedtagging and wireless communication technology to develop a system to enhance safe and secure school transportation of children. The on boarding and off boarding of children wearing RFID tags can be detected by a RFID-based detection unit placed inside the transportation bus. This detected data can then be communicated to database servers via a GSM modem wirelessly. Using this data one can identify who has boarded the bus and if any, are left behind. The database can be monitored or viewed by the school administration and parents. This automation helps both the school management and parents to easily monitor the child attendance at the school and also securing their safe transportation back to their residence.

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