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SMART SCHOOL BUS AND SAFETY SYSTEM

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ABSTRACT

Millions of children need to be moved from home to school and vice versa every day. Safer transportation of school children has been a critical issue as it is often observed that, kids find themselves locked in the school bus at the bus stop after going to school, they miss the bus, or ride the wrong bus with no way to track them. This research tested the applicability of radio frequency identification (RFID) technology in tracking and monitoring children during their trip to and from school on school buses. Also most of the school buses get accident because no proper safety measures are taken especially at curves and hair pin bends humps. This system can be used for prevention of such problem by indicating a pre indication and also reducing the speed of bus by reducing the fuel rate of bus. As the action is in terms of fuel rate so the bus automatically goes to control and avoids accidents. This speed reduction is done by using RF technology. When a complete prototype of the proposed system is implemented, the system will promise safer transportation of school children.

INTRODUCTION

THIS paper presents a system to monitor pick-up/drop-off of school childrento enhance the safety of children during the daily transportation from and to school. For parents, obtaining a safe transport for their children is a crucial issue. The students ride their bicycles, take buses, and arrive in vehicles with one purpose getting to and from school Safety. In this paper, we focus on a particular risk associated with the daily bus trip to and from school. There have been previous incidents where a child is forgotten in the bus and eventually die because of suffocation .To improve transportation safety, some schools employ a bus supervisor to look after the children inside the bus. Nonetheless, human oversight or supervisor absence may still lead to a heartbreaking ending as in the previously cited stories. The paper proposed a bus safety system which was designed to control the entering and exiting of students from the bus. Also controls the speed of school bus to avoid accidents. The system aims at automatically detecting when a child boards or leaves the bus and issue an alert message when child doesn't board or leave the bus to reduce the parent's concerns about using the bus for the daily transport of their children without being lost or forgotten. And also gives alert to the students about their respective stops while returned from school. RF transmitter and receiver are used to control the speed of school bus at curves and humps. A camera is used to monitor the surroundings when hump or turning detected.The camera is connected using a relay circuit. Because the camera needed to turn on when only the hump or turning detected.An IR IN-OUT counter is used to count the number of students in the bus to avoid the overpacking of children. If the number of students is greater then the seat capacity value, then system will pass the information to the authorities by giving the entire data of school bus.This IR sensor is also used to detect the presence of students on footstep of the bus.If sensor is detected the presence, then it will alert to the driver by using buzzer and displayed on LCD.

Literature survey

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

Recently in all over the world in every 40 seconds child becomes missing or kidnapped. The increasing prevalence of children wandering has many parents very concerned. We have to see and read many stories about children's or students who are kidnapped or not reaching homes. Most of the stories have had tragic endings. This paper focuses on implementing children tracking location system for every child attendingschool. Nowadays more children getting lost, Sen. Charles Schumer has proposed that the federal government provide funding for tracking devices for Autistic children so they do not go missing. These proposed tracking devices can be worn as wrist watches, anklets or in I -cards. The child module include ARDUINO, Global positioning system , Global system for mobile communication and receiver include parents mobilephone. It is very useful for women safety Designing a child tracking system to assure parents that their child is safe from suspicious actions and happy in school environment. The information of child being missed is sent to respective parents mobile, if they move beyond the coverage area. Also, when child wants to convey that they are in danger than they will press a panic button given on their school i-card. Mobile terminals have wireless local area network (LAN) and Bluetooth device. It adopts bluetooth communication among mobile terminals in every group to collect information and delivers to respective server using wireless LAN.

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

Recently, news of missing children often been reported. Most parents will bring along their kid during shopping and travelling. There are also several unsolved cases especially on missing children cases due to the parents are unaware of the time of the disappearance of their child. Today's enhancement of sophisticated developing technology, to countermeasure this child missing cases, a child-tracking system is developed to help parents monitor their children in public places. This device uses the alarm technique. It will trigger when the Bluetooth connection is disconnected and the GPS application is used to track the location of the child whose wearing this device. The child detector device has 2 main units which is for parents and children. The child's units function as a transmitter that transmits a GPS signal, while the parent's units will receive the signal which will determine the position and distance of their child using their own smartphone. This child detector technology will contribute to child safety so that parents will feel more secure to let their kid out in public The purpose of this project is to develop the system which the Global Positioning System (GPS) can be utilized in various matters. GPS is a satellite navigation system and positioning that can provide location and information about the time around the world without depending on time and weather. GPS operates under the control of the Department of Defense (DoD) which has a control center in the United States. Now GPS can be used to track place, the location of people, vehicles and so on. It can also be detected through applications in a computer or mobile phone [1]. Missing Children are the main reason for the development of this project. The incidence of

missing children is no longer a weird thing in the shopping mall. Children at the age of three to four years require special attention from parents to control their movements. Parents need to be aware of their children to avoid the incidence of missing children in the shopping mall. This is because of leave a child alone can increasing the risk of losing it or lead to kidnapping. Therefore, this project is developed and applied to help the children. To be more practical, Arduino Mega is used as the main microcontroller for an electronic device. In this project, the Arduino also connected with Bluetooth module, GPS module and SIM900 GSM/GPRS shield. The location of missing children will be detected through SMS that sends to the smartphone by using GSM shield. Recently, we often hear news about missing children reported in the media. Parents may not be able to monitor their children all the time, especially when they are going outside the house. This may cause the child to overlook and possibly they will be lost or misguided.This children tracking system is developed to help parents or guardians to protect their children safety, especially when in public. This device is to replace the conventional method of monitoring the child safety in public The use of this children tracking system is important to avoid undesirable things happen. This is the reason to develop this project for children security.

