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## **Iot Based Smart School Bus: Safety for School Children**

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### **ABSTRACT**

The major part of providing eminence education to children is safeguarding their security while traveling between school and home. We Put forward a cost effective smart school bus system utilizing various homemade as well as off the shelf components. We proposed the hardware-based smart school bus system for monitoring and ensuring the safety of school going children onboard a school bus.

**Keywords:** Arduino nano, RFID Reader, GPS, GSM Module

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### **Introduction**

Existence a minor country with the 8th major populace in the world [1] and consuming inadequate path structures have caused road traffic conditions in Bangladesh to drop over the years, especially in the citizen cities of the country. According to a World Bank report, within the last ten years, the regular speed of automobiles on the roads of Dhaka, the capital city of the country, has plummeted from 21 kilometers per hour (kmph) to a confounding 7 kmph. For the period of urgency hours, conditions developed dreadful near school areas as each student wish to transportable by their domestic car for the absence of a consistent community transportation arrangement. According to the alike report, it is supposed that by 2035, the common traffic speediness in Dhaka might drop down to 4 kmph, which is below the average human walking speed [2]. Combined with a few other reasons, this ever-declining normal traffic speed and regular road overcrowdings have been posturing an adverse effect on the overall driving performance of people. When these records are combined with the fact that Dhaka is the most densely populated city in the world, with almost 45,000 people living in per square kilometers of the city it's no wonder that the roads of the city are not safe for school going children because of fatal road accidents. Hence, we focused on developing a smart school bus system which will provide a low cost but effective hardware-based solution of the problem of watching security status of the school going children onboard school vehicles in Dhaka as well as in other major cities with similar traffic situations.

#### ***1.1. Contribution to the Paper***

In this paper, We focused on developing a smart school bus system which will provide a low cost but effective hardware-based solution of the problem of monitoring safety status of the school going children onboard school vehicles. As the matter of given that road protection to school going children while onboard school vehicle is of dominant position, a significant number of dissimilar methodologies have been taken to report this subject by various researchers.

#### ***1.2. Outline of the Paper***

The paper is organized as follows. Section 2 describes literature survey. Section 3 describes the research and design method used. Section 4 presents the system requirements. Section 5 presents the Implementation and results obtained during the research phase. Section 6 concludes the paper.

### 1.3. Related Work

As the topic of providing road safety to school going children while onboard school vehicle is of paramount importance, a considerable number of different approaches have been taken to address this issue by various researchers. Tanaka and Naito [3] realized a system for supportive position tracing of automobiles with smartphones, wireless LAN, and Bluetooth Low Energy devices. However, their system had bandwidth as well as security limitations. Rengaraj and Bijlani [4] described an alternative system using RFID technology for ensuring the security of school children while driving to and from school. Shaaban et al [10] implemented a smart school bus tracking system using passive RFID technology as opposed to active RFID based school transport security system implemented by Al-Lawai et al [9]. While Dhivya and Kathiravan [5] implemented a hybrid security & vigilance system for vehicles, Bojan, Kumar, and Bojan [6] took an IoT (Internet of Things) based approach for an intelligent transport system. Both Al-Ismaili, Al-mahruqi, and Vrindavanam [7] & Shah and Singh [8] utilized RFID and GSM technology to implement safety and tracking systems for school buses. However, in addition to sending the vehicle location data to the parents via SMS as done in [7], [8] also implemented an early accident warning system utilizing buzzers and ultrasonic sensors to alert the driver of the bus. Similarly, Khan and Mishra took a GPS-GSM based approach for developing a tracking system.

### 1.4. Research Method

In this section, we present the research method that will be used in the systematic literature review RFID reader present in the bus and send a message to the parents using GSM Technology. The model also offers two protection actions such as a drunk and drive stoppage system and speed control mechanism. This method is executed in a PIC18F25K22 microcontroller by infrared.

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## Existing System

The system will send a SMS to the parent containing location of school bus, children status via GSM mode. The pupil to be chased while entering and leaving the bus. The propose security system will provide various facilities missing children, inappropriate drop etc., which are helpful for parents.

