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IoT based School Bus Tracking System

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Abstract :- *In present time due to increased in number of kidnapping and road accident cases, parents always worry about their children's security. This project recommends an android based solution which assists parents to track their children location in real time. To track the location Active RFID module is used and to identify the identity of the child a biometric identification is used which is in built in the system. Whenever a child boards a bus, the biometric identification is done in the bus, and the system will identify the child and update log on a server will send notification to the parents which consist of current location and time. Parents can see the location of bus, they will be notified when the children is getting into a bus or getting down from a bus.*

1. INTRODUCTION

School bus plays an essential role in carrying most of the children everyday all over the world. While there are several problems that might disturb the parents with respect to the travel of school going kids; the paper aspires to look into initiating the safety with respect of school buses through bus tracking and security system that will help the school kids' transportation in a protected and more secure way. The circumstance of forgetting kids on the bus is one of the problems suffered, that has risen considerably in recent years. This has often led to the demise of many students due to suffocation. An article published in India says in every eight minutes a child goes missing as data published by national crime records bureau. Statistical report says that around 50,000 children go missing every year from which 42% children are not found. This system, through entry and exit recordings, intends to create an appropriate environment via following certain set of criteria of security and wellbeing for the school transport that will have a positive impact on safety of children. Road accidents are rising day by day. Major parts of these mishaps occur due to rash driving or over speeding of the vehicle. Speed control mechanism will help in limiting the speed of the bus. This system is designed using single microcontroller which will reduce the hardware size and so the cost. This paper also suggests a bus safety mechanism which is designed to count the entry/exit of students from the bus. The project 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.

2. LITERATURE SURVEY

Numerous and different kind of approaches to vehicle tracking, monitoring, and alerting system has been proposed so far. Ankit Kesharwasni, Vaishali Sadaphal proposed system to overcome problem of public transportation. Wireless sensor network are being in used for monitoring of bus transportation system and record of arrival time of buses at bus stops. The system is in work for detecting the delay and arrival time of buses at bus stop [4]. Kunal Maurya, Mandip Singh and Neelu Jain developed an idea on anti-theft tracking system. Vehicle tracking system is real time system which is working on the GPS and GSM technology which provide the location of vehicle to the vehicle owner if vehicle is stolen. It can also be used in wildlife tracking, asset tracking and in stolen vehicle recovery for security related [2]. Xing Jianping, Zhang Jun, et al. Proposed GPS real time vehicle alarm monitoring and alerting system were using GPRS and CSD on the embedded system. Compared with the conventional single mode of GPRS, this method makes up the disadvantage of high time delay and the uncertainty of the time delay in data transmission. Transportation is a very important shared resource that enabling efficient and effective use of resources like GSM modem and GPS unit that can be installed on a vehicle and used to track its location. This system is located on the bus and GSM modem communicates via SMS with a server connected to a basic GSM phone [1]. R. Anil Kumar, G, Jyothirmayi and K. Ramesh Babu Proposed Vehicle positioning System Based on ARM with combination of GPS and GSM can upload the information of the vehicle such as the position and speed to the monitoring center in time and make it easy and convenient to control the traffic. The vehicle position system has advantage of small size, scalable, reliable and powerful expansibility which makes this system unique.

A. Data Acquisition through standard internet protocol suite (TCP/IP) can be used for real time embedded application [2].

B. Physical digital identification Technology: The digital identification techniques are generally used by two technologies as follows:

I. RFID identification- The smart card is used in various applications for digital identification. Magnetic strip card or inductance is used for data communication medium were used.

II. Biometrics identification- Biometric identification is used as a biometric identifier such as a fingerprint or facial scan. Biometric identification is difficult to copy or misuses so it is considered safe digital identification [3].

C. GPS positioning Position and timing information is sent to server for proper location coordinates of a vehicle. This data further processed to view vehicle location on google map [1].