Shu, C., "Guardian Uses Bluetooth Low Energy Tech To Keep Your Child Safe" Available at: http://techcrunch.com/2013/10/09/guardian-usesbluetooth-low-energy-tech-to-keep-your-child-safe/

Bluetooth Low Energy (BLE) is an innovative technique that was firstly employed in Bluetooth 4.0 and is being applied in the Bluetooth 5.0 and 5.2 technologies. Bluetooth 5.0 and 5.2 technologies are now widely used in all kinds of electronic communication equipment (e.g., PCs, tablets, smartphones, wearable devices). BLE has the capacity to minimize the power consumption and equipment cost in the low-power devices, which becomes a competitive scheme among the huge number of standard wireless transmission techniques already existing in everyday life for a large number of applications. As one of the available solutions in wireless transmission, Bluetooth technology equipped with the BLE module is very suitable for developing internet of things (IoTs) technology, which is gaining more and more interest. This paper briefly introduces the modulation and encoding of the BLE standard in the physical layer (PHY). The applications of cyclic redundancy check (CRC) in BLE are then presented. Moreover, the main characteristics, including the maximum reachable range, transmission latency, and power consumption of BLE, are also introduced. The concept of the internet of things (IoTs) was firstly presented by the International Telecommunication Union (ITU) in 2005 [1], and a conventional and universally recognized concept of IoTs was established until 2009. In the past decade, great progress has been made on IoTs. The new technology of connecting sensors with the existing Internet is rapidly spreading. The intelligent recognition and management of industry are gradually realizing, and the real-world objects are transformed into intelligent virtual objects. The goal of IoTs is to unify everything connected with the Internet (e.g., intelligent furniture, intelligent traffic network, intelligent medical, intelligent grid, intelligent logistics, intelligent car, and intelligent agriculture). Under a common infrastructure through the small, compact, and embedded sensors, wireless transmission between these sensors and the base stations (BSs) plays an important role. There are many wireless transmission solutions, such as IEEE 802.11 (WiFi) technology, ZigBee, Bluetooth Classic, and Bluetooth Low Energy (BLE). Though the WiFi technology can achieve high data rate transmission, it brings great power consumption. Moreover, compared with the BLE technology,

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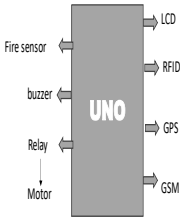
WiFi is inconvenient from the perspective of device connection. BLE merging together lowenergy consumption and widespread diffusion is developed by the Bluetooth Special Interest Group (SIG) as an innovative technology. It has become one of the main technologies to promote the development of the IoT [2,3]. The Bluetooth was first named by Jim Kardach, which aimed to become a unified and universal transmission standard and connect all disparate devices and content. The real development of Bluetooth started in World War II. The core of Bluetooth is short-range radio communication. Its foundation comes from the frequency hopping spread spectrum (FHSS) technology that was not recognized until the end of the last century. In 1999, Bluetooth 1.0 was published by the Bluetooth Special Interest Group (SIG), which was an early exploration achievement of short-range communication. However, Bluetooth 1.0 was buried due to some unsolved problems, e.g., it was difficult to be compatible with some products, and anonymity could not be achieved at the protocol level, which caused the risk of data leakage [4]. In 2004, Bluetooth 2.0 added Enhanced Data Rate (EDR) technology enhanced the ability of multi-tasking and supported multiple Bluetooth devices running simultaneously, and the transmission rate was up to 3Mbps. Moreover, the Bluetooth 2.0 could support the duplex mode, which could transmit documents or high-quality pictures simultaneously for voice communication. In 2009, the core of Bluetooth 3.0 used the new alternating radiofrequency technology Alternate MAC/PHY (AMP). The AMP technology allowed the Bluetooth protocol stack to select the correct radio frequency for any task dynamically. Bluetooth 4.1 and 4.2 integrated three modes, i.e., low-power Bluetooth, traditional Bluetooth, and high-speed Bluetooth, was successfully equipped with BLE [5]. Compared with 4.0, Bluetooth 5.0 greatly improved power consumption, capacity, transmission speed, and coverage Bluetooth 5.2, joined with the latest Low Complexity Communication Codec (LC3), improving the processing speed [7]. However, some problems are still unsolved, such as short coverage and transmission distance, occasional connection failure. Although the data transmission speed of Bluetooth 5.0 has doubled compared with Bluetooth 4.0, the transmission efficiency has not doubled. The limitation of Bluetooth will also become the limitation of the development of the IoT, thus solving the defects of Bluetooth technology will be a key to the technological breakthrough of IoT. BLE enhances the transmission distance as a module used after Bluetooth 4.0 and reduces the long response delay. Meanwhile, it also further reduces the energy consumption based on Bluetooth, thus allowing a button battery to support the operation of the device for several months or even years. BLE mainly uses the CRC check codes. As a widely used check code, CRC is often used in the data link layer to check whether the network packet is wrong or not. If the test result is wrong, the data will be retransmitted. This leads to a waste of time for retransmission once an error occurs. If the check function based on the CRC check code can be optimized, the transmission time will be greatly shortened. This work is organized as follows: Firstly, the modulation and coding performance of BLE at the physical layer (PHY) are discussed, which includes the BLE core and its protocol layer, the BLE work field, the GFSK technology used in PHY, and the new 2M PHY. Then, the main characteristics, e.g., the maximum reachable range, transmission latency, and power consumption of BLE, are presented. Finally, the application principle of CRC check in BLE is presented, and we also give the use area and significance of CRC.

