

IOT BASED SCHOOL CHILDREN TRANSPORT SYSTEM

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ABSTRACT

The use of private vehicles intensifies the existing unbearable traffic jam and majority of the parents consider school buses to be largely unsafe for their kids. However, safe and user friendly school buses can reduce the use of private vehicles and will eventually cut back the traffic jam in cities especially in school hours. All buses can be tracked by the guardians using the proposed intelligent and secured tracking system for school buses. This proposed system includes an Android application that can be employed to send notifications during entry and exit of the students using radio frequency identification (RFID) as well as Fingerprint scanner, ensuring arrival confirmation of the student by dual authentication. The system will also notify parents when the bus is a 15-min distance away from the home. To ensure on-board safety, 'Window Signaling' will also be used. The focus of the research is to display the feasibility of a safe and intelligent school bus using secured tracking system based on dual authentication procedures. It is expected that the offshoot

of this research initiative will regain the confidence and reliability of parents in school bus and reduce the use of individual transport. A smart school bus will keep the student safe, easing the tension for parents and the city will have a smooth traffic system. The use of private vehicles intensifies the existing unbearable traffic jam and majority of the parents consider school buses to be largely unsafe for their kids. However, safe and user friendly school buses can reduce the use of private vehicles and will eventually cut back the traffic jam in cities especially in school hours. All buses can be tracked by the guardians using the proposed intelligent and secured tracking system for school buses. This proposed system includes an Android application that can be employed to send notifications during entry and exit of the students using radio frequency identification (RFID) as well as Fingerprint scanner, ensuring arrival confirmation of the student by dual authentication. The system will also notify parents when the bus is a 15-min distance away from the home. To

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INTRODUCTION

In the context of daily affairs, one of the common problem is traffic jam where the personal cars carrying students during school hour directly compounds the negative impacts on traffic jam. This happens because parents having private transport don't want to take the risk of using public transport or traditional school bus for school-going children. While parents who don't own a private transport and use the public ones to carry the children to school, often stay around the school for the whole of the school-hour duration. These parents often have to take number of different routes en route to school and back home. Another probable scenario is that the parents send their children to school alone

but they stay tensed as they don't have any regular status updates of their loving ones. There can also be issues such as the students may not go to school or just simply passing time outside the institution, while their parents having no way to locate the whereabouts of these students.

Thus there is a lack of proper safety which does create complicated traffic related issues in densely populated places like Dhaka, Delhi etc. On the other hand, Statistics from Europe, USA, Canada and Australia suggest that public transport (and school transport in particular) has a high level of safety . For instance, the Australian College of Road Safety notes that bus travel is the safest form of road transport, at least 14 times safer than private vehicles, and that the record for school bus travel, in particular, is very good which is opposite of what can be seen in cities with overflowing populace . Following a survey, carried out among the guardians from different schools in Dhaka, it has been found that 72% of them don't have private vehicles to drop their children off to schools. Among them 20% uses school bus but do remain tensed as these guardians can't have any real-time update on the movement of their children. The other 52% of the guardians who use neither personal vehicles nor school buses have to spend their own

time to drop off and pick up students which puts relentless pressure in their daily lives. Remaining 28%

own private transports. Even then, for some of the parents using private cars, it becomes noticeably distressing due to the highly congested traffic conditions, such regular prolonged stay

inside a car is also a red-flag for their health. However, still they have to use it, in result worsening the traffic situation even further, particularly in school hours. All the sides agree that a sustainable solution providing proper safety in school buses would be beneficial to parents as well as to the students themselves.

LITERATURE SURVEY

H. Ben introduced a system that monitors kids within the bus in a safe and reasonably reliable manner. It uses a mixture of RFID, GPS (Global Positioning System), and GPRS (General Packet Radio Service) technologies. Every student carries a unique RFID card, the cardboard is embedded into every student's college luggage. Whenever a student enters into or exits from the bus, the reader records the time, date, and placement and so transfer the information into a secure server. The whole process is automatic, requiring no action from the driver and students.