3. WORKING

Android based solution which assists parents to track their children location in real time using arduino controller. To track the location active RFID module is used to show 6 different static locations of bus. LCD is used for user interface, it will show all the details like location, which fingerprint is scanned, route etc. Before using the system, Users - driver, attendant, children's needs to register their fingerprints using fingerprint module and switches. Fingerprint module will assign each user one ID. After registration, driver will select the route i.e from school to home or home to school, and first fingerprint should be of driver and attendant to start the bus for picking up the children. Active RFID transmitter is used to send the information regarding location, bus side will have active RFID receiver which will receive the location. And all location details are sent on a server via Wi-Fi module. For each child there will be different location and before scanning the fingerprint locations needs to be selected. Whenever a child boards a bus, the biometric identification (Fingerprint scanning) is done in the bus and the system will identify the child and send time and location of child using Wi-Fi module to server and server will pass on this message on parent's android application. Data log update on a server and will send to the parents consisting the current location and time. Parents can see in their application that who is the driver and attendant, where is the bus and who is boarding into a bus at what time. When children will reach to school again they will scan their fingerprint and arduino will send this information on a server. And server will send this information to parents, as their child is reached in school. If Child fingerprint not detected in the morning, that means child is absent for the whole day. And parents will get this notification in speech form. Driver and attendant again have to scan their fingerprint indication all the children are reached in school. Now while coming from school to home again process will repeat, first driver will select the route and scans the fingerprint. After that children will scan their fingerprint. Attendant have to scan his fingerprint in an end indicating all the children's are boarded into bus. This information are sent on a parent's android app via a server using IOT. If any child's fingerprint is missing means the child is still in the school or may be kidnapped. Parents will get speech notification in android application for immediate response. And data will also get logged. This system will check fingerprint of children 4 times and fingerprint of driver and attendant 2 times to make sure the journey is safe. If any of the fingerprint is missing then children's are not safe.

4. XAMPP

XAMPP is an abbreviation of Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). It is a simple, lightweight Apache distribution that makes it extremely easy for developers to create a local web server for testing and deployment purposes. [5]

5. COMPONENTS REQUIRED

1. Arduino controller
2. Fingerprint module
3. Wifi module - ESP8266
4. Active RFID TX and RX module
5. LCD - 16x2

6. FUTURE SCOPE

The application can be developed further so that the school transportation departments can drive the maximum advantage from the application. To do so, there are numerous other functions that can be included into the application like:

The bus school driver is one of the mobile workforce who needs to be regularly in communication or contact with the school. Many advanced wireless technology can help in fulfilling this requirement. Hence, Mobile GIS or GIS via wireless technology can be brought in or can be developed for better communication between the bus driver and the school transportation department. Assumed cost savings needs to be verified. New methods need to be developed and current methods need to be improved or refined to improve transportation security. Some new technology or sensors can be added, sensors like diagnostic sensors to monitor the opening and closing of doors, and an alarm system that serves as a local deterrent. Current modules may be improved with more detailed applications so that daily tasks can be automated. And modules that give corresponding functionality can be added to the system, e.g., Passenger assignment, School rezoning etc. Geo fencing areas can be defined -Danger areas for children. Emergency conditions can be notify to police.

7. FEATURES

1. RF on Bus for bus tracking- active RFID receiver in bus and active RFID transmitter for different locations.

2. An Android app for parents- For demo single parent app.

3. Arduino controller.

4. In & out scan for child 4 times and for a driver and attendant 2 times- single attendant and single driver, 4 children.

5. Each time notification on an app with the time and location in form of text.

6. Route track of bus - display on an android app (on request by parents).

7. If Child fingerprint not detected in the morning, that means child is absent for the whole day and alert will get generate on the android app for a parent.

8. Wi-Fi module bus side IOT intranet concept.

9. Alert sms in form of speech (TTS) in android app side

10. Six locations to be demonstrate.

11. Fingerprint Module-R305 Module.

12. PC side xampp server - Database in MySQL.

8. ADVANTAGES

1. This system will help the school transportation management to design shortest and fastest school bus routes which will result in decreasing the fuel consumption and save time, and by using this system they can also allocates bus stops, which will help them in selecting the pick-up stops for the students and staff according to their concentration in the areas.

2. This system is Easy to use for parents as well as child.

3. Each time when children scans fingerprint notification comes on app.

4. Avoid kidnapping and road accident.

5. All data updated in log on server side.

9. APPLICATIONS

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

2. This system can also use for Tracking luggage, parcels, vehicles etc in transport system.

10. CONCLUSION

Combining Fingerprint, GPS and android advances for safety and security reason is incredibly vital. Presently, as a result of increase in mishaps of kids getting out at wrong stations or children getting missed out at the bus this may lead to demise due to suffocation. This proposal shows that android based school bus tracking technology is a feasible alternative for supervising and tracing the pupils during their drive to and from school.

11. REFERENCES

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