RFID Based System for School Children Transportation Safety Enhancement

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Abstract: In recent years, the newspapers flashes more news about school children missing, children kidnapped by kidnappers and child abuse. Such crime rate increases due to lack of communication between school management and parents. Safer transportation of the children has been critical issue because it is usually observed that, kids find themselves locked within the bus, or ride the incorrect bus with no way to track them. This project intends to find yet another solution to solve this problem by developing a children safety system that will control the entry and exit of students from the buses through an energy efficient methodology. This project presents a system to watch pick-up, drop-off of the children to reinforce the security of children during the daily transportation from and to their school. This project consists of RFID reader, Switch, ARDUINO NANO microcontroller, GSM modem, Motor door. When they are on-board or leave the bus by using the RFID the message will sent to the parents mobile and school management with the help of GSM modem. When the Switch is used during travel the bus jammed in traffic, the driver will press the switch then message sent to parent mobile, that conveys stating bus delayed to reach destination due to traffic, with the support of GSM modem.

Keywords: RFID (Radio Frequency Identification), GSM modem, system integration, transportation safety, detection.

I. INTRODUCTION

Now day's we live during a huge traffic and a highly dense society, where reaching is arriving a location became harder A system and method whereby school children expecting the arrival of a faculty bus are notified of impending arrival of the bus by means of a radio transmitted signal which activates a visible or audio alarm located in their respective residences. School transport is an important yet most neglected part of schooling. Daily millions of children go to school in India. Their journeys are mostly ignored by their parents, school authorities and even government bodies. It is presumed that they are safe during transportation to school. In many families escorting children to school had been a norm up to recent past. This was the reason we used to get peak traffic densities co-inciding with the school timings.

Active school transport like walking or biking up to escorted school transport to motorized school transport. the best risk to your child isn't riding a bus, but entering or leaving one. Before your child goes back to high school or starts school for the primary time, it's important for you and your child to understand traffic safety rules. Teach your child to follow these practices to form bus transportation safer. Your child should reach the stop a minimum of five minutes before the bus is scheduled to arrive. Visit the stop and show your child where to attend for the bus: a minimum of three giant steps (six feet) far away from the curb. Remind your child that the stop isn't an area to run or play. When the varsity bus arrives, your child should wait until the bus involves an entire stop, the door opens, and therefore the driver says it's okay before approaching the bus door. Your child should use the handrails to avoid falling down. Illegal parking of personal vehicles, mostly two-wheelers, cars and auto rickshaws, has been causing traffic jam near many faculties. Most of those vehicles belong to oldsters who drop and pick their wards. Though students, parents and therefore the public at large are affected, the difficulty remains unattended. Many private schools are located along the arterial roads and important roads within the city.

A frequency transmitter is placed in each bus, with the transmission frequency selected to correspond to a specific path. A frequency receiver is placed within a plurality of selected residences along a path and tuned to receive the frequency like that transmitted by the bus following the route followed by the bus which is to prevent and devour children at that residence.

When the receiver receives the transmitted signal, an audible or visual alarm is activated thereby notifying the occupants of the residence of the approaching arrival of the bus. The sensitivity of every receiver to the transmitted signal may be adjustable in order that the receiver won't activate its alarm until the bus is a certain distance away, thereby reducing to a minimum the quantity of your time the children must wait at the stop, yet giving them sufficient time to remember of the approach of the bus.

The notification system is meant to be used in both urban and rural areas wherein the varsity buses following different routes are going to be equipped with transmitters of respective different frequencies, and therefore the various groups of residences are equipped with receiver's sensitive to an equivalent respective frequencies, counting on the bus which the children living within the residences are to require. RFID-Based System for School Children Transportation Safety Enhancement to ensure parents that their child is safe. Due to the increased vulnerabilities against school student's safety, this system is developed. The students are travelling longer distances to reach their school, where most of the students prefer school transportation. 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 home and school. When the children on board or leave the bus message will send to parent and school management. During travel the bus jammed in traffic, the driver will press the switch then message sent to parent mobile, that conveys stating bus delayed to reach destination due to traffic, with the support of GSM modem.

