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Identification and Transportation Tracking System for School Children using IOT

S. Inbaraj[1], M Praveen Kumar[2], E Balraj[3]
[1, 2]*UG Student,* [3]*Assistant professor Department of Information Technology, M. Kumarasamy college of Engineering, karur, India.*

Abstract: ***The objective of this project is to monitor and track the school children's using Global Positioning System and RFID, IOT. In this paper a system for increasing children's safety is proposed. The focus is on the daily route from home to school and vice versa, assuming the use of school buses. IoT paradigm is exploited together with different localization techniques i.e. RFID and GPS, in order to design a solution for parents willing to make certain of their child's following the main steps to school or home, i.e. taking the school bus and entering school or leaving school and entering the school bus. In this paper the applicability of RFID technology efficient tracking capabilities is tested in children's tracking and monitoring during their trip to and from school by school buses. The proposed solution is discussed in terms of technologies and architecture and the first prototype is presented. Finally a test phase is planned to verify the correct operation of the system.***

I. INTRODUCTION

The objective of this project is to identify the students in bus stops by using the RFID technology. In this project the each person should have one RFID card. This project improves the security performance because without help they can identify the student
The Global Positioning System is a space age navigational system that can pinpoint animal position anywhere on the globe, usually within a few yards or meters. This amazing technology is available to everyone, everywhere, day and night, and best of all, at no cost for use of the navigational data. GPS uses a constellation of 24 satellites in precise orbits approximately 11,000 miles above the earth. The satellites transmit data via high frequency radio waves back to Earth and, by locking onto these signals; a GPS receiver can process this data to triangulate its precise location on the globe.
GPS operates 24 hours a day, in all weather conditions, and can be used worldwide for precise navigation on land, on water and even in the air. Some of its many current applications include: boating, fishing, hunting, scouting on land or from the air, hiking, camping, biking, rafting, pack trips by horseback, hot air ballooning, general aviation, snowmobiling and skiing, search and rescue, emergency vehicle tracking, 4 wheeling, highway driving and a host of other outdoor activities where accurate positioning is required.
IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system. IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology. This tutorial aims to provide you with a thorough introduction to IoT. It introduces the key concepts of IoT, necessary in using and deploying IoT systems. The student selects the book in web server. The microcontroller receives the data information from PC through RS 232. The leverage obtained by prefering this system over the similar kinds of existing systems is that the alerts and the status sent by the wifi connected microcontroller managed system can be received by the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. The microcontroller used in the current prototype is the TI-CC3200 Launch pad board which comes with an embedded micro-controller .

II. LITERATURE SURVEY

The Internet of Things System (loT) [1] refers to the set of devices and systems that stay interconnected with real-world sensors and actuators to the Internet. loT includes many different systems like smart cars, wearable devices [2] and even human implanted devices, home automation systems [3] and lighting controls; smartphones which are increasingly being used to measure the world around them. Similarly, wireless sensor networks [4] that measure weather, flood defenses, tides and more. There are two key aspects to the loT: the devices themselves and the server-side architecture that supports them. The motivation for this wearable comes from the increasing need for safety for little children in current times as there could be scenarios of the child getting lost in the major crowded areas. This paper focusses on the key aspect that lost child can be helped by the people around the child and can

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play a significant role in the child's safety until reunited with the parents. Most of the wearables available today are focused on providing the location, activity, etc. of the child to the parents via Wi-Fi [8] and Bluetooth [9].

But Wi- Fi and Bluetooth seem a very unreliable source to transfer information. Therefore it is intended to use SMS as the mode of communication between the parent and child's wearable device, as this has fewer chances of failing compared to Wi-Fi and Bluetooth. The platform on which this project will be running on is the Arduino [10] Uno microcontroller board based on the ATmega328P, and the functions of sending and receiving SMS, calls and connecting to the internet which is provided by the Arduino GSM shield using the GSM network [11]. Also, additional modules employed which will provide the current location of the child to the parents via SMS.

The second measure added is SOS Light indicator that will be programmed with Arduino UNO board to display the SOS signal using Morse code. The different modules stay enclosed in a custom designed 3D printed case [12]. In the scenario, a lost child can be located by the parent could send an SMS to the wearable device which would activate the SOS light feature on the wearable. Therefore alerting the people around the child that the child is in some distress and needs assistance as the SOS signal is universally known as the signal for help needed. Additionally, the wearable comes equipped with a distress alarm buzzer which sets to active by sending the SMS keyword "BUZZ" to the wearable.

