Design And Fabrication of Vehicle Tracker For Educational Institution

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Abstract- *Vehicle Tracking System is developed using a web-based and an IoT platform, which act as a tracking device. This system is developed for all vehicle users to provide easy tracking of their vehicle location. GPS module is responsible for getting the location in the form of latitude and longitude from the satellite. The location will then send to the SIM 808 microcontroller and processed before being redirected to the GSM module. In the meantime, the GSM module is responsible for sending the location to the users via Short Message Service (SMS) or data transfer to the web-server. This tracking device is installed inside the vehicle where it is not visible to anyone. The present generation requires the information time to time. The use of technology have been increasing day by day. So we are planning for the combination of present technology with the requirement of information transmission, we planned for the creative approach of "Vehicle Tracking System using GPS and GSM". To overcome the drawbacks of the previous methods of paper based and we introduce a project to track a vehicle using GPS and GSM. This Vehicle Tracking System can also be used for Accident Detection Alert System, Soldier Tracking System and many more, by just making few changes in hardware and software and widely in tracking Cabs/Taxis, stolen vehicles, school/colleges buses etc.*

Keywords- Live tracking; accident detection; alert system; time management.

I. INTRODUCTION

College bus Tracking System is the technology used to determine the location of a vehicle using different methods like GPS and other radio navigation systems operating through satellites and ground based stations. By following triangulation or trilateration methods the tracking system enables to calculate easy and accurate location of the vehicle. Vehicle information like location details, speed, distance traveled etc. can be viewed on a digital mapping with the help of a software via Internet. Even data can be stored and downloaded to a computer from the GPS unit at a base station and that can later be used for analysis. This system is an important tool for tracking each vehicle at a given period of time and now it is becoming increasingly popular for people having expensive cars and hence as a theft prevention and retrieval device.

The system consists of modern hardware and software components enabling one to track their vehicle online or offline. Any vehicle tracking system consists of mainly three parts mobile vehicle unit, fixed based station and, database and software system.

Vehicle Unit: It is the hardware component attached to the vehicle having either a GPS/GSM modem. The unit is configured around a primary modem that functions with the tracking software by receiving signals from GPS satellites or radio station points with the help of antenna. The controller modem converts the data and sends the vehicle location data to the server.

Fixed Based Station: Consists of a wireless network to receive and forward the data to the data center. Base stations are equipped with tracking software and geographic map useful for determining the vehicle location. Maps of every city and landmarks are available in the based station that has an in-built Web Server.

Database and Software: The position information or the coordinates of each visiting points are stored in a database, which later can be viewed in a display screen using digital maps. However, the users have to connect themselves to the web server with

II. LITERATURESURVEY

"Design and Development of GPS-GSM Based Tracking System with Google Map Based Monitoring" by S. Srinivasan, S. Sivakumar, and K. Satheesh Kumar This paper discusses the development of a GPS-GSM-based vehicle tracking system with Google Map-based monitoring. The system uses a GPS module to determine the location of the vehicle and sends this information to a central server using a GSM module. The location of the vehicle can then be monitored in real-time using a web-based interface.

"Design and Implementation of Vehicle Tracking System using GPS/GSM/GPRS Technology and Smartphone Application" by I.A. Lawal, S.A. Akintoye, and S.O. Sanni Thispaper presents the design and implementation of a vehicle tracking system using GPS, GSM, and GPRS technology and a smartphone application. The system consists of a GPS module, a GSM module, and a microcontroller. The smartphoneapplication is used to monitor the location of the vehicle in real-time.

"Design and Implementation of a Vehicle Tracking System using GPS and GSM Technologies" by E.O. Adeleke, F.A. Adeyemo, and I.A. Akintayo This paper describes the design and implementation of a vehicle tracking system using GPS and GSM technologies. The system consists of a GPS module, a GSM module, and a microcontroller. The GPS module is used to determine the location of the vehicle, while the GSM module is used to transmit this information to a central server. The location of the vehicle can then be monitored in real-time using a web-based interface.