II. METHODOLOGY

This project aims at providing better security 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 technique are often used for providing assurance to the oldsters about the security of their children from the faculties . Discipline are often instilled within the school children during the transportation which sometimes isn't possible through human supervision alone. The system should provide an cost effective means for the school Transportation system to watch and enhance the security of school children during transportation.

This system consists of following components.

1.ARDUINO NANO

2.LCD display

3.Buzzer

4.RFID tags and Smart labels

5.RFID Reader

6.GSM

The description of the above components are given below.

A. ARDUINO NANO

Arduino Nano might be a little, compatible, flexible and breadboard friendly Microcontroller board, developed by.cc in Italy, supported ATmega328p (Arduino Nano V3.x) / Atmega168 (Arduino Nano V3.x). Arduino Nano Pin out consists of 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins.

Each of these Digital & Analog Pins are assigned with multiple functions but their main function is to be configured as input or output pins. Tiny size and breadboard Arduino friendly nature make this device an ideal choice for several of the applications where a size of the electronic components are of great concern.

Flash memory is 16KB or 32KB that everyone depends on the Atmega board i.e. Atmega168 comes with 16KB of non-volatile storage while Atmega328 comes with a non-volatile storage of 32KB. non-volatile storage is used for storing code. The 2KB of memory out of total non-volatile storage is used for a bootloader

B. LCD DISPLAY

LCD modules are commonly utilized in most embedded projects, the rationale being its cheap price, availability and programmer friendly. most of the people would have encounter these displays in our day to day life, either at PCO's or calculators. the looks and thus the pin outs have already been visualized above now allow us to urge slightly technical.16×2 LCD is known as so because; it's 16 Columns and some of Rows. There are many combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the foremost used one is that the 16×2 LCD. So, it'll have (16×2=32) 32 characters in total and every character are becoming to be made from 5×8 Pixel Dots. The main function of this IC is to urge the Commands and Data from the Microcontroller unit and process them to display meaningful information onto our LCD screen.

C. BUZZER

A buzzer or beeper is an audio signalling device, which can be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input like a Mouse click or keypress. Early devices were supported an electromechanical system a dead ringer for an electrical bell without the metal gong. Similarly, a relay could also be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were fixed to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the raspy noise that electromechanical buzzers made. A buzzer could be a signalling device.

D. RFID TAGS AND SMART LABELS

As stated above, an RFID tag consists of an microcircuit and an antenna. The tag is additionally composed of a protective material that holds the pieces together and shields them from various environmental conditions. The protective material depends on the appliance. for instance, employee ID badges containing RFID tags are typically made up of durable plastic, and therefore the tag is embedded between the layers of plastic. RFID tags are available a spread of shapes and sizes and are either passive or active. Passive tags are the foremost widely used, as they're smaller and fewer expensive to implement. Passive tags must be "powered up" by the RFID reader before they will transmit data. Unlike passive tags, active RFID tags have an on-board power supply (e.g., a battery), thereby enabling them to transmit data in the least times. For a more detailed discussion, ask this article: Passive RFID Tags Vs Active RFID Tags. Smart labels differ from RFID tags therein they incorporate both RFID and barcode technologies. They're made from an adhesive label embedded with an RFID tag inlay, and that they can also feature a barcode and/or other printed information. Smart labels are often encoded and printed on-demand using desktop label printers, whereas programming RFID tags is longer consuming and requires more advanced equipment.