Hence the buzzer is loud and can be heard by the parent from very considerable distance. Also the parents via SMS can receive accurate coordinates of the child, which can help them locate the child with pinpoint accuracy. Some of the existing work done on these similar lines are for example the low-cost, lightweight Wristband Vital [2] which senses and reports hazardous surroundings for people who need immediate assistance such as children and seniors. It is based on a multi-sensor Arduino micro-system and a low- power Bluetooth 4.1 module. The Vital band samples data from multiple sensors and reports to a base station, such as the guardian's phone or the emergency services. It has an estimated battery life of 100 hours. The major drawback for the Vital band is that it uses Bluetooth as the mode of communication between child and the parent. Since the distance between the two in some cases could be substantial and the Bluetooth just won't be able to establish a close link between the two. Some more of the similar wearable devices are the Mimo, Sproutling, and iSwingband having their several drawbacks. Therefore, the wearable device proposed will be communicating with the parent via SMS which would ensure that there is a secure communication link. Also, customization of the wearable is possible as per our needs by reprogramming the Arduino system.

III. EXISTING SYSTEM

Ensuring the safety of school children during their commute to and from school requires making the school journey entirely transparent and accountable. The proposed model conceptualizes a comprehensive monitoring system which would track the bus continuously in real time. T functionalities of the proposed model includes tracking the location, the speed, the list of passengers onboard and the route of the bus and plotting these information on a map integrated using the Google Maps API, to the user interface of an android application which serves the administration, parents and drivers, to monitor the bus and the student within[6]. The system will also identify each student as they board or alight the bus and push notifications to the respective parents' mobile device with the time and location of the event. Figure 1 shows the overall block diagram and the flow of the system. The hardware assembly is kept at the entrance of the school bus. The two main sensor integrations to the microcontroller are the GPS system and the RFID reader.

The GPS system obtains the coordinates of the current location of the bus while the RFID reader uniquely identifies each student entering the bus by means of the RFID tag embedded in the student ID cards. Both these readings are fed to the ESP8266 microcontroller[4]. Figure 2 shows the circuitry that connects the sensors to the microcontroller. The GPS module has mainly two functions. It continuously reads the geographic coordinates of the bus's current location as well the speed it is going at, which is subsequently read by the microcontroller[5]. This data is continuously uploaded to the status data table in the My SQL database that is hosted on a remote server via an HTTP POST request using WiFi along with the bus id and the timestamp. The WiFi connectivity is assumed to be provided by a WiFi adapter place onboard the bus.

The RFID reader reads the unique id embedded in the passive tag of each student as they approach the entrance of the bus where the hardware ensemble is placed[2]. This is read by the microcontroller which invokes a PHP script on the server which uses a toggle to change the status of the student to either onboard or off board, finds the device id of the corresponding parent and pushes a notification message including the location and time from the status data table to the smart phones of the respective parent via an android application, using the Firebase Cloud Messaging service. The front-end mobile application for the proposed model works on the Android operating system[7]. The application can accommodate three types of users, administration, parents and drivers. On signing up, a unique device id is generated using Firebase Registration Service and stored in the database with login credentials.

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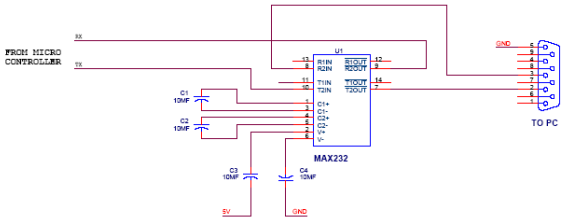
A Google Map API is integrated to the application UI to plot the location and route of the bus. A parent can scan the database for their child using the unique id provided for each student and choose to follow them. This would allow the parents to view the information of the bus their child takes, like the location, route and speed, plotted on map and contact the bus driver or the administration and get notified whenever their child boards or exits the bus. Firebase Cloud Messaging service is used to push the notifications Using a URL request in the PHP script that is invoked each time the hardware ensemble reads an RFID tag[6]. The Firebase token corresponding to the respective parent is fetched from the database and the notification is pushed.

IV. PROPOSED WORK

In this project GPS is used to monitor the children position anywhere in the earth. The GPS receiver is attached in the child with the help of bag. The GPS sensor consists of GPS antenna and GPS receiver. GPS uses satellite ranging to triangulate animal position. In other words, the GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite its sampling. By locking onto the signals from a minimum of three different satellites, a GPS receiver can calculate a 2D (two-dimensional) positional fix, consisting of your latitude and longitude.