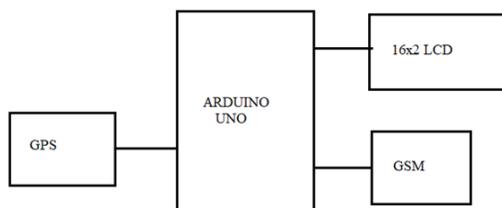
In another notable development, brought forward by Maryam et al. , a system will control students' entry into and exit from the bus using RFID (Radio Frequency Identification) and GSM to ensure that the process goes on with utmost safety. The framework does not require any additional actions by anyone. The system will execute all the steps and allow the student to be tracked while entering and leaving the bus. If the bus journey is successful from the source to destination, it will send an SMS to the guardian or authority to indicate a successful start and termination of its journey.

Zonar et al. , has developed the Z pass specifically for school buses in a view to meticulously monitor the school kids. This method uses RFID with a small card kept by the student. It contains passive RFID technology that automatically records every students' entry and exit attempts once the student passes through the pre-set motor bus scanning device. Z pass provides immediate and precise answers and prioritizes the safety issue. Guardians will receive information about the student using a browser having Z pass installed.

EXISTING SYSTEMS

In existing systems, some features are common. Such as GPS is used for tracking

purposes while RFID is used for authentication. To transfer information to parents, few common mediums have been employed such as text messaging or some android application. The existing systems can facilitate to identify the location of the bus using GPS as well as to notify the parents when students enter into the bus. RFID tags are scanned to achieve the goal. H. Ben et al. , introduced a system that monitors kids within the bus in a safe and reasonably reliable manner. It uses a mixture of RFID, GPS (Global Positioning System), and GPRS (General Packet Radio Service) technologies. Every student carries a unique RFID card, the cardboard is embedded into every student's college luggage. Whenever a student enters into or exits from the bus, the reader records the time, date, and placement and so transfer the information into a secure server. The whole process is automatic, requiring no action from the driver and students.



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meticulously monitor the school kids. This method uses RFID with a small card kept by the student. It contains passive RFID technology that automatically records every students' entry and exit attempts once the student passes through the pre-set motor bus scanning device. Z pass provides immediate and precise answers and prioritizes the safety issue. Guardians will receive information about the student using a browser having Z pass installed. Anon et al. , proposed a system called Smart School Bus Architecture. Under this framework, the student swipes the cardboard at the RFID reader while getting on the bus, the RFID reader then transmits the student identification to a mobile DVR. This mobile DVR will then use 2G/3G/WIFI network to send the student identification to a CMS server. Following which the CMS server will send out an SMS to parent's mobile and the bus will set out for its destination. Throughout the journey, the mobile DVR will take audio and video records at various bus stoppages, and CMS server will have access to those files through 2G/3G/WIFI network. Such a design will allow the parents to visually check the whereabouts of the bus. Besides, GPS can also be used to

track the bus locations from the central monitoring website. In another notable development, brought forward by Maryam et al. , a system will control students' entry into and exit from the bus using RFID (Radio Frequency Identification) and GSM to ensure that the process goes on with utmost safety. The framework does not require any additional actions by anyone. The system will execute all the steps and allow the student to be tracked while entering and leaving the bus. If the bus journey is successful from the source to destination, it will send an SMS to the guardian or authority to indicate a successful start and termination of its journey.

The above mentioned systems do provide some level of solutions but questions remain about their effectiveness in countries like Bangladesh and India. Advanced application of technological concepts has seen a rapid growth in recent times in various sectors like healthcare ,organizational securities . The proposed school bus system will also have such implementations and thus the final output will be a lot more robust, secure and accurate than the traditional frameworks described above. One such major enhancement will be the addition of Dual Authentication, as providing only RFID can't guarantee students' arrival in the bus

in a fuller degree as it is prone to misuse. To address this, fingerprint authentication has been proposed in this research as a part of dual authentication. Thus during entrance and exit of the students, parents may get an accurate notification.

Besides, in the existing systems, safety measures are lacking while students are on-board. Considering this threat, it has been proposed that a "Window Safety" system, consisting of laser activated alarm will be included to prevent the students from poking outside. Providing Air Conditioning bus for all schools, where windows are closed anyway, is not always possible, therefore this added security feature will bring more reliability to the proposed sys
programmable Watchdog Timer with internal Oscillator, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, USART, 2-wire Serial Interface, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset.