Block diagram



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ARUDINO:

The Arduino is a family of microcontroller boards to simplify electronic design, prototyping and experimenting for artists, hackers, hobbyists, but also many professionals. People use it as brains for their robots, to build new digital music instruments, or to build a system that lets your house plants tweet you when they're dry. Arduinos (we use the standard Arduino Uno) are built around an ATmega microcontroller — essentially a complete computer with CPU, RAM, Flash memory, and input/output pins, all on a single chip. Unlike, say, a Raspberry Pi, it's designed to attach all kinds of sensors, LEDs, small motors and speakers, servos, etc. directly to these pins, which can read in or output digital or analog voltages between 0 and 5 volts. The Arduino connects to your computer via USB, where you program it in a simple language (C/C++, similar to Java) from inside the free Arduino IDE by uploading your compiled code to the board. Once programmed, the Arduino can run with the USB link back to your computer, or stand-alone without it — no keyboard or screen needed, just power.

RFID READER

Active RFID and Passive RFID technologies, while often considered and evaluated together, are fundamentally distinct technologies with substantially different capabilities. In most cases, neither technology provides a complete solution for supply chain asset management applications. Rather, the most effective and complete supply chain solutions leverage the advantages of each technology and combine their use in complementary ways. This need for both technologies must be considered by RFID standards initiatives to effectively meet the requirements of the user community.

GSM (Global System for Mobile communications)

GSM (Global System for Mobile communications) is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. GSM networks operate in four different frequency ranges. Most GSM networks operate in the 900 MHz or 1800 MHz bands. Some countries in the Americas use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated.

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The rarer 400 and 450 MHz frequency bands are assigned in some countries, where these frequencies were previously used for first-generation systems.

GSM-900 uses 890–915 MHz to send information from the mobile station to the base station (uplink) and 935–960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz. Duplex spacing of 45 MHz is used. In some countries the GSM-900 band has been extended to cover a larger frequency range. This 'extended GSM', E-GSM, uses 880–915 MHz (uplink) and 925–960 MHz (downlink), adding 50 channels (channel numbers 975 to 1023 and 0) to the original GSM-900 band. Time division multiplexing is used to allow eight full-rate or sixteen half-rate speech channels per radio frequency channel. There are eight radio timeslots (giving eight burst periods) grouped into what is called a TDMA frame. Half rate channels use alternate frames in the same timeslot. The channel data rate is 270.833 kbit/s, and the frame duration is 4.615 ms.

BUZZERS

In common parlance a Buzzer is a signaling device that is not a loudspeaker. It can be mechanical, electromechanical, or electronic (a piezo transducer). BeStar produces Buzzers in every available configuration for a wide variety of applications. A Piezo transducer can produce the sound for panel mount buzzers, household goods, medical devices and even very loud sirens. When a lower frequency is required an electromagnetic buzzer can fill the need. These are very common in automotive chimes and higher end clinical diagnostic devices. The BeStar buzzer range includes self drive units with their own drive circuitry (indicators), or external drive units, which allow the designer the flexibility to create their own sound patterns.

MOTOR:

A DC motor (Direct Current motor) is the most common type of motor. DC motors normally have just two leads, one positive and one negative. If you connect these two leads directly to a battery, the motor will rotate. If you

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switch the leads, the motor will rotate in the opposite direction.

CONCLUSION

The integration of RFID, GPS and GPRS technologies for safety and security purpose is very important nowadays due to increase in accidents of children gets missed out at the bus which may lead to death due to suffocation. RFID based detection unit locate inside the bus detects the RFID tags worn by children. It then sends relevant data to the system database server. The system checks and detects which child did not board or leave the bus and issues an alert message to this effect. In earlier systems the driver has to monitor the entry and exit of students. The supervision of entry and exit of students is effectively done by RFID mechanism. This system provides overall comfort for the students. In addition, the system reduces the speed of school bus when curves and humps are detected. Therefore we can avoid the accidents due to over speed. T his project is the result of analysis of technologies for the enhancement of safety of transportation of school children. This paper is proposing an idea which provides complete safety of school children at low cost using newer technologies.

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