E. RFID READER

An RFID (Radio-frequency identification and detection) reader may be a device which is employed to speak with RFID tags by receiving and transmitting signals. These signals used radio waves for wireless communication. RFID tag is applied to products, individuals or animals to spot and track them. The identification is completed through a singular serial number. this subject covers the interfacing of a passive RFID system with AT89C51. The code of RFID tag is additionally displayed on an LCD interface. RFID tag may be a small device which stores and sends data to RFID reader. they're categorized in two types. they're active tag and passive tag. Active tags are those which contain an indoor battery and don't require power from the reader. Typically, active tags have a extended distance range than passive tags. Passive tags are smaller in size &lighter in weight than the active tags. they are doing not contain an indoor battery and thus depend upon RFID reader for operating power and positively have a coffee range limited up to few meters.

F. GSM

GSM stands for Global System for Mobile Communications. Given below may be a simple pictorial view of the GSM architecture.GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. Global System for Mobile Communication was developed as a digital system using time division multiple access (TDMA) technique for communication purposes. A GSM digitizes and reduces the information, then sends it down through a channel with two different streams of client data, each in its own particular interval. The digital system has a capable of holding 64 kbps to 120 Mbps of data rates.

G. GSM ARCHITECTURE

A GSM network consists of the following components: Mobile Station: it's the mobile which consists of the transceiver, the display and therefore the processor and is controlled by a SIM card operating over the network. Base Station: It acts as an interface between the mobile station and the network subsystem. It consists of the bottom Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the bottom Station Controller which controls the bottom Transceiver station and acts as a interface between the mobile station and mobile switching center. Network Subsystem: It provides the essential network connection to the mobile stations. The basic a part of the Network Subsystem is that the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the house Location Register and therefore the Visitor Location Register which provides the decision routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipment where each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

III. MODELING AND ANALYSIS

The Bus Unit is employed for detecting the children when the children enters and exits the bus and send this information to the varsity Unit also as parent unit. The Bus Unit consists of RFID Technology: RFID Reader and RFID Tag (Radio Frequency Identification Detection), Microcontroller, Switch. The functions of RFID Reader are integrated with the RFID Tags. The RFID Reader is attached at the doorway of the bus and therefore the RFID

Reader module works as both transmitter and receiver of the frequency signals. The RFID Tag is enhanced in student's ID card. The switch board consists of a button where, when the bus is in major trouble can press the button as by microcontroller can communicate with the server.This is how we implemented the entire system like below shown in (Fig.1)block diagram.

The School Database contains overall database for the children safety and is liable for transmitting the received data from the Microcontroller into useful services. The Server filters and analyses the received data, track the important time current location of the buses, generate alert messages, notifications and reports then on. School Database Server consist databases like student's information, their parent's details, school buses details and wish a number of the algorithms to finish the task like sending notification of specified parents within the database of every and each activity of the scholar and therefore the bus details.
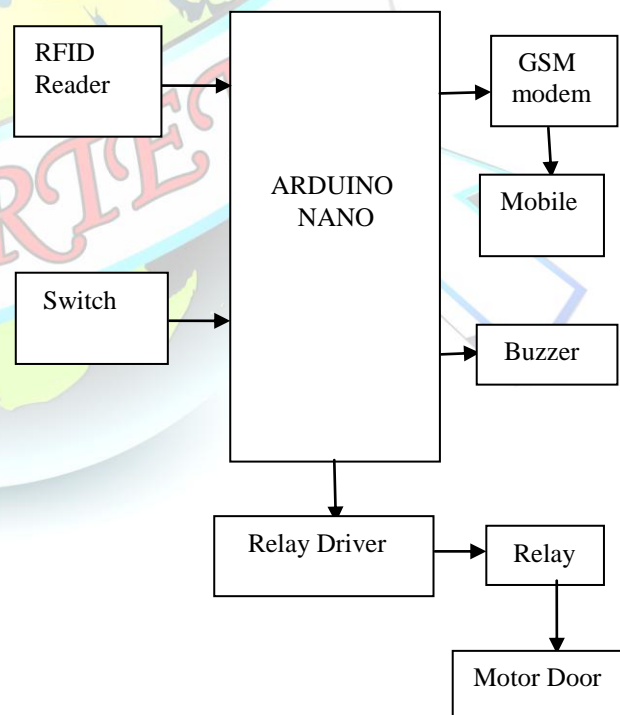
BLOCK DIAGRAM