GPS receiver received animal latitude and longitude from satellite through GPS antenna. GPS receiver is interfaced with the microcontroller through RS232 converter. RS 232 converter is used to convert RS232 logic to TTL logic vice versa because GPS receiver is the RS232 logic and microcontroller is the TTL logic. Then the receiver sends the received signal to microcontroller. Here the microcontroller is the flash type reprogrammable microcontroller in which we have already programmed. Now the microcontroller displays the latitude and longitude on the LCD display. Then position information signal is transmitted through iot network or mobile.

A. RS232 Communication



B. RS232

In telecommunications, RS-232 is a standard for serial binary data interconnection between a *DTE* (Data terminal equipment) and a *DCE* (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.

C. Scope of the Standard

The Electronic Industries Alliance (EIA) standard RS-232-C [3] as of 1969 defines:

1) Electrical signal characteristics such as voltage levels, signaling rate, timing and slew-rate of signals, voltage withstand level, short-circuit behavior, maximum stray capacitance and cable length
2) Interface mechanical characteristics, pluggable connectors and pin identification
3) Functions of each circuit in the interface connector
4) Standard subsets of interface circuits for selected telecom applications

The standard does not define such elements as character encoding (for example, ASCII, Baudot or EBCDIC), or the framing of characters in the data stream (bits per character, start/stop bits, parity). The standard does not define protocols for error detection or algorithms for data compression.The standard does not define bit rates for transmission, although the standard says it is intended for bit rates lower than 20,000 bits per second. Many modern devices can exceed this speed (38,400 and 57,600 bit/s being common, and 115,200 and 230,400 bit/s making occasional appearances) while still using RS-232 compatible signal levels.

Details of character format and transmission bit rate are controlled by the serial port hardware, often a single integrated circuit called a UART that converts data from parallel to serial form. A typical serial port includes specialized driver and receiver integrated circuits to convert between internal logic levels and RS-232 compatible signal levels.

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D. Circuit working Description

In this circuit the MAX 232 IC used as level logic converter. The MAX232 is a dual driver/receiver that includes a capacive voltage generator to supply EIA 232 voltage levels from a single 5v supply. Each receiver converts EIA-232 to 5v TTL/CMOS levels. Each driver converts TLL/CMOS input levels into EIA-232 levels.

Function Tables

EACH DRIVER

INPUT TIN	OUTPUT TOUT
L	H
H	L

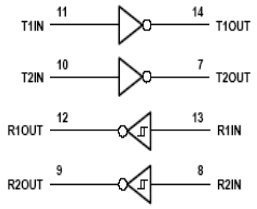
H = high level, L = low level

EACH RECEIVER

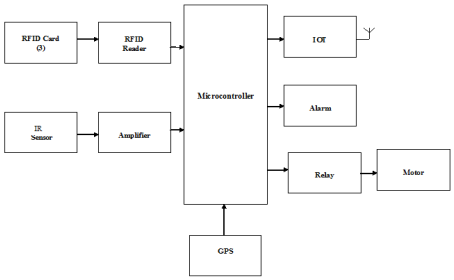
INPUT RIN	OUTPUT ROUT
L	H
H	L

H = high level, L = low level

logic diagram (positive logic)



In this circuit the microcontroller transmitter pin is connected in the MAX232 T2IN pin which converts input 5v TTL/CMOS level to RS232 level. Then T2OUT pin is connected to reviver pin of 9 pin D type serial connector which is directly connected to PC.



In PC the transmitting data is given to R2IN of MAX232 through transmitting pin of 9 pin D type connector which converts the RS232 level to 5v TTL/CMOS level. The R2OUT pin is connected to receiver pin of the microcontroller. Likewise the data is transmitted and received between the microcontroller and PC or other device vice versa.

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GPS operates 24 hours a day, in all weather conditions, and can be used worldwide for precise navigation on land, on water and even in the air. Some of its many current applications include: boating, fishing, hunting, scouting on land or from the air, hiking, camping, biking, rafting, pack trips by horseback, hot air ballooning, general aviation, snowmobiling and skiing, search and rescue, emergency vehicle tracking, 4 wheeling, highway driving and a host of other outdoor activities where accurate positioning is required. IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system. IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology. This tutorial aims to provide you with a thorough introduction to IoT. It introduces the key concepts of IoT, necessary in using and deploying IoT systems. The student selects the book in web server. The microcontroller receives the data information from PC through RS 232. The leverage obtained by prefering this system over the similar kinds of existing systems is that the alerts and the status sent by the wifi connected microcontroller managed system can be received by the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. The microcontroller used in the current prototype is the TI-CC3200 Launch pad board which comes with an embedded micro-controller .