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## Proposed System

This section describes about proposed system. It comprises RFID technology, GSM & GPS block, ARDUINO MEGA 2560, LCD Display and buzzer. In this system Arduino nano microcontroller has been used. The method contains of three units, bus unit, school unit and parent unit. This offered system consists of RFID Reader, different sensors and GSM unit to issue the alert messages to parents when their children boards or leaves the bus. Graduate school unit consists of RFID Reader and GSM Module. The entire data in two units will be processed by using Arduino nano microcontroller. Arduino nano microcontroller is used in this system. This microcontroller has benefits like, total number of pins 40 and there are 30 pins for input and outputs, 368 RAM bytes, 5MIPS CPU speed, 8 channels of 10 bit ADC converter is used. The alert announcement will be send to the school unit and parents with the help of GSM and IOT. All students consist of an individual RFID tag with the help of RFID tag, GSM, IOT. Parents and school unit can accumulates an alert message. The data of RFID tag is recite by RFID reader. The reader conveys the matching evidence. RFID ticket is used to show an aware message like the position of a person, speed of the bus to their respective parents. In this arrangement GSM and IOT is used to send the attentive message to the parents if their respective child is get in the bus or get down the bus with the assistance of RFID tag and reader. LCD attitudes for Liquid Crystal Display is a flat panel display technology normally used in TVs and computer monitors. It is also applied in monitors for mobile devices, such as laptops, tablets, and smartphones. The rear light in liquid crystal display provides an even light source behind the screen. This light is divided, meaning only half of the light shines through to the liquid crystal layer. The liquid crystals are prepared up of a part solid, part liquid material that can be "twisted" by put on electrical voltage to them. They hunk the polarized light when they are off, but reflect red, green, or blue light when activated. A DC Power Supply Unit (commonly called a PSU) originating power from the AC mains (line) supply performs a number of tasks: It changes (in most cases reduces) the level of source to a value appropriate for driving the load circuit. It creates a DC supply from the mains (or line) supply AC sine wave. It stops any AC from appearing at the supply output. Power provisions in current periods have significantly enhanced in reliability but, because they have to handle considerably higher voltages and currents than any or most of the circuitry they supply, they are often the most liable to letdown of any part of an electronic system. GPS is a satellite navigation system used to regulate the ground position of an object. Each GPS satellite shows a message that includes the satellite's existing position, orbit, and exact time. A GPS receiver trusts the broadcasts from multiple satellites to calculate its exact position using a process called triangulation.

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## Implementation and result

Thus, the hardware and software are implemented and the recorded data were sent to the parents. The recorded data will be saved for future reference.

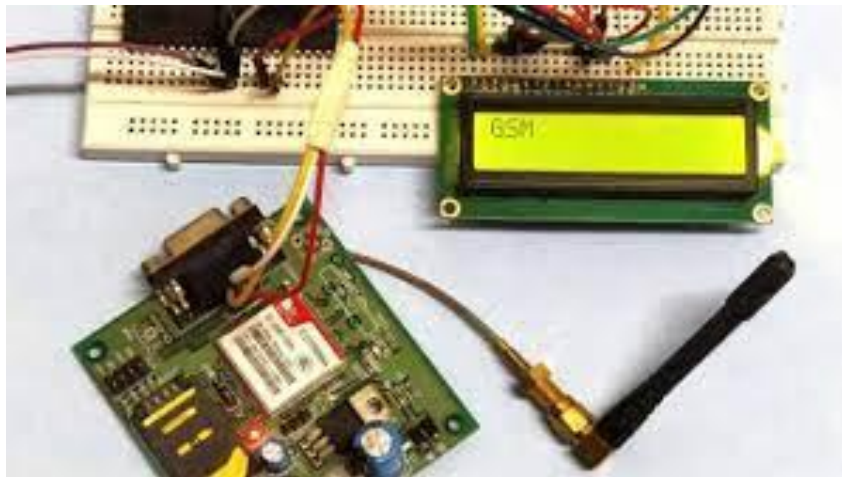
### 4.1 Hardware Requirements

- Arduino nano
- RFID Reader
- GPS
- GSM Module
- Lcd
- Power Supply

In this section we are going to explain about results of the proposed system. It contains all the blocks are connected through ARDUINO MEGA 2560. 5V DC Power supply is given to all the blocks. GSM Modem and LCD is switched on. Later power gets to the LCD it first LCD shows Welcome message. ARDUINO MEGA 2560 gets power and displays message as ok. GSM starts initializing. SIM connected in GSM Modem. SIM Registered Network displaying by LCD.

#### ***4.2 Configuration of Arduino nano ATmega328p Microcontroller***

Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be constructed by a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other progress boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board.



**Fig 4.2.Connection diagram**

#### ***4.3 Software Requirements***

- Arduino nano

#### ***4.4 Software Implementation***

ATmega328p provides a complete and self-contained wireless fidelity networking solution, grant it to either host the application or to offload all wireless fidelity networking functions from another application processor during the example ATmega328p



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## Future Scope

In the future, we intend to add 'live v streaming' capability to our system so that the parents, as well as the concerned authorities, can view the video showing the condition inside the vehicle in real-time. We also plan to improve the sensitivity and quality of our pressure pad devices. As we mostly used home-quality materials in constructing the pressure pad devices, they tend to malfunction after being used for a long time. We plan to address this issue by trying out different materials with higher longevity while keeping the material cost as low as possible. In addition to ideas above, we intend to develop a web-based interface where registered parents or authorized personnel can log into the system from anywhere in the world using a web browser and internet connection and view sensor and other data of a vehicle in real-time.

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