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SMART COLLEGE BUS TRACKING SYSTEM USING SATELLITE COMMUNICATIONS

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Abstract: - An IoT-based school bus monitoring system is a technology solution that utilizes the Internet of Things (IoT) to monitor and track school buses in real-time. These systems use Internet of Things (IoT) devices and sensors to track the location, speed, and safety of school buses in real-time, allowing schools and parents to monitor their children's travel to and from school. In this literature survey, we will explore the past studies on IoT-based school bus monitoring systems, including their benefits, challenges, and areas for future research. Through a review of the existing literature, we aim to provide a comprehensive overview of the state of the art in this field and identify opportunities for further study.

Key Words: Bus Monitoring, safety, tracker, location track.

I. INTRODUCTION

An IoT-based school bus monitoring system is a technology solution t hat utilizes the Internet of Things (IoT) to monitor and track school buses in real-time. The system can be used to improve safety, reduce operating costs, and enhance the efficiency of school bus transportation. It typically consists of sensors, GPS tracking devices, and communication infrastructure that ar e installed on the school buses and connected to a centralized management platform.

The system enables real-time tracking of the location, speed, and rout e of school buses, as well as the identification of any potential safety issues such as sudden stops, collisions, or breakdowns. It also allows parents and school administrators to monitor the location and status of the school bus i n real-time, and to receive notifications in case of any delays or emergencies. The use of an IoT-based school bus monitoring system can provide numero us benefits, including improved safety and security for students, reduced fu el consumption and maintenance costs, and enhanced communication and coordination between parents, school administrators, and bus drivers. It can also help to improve the overall efficiency and effectiveness of school bus tra

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nsportation, by enabling more accurate scheduling and routing, and by prov iding valuable data for decision-making and continuous improvement.

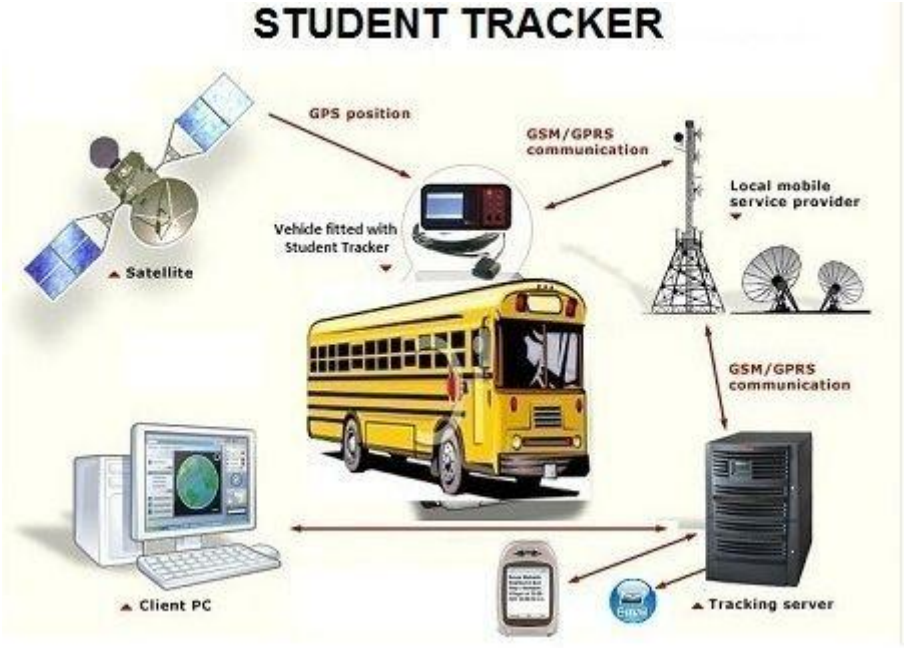

Fig 1 Total Equipment process

II. LITERATURE SURVEY

RFID tag is used as a first stage of verification. Only after successful R FID identification the students are made to undergo the 2nd stage of verifica tion using camera. Here, the camera captures the student's image n verifies it with the image the is previously stored and also checks if the student is w earing the mask or not. This system also monitors the temperature of the st udent using IR sensor. Only If the temperature is found to be lesser than the threshold, the student is allowed. If the student doesn't meet all the criteria, then he/she is not permitted to board the bus and the status are sent to sc hool website as well as the parents [2]. For monitoring the transport of child ren to and from school using IoT technology, the system uses RFID and GS M technologies to track the entry and exit of students on the bus and sends SMS notifications to parents when the student's travel is successful. The sys tem also aims to detect students who may board the wrong bus or be absent, and to monitor the sobriety of the driver. The system is intended to provide greater safety and security for children during their daily travels to and from school, and to allow the driver to communicate with the management in the event of any delays or issues. The system for monitoring and tracking a sch ool bus using various IoT components, including an Arduino uno controller, an alcohol sensor, a GPS module, a GSM module, and an RFID module.