Fig 1: Block Diagram of Rfid Based System for School Children Transportation Safety Enhancement

In this paper, bus tracking and monitoring has been

proposed. RFID is employed for the identification of the children. Each student has their individual RFID tag with the assistance of the RFID tag the children can monitored by their parents and also by school. When the children enters or exits from the bus the reader records and transfer data within the database. For each entry and exit RFID tag is sensed by the RFID reader. The amount of children are often counted within the bus. The tracking system details are going to be sent to the server at the varsity side for storage and on the mobile device to the oldsters. The knowledge of children is stored during a database at a faculty side. The LCD display is fixed within the bus to display the identification of the scholar to the driving force. The proposed system is employed to intimate parents about the bus boarding to the varsity bus. The system addressed to faced by parents of waiting on the stop for long duration. The system includes RFID for unique identification and therefore the android phone. Each student has the unique key at the varsity side to display the children details not only at the entry and exit of the children at any time. If the primary key's pressed the respective student details displayed within the android mobile in class unit. A key's fixed during a bus unit at a driver side to send an aware of parents which overcomes the matter faced by the oldsters of waiting on the stop for long duration.

IV. RESULTS AND DISCUSSION

The system implementation was tested and it found that the system has worked like below shown in (Fig.3) needless to say. First the system was simulated within the Arduino IDE software. Then, the system was programmed by Arduino C. The RFID reader is fixed on bus door. The RFID reader has tested by entering the tags (cards) within the bus shown in (Fig.2) through it. Additionally, the LCD was fixed ahead of the bus as shown in (Fig.4) and it's tested to perform the operation of the system.
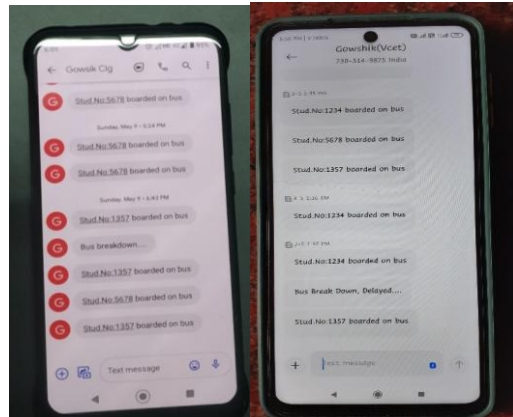

FIG 2: Implemented proto type

FIG 3: Output and Results

Fig 4: LCD Display

V. CONCLUSION

The integration of RFID and GSM technologies for safety and security purpose is very important now a days due to increase in accidents of children gets missed out at the bus which can cause death thanks to suffocation. Thus the project contributes an enoromous break through within the sector of "EMBEDDED SYSTEM". This RFID-Based system that aims at enhancing the safety of children during the daily bus trip to and from the school. RFID-Based detection unit located inside the bus detects. The RFID tags worn by the children. It then sends message via GSM modem. It is very useful to check and detects which child did not board or leave the bus. In addition to that, traffic indicator switch was implemented in the system with the help of switch, bus driver can alert the parent and management authorities about the current situation of bus about "Traffic jam or Bus breakdown".

The paper shows that RFID technology based tracker system is still act as one of the best solution to enhance safety in the school buses, which will reduce the accidents of forgetting the students inside the bus. This system is cost-efficient and it can be widely implement in school buses. The required software program for this project was written in "Arduino C language" and embedded in microcontroller. The entire project was tested in both Hardware and Software testing tools. This project has been completed successfully and thus the output results are verified. The results are in line with the expected output. The project is further adaptive towards continuous performance and software and hardware peripheral upgradations

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