V. CONCLUSION

Using the GPS receiver, you can find the corresponding children location with great precision GPS receivers can be hand carried or installed on aircraft, ships, tanks, submarines, cars, and trucks. These receivers detect, decode, and process GPS satellite signals. In this project GPS is used to monitor the children position anywhere in the earth. The GPS receiver is attached in the child with the help of bag. The GPS sensor consists of GPS antenna and GPS receiver. GPS uses satellite ranging to triangulate animal position. In other words, the GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite its sampling. By locking onto the signals from a minimum of three different satellites, a GPS receiver can calculate a 2D (two-dimensional) positional fix, consisting of your latitude and longitude.

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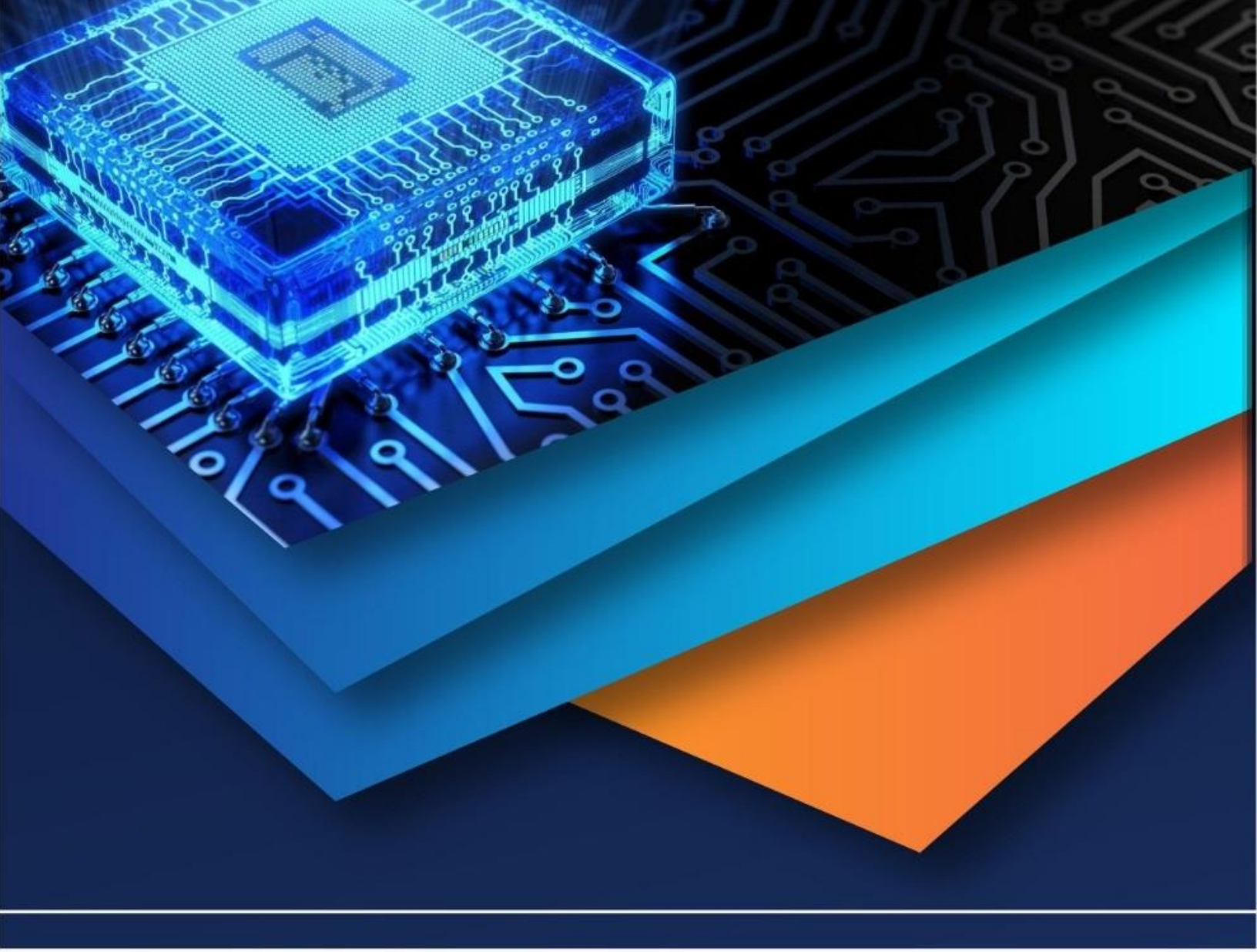
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