The system is designed to prevent the bus from starting if the alcohol sensor detects the presence of alcohol in the driver's system, and to send a

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warning message to the authorities if this occurs. The system also uses the GSM module to send messages to parents when the bus is approaching thei r station, and to track the bus's location using GPS. The RFID module is use d to verify the identity of students entering the bus, and to open the door if t he student's RFID code matches the system's records. The system also inclu des an LCD display to show relevant information and messages [1]. The scho ol bus consists of the RFID module fitted in it. The RFID reader read the tag s and sends the tag number to the android phone of the driver in the bus via a Bluetooth device. The driver side application receives the tag number and sends it to the database where the details required to send the message are selected and returned. The SMS is sent from the driver's phone to all parent s and also the location details are sent to the system parallelly.

The parent side application is needed to check the current location of t he bus and to register for SMS service [12]. With the usage of a GPS Module, the current location of the bus is tracked, a GPRS module to update the inf ormation to the parents and the school authorities and a alcohol sensor to s ense if the driver has consumed alcohol or not. They have used Google API a nd object-oriented programming language like JSON for using Google maps and SQL for managing the databases. All these information's will be shared using Blink App so that it can be customized according to the needs of the u ser [3]. The framework is an Internet of Things (IoT)-based school bus monit oring system that tracks the whereabouts and motions of school buses and notifies parents of their children's whereabouts using RFID tags, GPS, and G SM/GPRS technologies. The solution incorporates an in-vehicle gadget that uses an RFID tag to identify each student and a GPS module to follow the b us. If the school bus's predetermined route schedule changes, a GSM modul e is utilized to warn parents via short messages. Parents can track the schoo l bus's whereabouts and see its route on Google Maps using a smart phone application that transmits the data gathered by the GPS device to a cloud se rver. Additionally, the smart phone app also establishes the school bus's arri val times at each bus stop, giving parents up-to-date knowledge about the b us' anticipated arrival time. Because it is based on widely accessible electron ic gadgets, the system is inexpensive [8].

Consisting of three basic units the College unit, parent unit and the b us unit, this system makes use of the GPS location to track the live location of the bus and send the real time updates to the college and school unit. A G SM module is used to send the SMS. It also alerts the Parents in case of any fire accident with the use of Fire Sensor. It also has an IR Sensor placed at t he front door to increase the count of students and an IR sensor at the back door to decrease the count of the students. The Parent unit uses a Applicati on and sign to it using the registered mobile number and obtain the updates. The school units include server's and databases to store the data [5]. Provid

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es the current location of the bus using GPS module and GPRS module, this system also provides the bus number that will run between the source and destination location the route details and the coordinates of the current loca tion. All this data will be sent to the user as well as the admin database for s toring the data using My SQL. A separate website is developed to access all t his data [10]. Including various modules, such as an OBD-II module for colle cting real-time data from the bus, an RFID module for tracking student atte ndance, and sensors for measuring temperature and humidity, these modul es send data to an Arduino microcontroller, which then transmits the data t o a cloud-based MQTT broker.

An application server implemented using Node.js collects the data fro m the broker and saves it to a database for further processing. The saved da ta can also be analysed using an analytical engine like R to generate reports for different stakeholders, such as parents, regulators, and school administr ators. The system allows for real-time tracking of the location, speed, and ro ute of the school bus, as well as the identification of any potential safety iss ues. It also allows parents to track their child's attendance on the school bu s and ensures that no child spends an excessive amount of time on the bus [11]. Numerous research and implementations of GPS and GSM-based car tr acking systems have been made, although the GPS system's accuracy is so metimes called into question because of Selective Availability. Cellular phon e placement based on signal attenuation, angle of arrival, time of arrival, tim e difference of arrival, and time advanced is possible, however GPS and GSM positioning are sufficiently developed for civil usage. Students waiting alone for the bus, rushing to board and possibly injuring themselves, making nois e that might annoy the driver, eating and drinking inside the bus, which can contaminate the floor and lead to accidents, and being unaware of the risks of standing too long are some issues with using school buses [6].

III. PROPOSED SYSTEM

The proposed model presents the tracking of the school bus and the condition of the school driver. In addition to this it also alerts about any emergency situation.