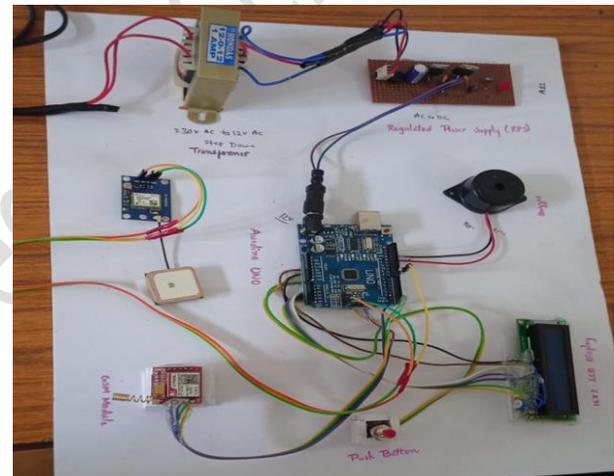
In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption.

The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega48PA/88PA/168PA/328P is a

powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications.

The ATmega48PA/88PA/168PA/328P AVR is supported with a full suite of program and system development tools including: C Compilers, Macro Assemblers, Program Debugger/Simulators, In-Circuit Emulators, and Evaluation kits.

RESULT



CONCLUSION

This system will ensure safety; ease tension and anxiety of parents, and will without doubt,

improve road conditions. It will also provide an easy pick13up system by providing notifications. Guardians will get notifications through an Android application; this app can be used to see the current status of the bus in a map, thus it will be easy for the parents to track the movement of the bus and get notified at the

appropriate times. Hence, they will have a highly reliable, secure and intelligent system to depend upon.

FUTURE SCOPE

Firstly, this proposed system requires students' fingerprint images which is a sensitive issue and should be properly secured. Thus security is a prime concern. There are number of encryption techniques available for such purpose [11]. Again there are certain skin diseases that destroy the dermis and epidermis layer of the skin. As a result, it becomes difficult to correctly identify different individuals on a regular basis [8]. Besides, the student have to carry the ID card in order to scan with the RFID scanner. If somehow the ID card is lost or forgotten, then there is no way to enter the bus and follow the system simultaneously. These are some of the limitations of the proposed system.

In this work, effort has gone into making the system reliable for the parents. Such reliability issue will be further intensified in the future. Another plan is to install for IP cameras which will produce live images from inside the bus, it will also add speed alert, road change alert, route change notification, smoke sensor, addition of stoppage ID in the entry and exit notification

etc. An efficient encryption method will be developed to strengthen security. The main goal is to make the system more user friendly and helpful.

REFERENCES

1. Shaaban K, Bekkali A, Hamida EB, Kadri A. Smart Tracking system for school buses using passive RFID technology to enhance child safety. *Journal of Traffic and Logistics Engineering*. 2013 Dec;1(2):191-6.
2. Wikipedia, 'Internet of Things', [Online]. Available: https://en.wikipedia.org/wiki/Internet_of_things
3. Anon, Smart school bus monitoring and tracking system. *IEEE Trans. Single processing*, 55 (9), 200-205, 2011.
4. Zonar, Zpass: Student ridership tracking, *International research*. 4 (1), 20-25, 2013.
5. Al-Lawati A, Al-Jahdhami S, Al-Belushi A, Al-Adawi D, Awadalla M, Al-Abri D. RFID-based system for school children transportation safety enhancement. In *GCC Conference and Exhibition (GCCCE)*, 2015 IEEE 8th 2015 Feb 1 (pp. 1-6). IEEE.
6. Nur FN, Moon NN. Health care system based on cloud computing. *Asian Transactions on Computers*. 2012 Nov;2(5):9-11.

7. Saifuzzaman M, Khan AH, Moon NN, Nur FN. Smart Security for an Organization based on IoT. International Journal of Computer Applications. 2017;165(10):33-8.
8. Fingerprint Recognition for Children,2013, EUR 26193 EN.
9. Lee JW, Min DJ, Kim J, Kim W. A 600-dpi capacitive fingerprint sensor chip and image-synthesis technique. IEEE Journal of Solid-State Circuits. 1999 Apr;34(4):469-75.
10. Daftardar I. 'Do fingerprints change?', 2016 [Online]. Available: <https://www.scienceabc.com/humans/fingerprints-unique-change-age-alter-crime-diseases-identification-biometrics.html> [Accessed: 20 October, 2018].
11. Mota, A. V., Azam, S., Shanmugam, B., Yeo, K.C. and Kannoopatti, K. Comparative analysis of different techniques of encryption for secured data transmission, IEEE International Conference on Power, Control, Signals and Instrumentation Engineering, ICPCSI 2017.

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