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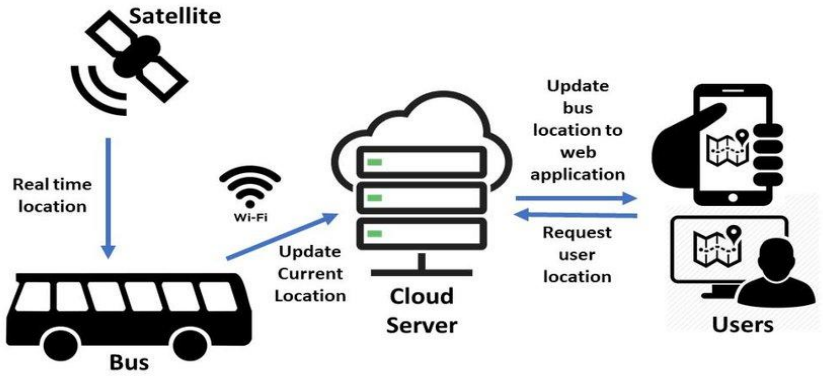

Fig 2 Proposed Block diagram

IV. HARDWARE DESCRIPTION

The model consists of following components

A. Arduino MEGA

Arduino MEGA is a heart of the school bus monitoring system. All operations like fetching the latitude and longitude locations from GPS module, sending it on server using Wi-Fi chip. Sending the SMS to the school organization and parents when the driver is drunk and when panic switch is pressed by the student respectively.

B. GPS Module

We are using NEO 6 GPS module which sends the information serially to the Arduino MEGA through serial port1.

C. ESP 8266 Wi-Fi Module

ESP 8266 Wi-Fi module interacts with the Blynk application using Wi-Fi. Firstly, this ESP chip is connected to the Wi-Fi network whose SSID and password is given in the program. Then the latitude and longitude information are sent on the blynk server from where this data is supplied to blynk map. Where we can visualize the current location of bus. After every 20 sec the current location.

D. GSM Module

SIM900 GSM module is used for sending the SMS to the organization and parents. SIM 900 module works on AT commands. It is connected to the serial port 3 of Arduino MEGA.

E. Power Supply

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The ac voltage, typically 220V rms, is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

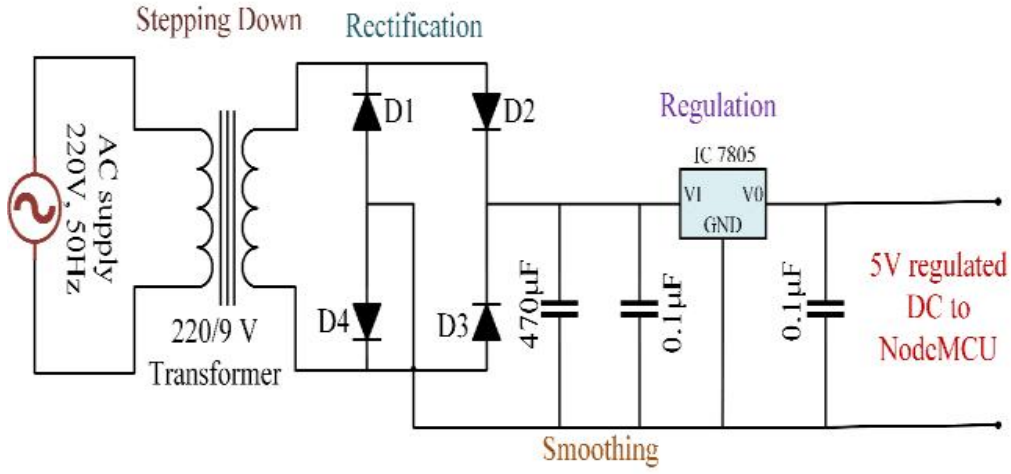

Fig 2 Power supply module

Working principle

Transformer The potential electrical device can step down the facility offer voltage (0-230V) to (0-6V) level. Then the secondary of the potential electrical device are connected to the exactness rectifier, that is built with the assistance of op– amp. the benefits of victimization exactness rectifier area unit it'll provide peak voltage output as DC, remainder of the circuits can provide solely RMS output.

IV. PROJECT DESCRIPTION

Fig shows the diagram of our vehicle tracking system. It can help understand how the project is implemented.

A. Testing Smartphone (trite Application)

As shown in diagram, display the location of the school bus. The vehicle's location information is transmitted to the cloud via ESP 8266 Wi-Fi module.

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Fig 3 Hardware Kit Result 1

We developed and tested a vehicle tracking system to track the exact location of a vehicle. This paper has described the design and implementation of the school bus tracking system. A panic switch is placed inside the vehicle for the safety of the students. A smartphone application can be downloaded by the parents which will continuously show the location of the bus. The system was able to experimentally demonstrate it's effective performance to track the school bus there by ensuring the parents of their child's safety.

V. CONCLUSION

Users can effortlessly track the bus and confirm its way shifting at safe speeds, preserve the authorities in charge of delays or deviations, be up thus far on the changes in agenda and speak to drivers or authorities if necessary. Admin will see the vicinity of all buses, see the list of passengers on-board, add new students, replace bus schedules and route. The school bus app could be a person friendly tool for parents to visualize their wards and school management to observe the drivers. In summary, this task has made a school bus protection device that has comprehensive protection to the commute. The device has real time following, student identification, delays, and scholar absence.

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