"Design and Implementation of a Vehicle Tracking System using GPS and GSM Technologies for Fleet Management" by K.A. Ogunleye and A. Olusegun This paper presents the design and implementation of a vehicle tracking system using GPS and GSM technologies for fleet management. The system uses a GPS module to determine the location of the vehicle and a GSM module to transmit this information to a central server. The location of the vehicle can then be monitored in real-time using a web-based interface. The system also includes features such as speed monitoring, fuel monitoring, and driver identification.

"Development of a Low-Cost Vehicle Tracking System using GPS and GSM" by S. Rajesh and S. Sabari Nathan This paper discusses the development of a low-cost vehicle tracking system using GPS and GSM technologies. The system consists of a GPS module, a GSM module, and a microcontroller. The GPS module is used to determine the location of the vehicle, while the GSM module is used to transmit this information to a central server. The location of the vehicle can then be monitored in real-time using a web-based interface.

III. SYSTEM REQUIREMENTS

Hardware Requirements:
GPS Module: to determine the vehicle's location
Microcontroller: to control the system's overall operation
GSM Module: to send and receive data via SMS or GPRS
Power Source: battery or power supply unit
Antenna: to receive signals from GPS and GSM modules
PCB board: to connect all the components together
Enclosure: to protect the system from external factors
Software Requirements:
Programming Language: C
Integrated Development Environment (IDE): Arduino IDE, Code Blocks, or similar
Libraries: GSM and GPS libraries
Compiler: AVR-GCC or similar.
Text Editor: Notepad++, Sublime Text, or similar
Other Requirements:
Access to a vehicle for testing the system
Access to a mobile device for receiving SMS or GPRS data

IV. IMPLEMENTATION

Description of the ATMEGA328 microcontroller 32 general-purpose working registers are combined with a robust instruction set in the Atmel AVR® core. Since the Arithmetic Logic Unit (ALU) is directly coupled to all 32 registers, two separate registers can be accessed in a single instruction that is performed in one clock cycle. In comparison to traditional CISC microcontrollers, the resulting design is quicker and more code-efficient..The following characteristics are offered by the ATmega328/P: Three flexible timers and counters with compare modes and PWM, one serial programmable USART, 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes of EEPROM, 2Kbytes of SRAM, 32 general-purpose working registers, a real-time counter (RTC), three flexible timers and counters with compare modes and PWM, a 6-channel 10-channel bit ADC (8 channels in TQFP and QFN/ML, a programmable watchdogTimer with an internal oscillator, an SPI serial port, and six software-selectable powersaving modes. The CPU is turned off in idle mode, while the SRAM, timers, counters, SPI port, and interrupt continue to run. While the oscillator is frozen in the power-down state, which disables all other chip operations until the next interrupt or hardware reset, the register contents are saved. While the remainder of the device is resting in power-saving mode, the asynchronous timer keeps running, enabling the user to maintain a timer basis. To reduce switching noise during ADC conversions, the ADC Noise Reduction mode disables the CPU and all other I/O modules except the asynchronous timer and ADCWhile the rest of the device is sleeping in standby mode, the crystal/resonator oscillator is operating. This enables a very quick start-up and minimal power usage. The primary oscillator and the asynchronous timer both carry on operating in extended standby mode. For integrating capacitive touch buttons, sliders, and wheel functions into AVR microcontrollers, Atmel provides the Touch® library.Robust sensing is provided via the unique charge-transfer signal acquisition. and contains reporting of touch keys and adjacent keys that has been

entirely debounced. Suppression (AKSTM) technique for clear-cut event detection You are able to experiment with, create, and debug your own touch applications using the simple-to-use Touch Suite toolchain. The product is made with high-density non-volatile memory technology from Atmel. A traditional non-volatile memory programmer or an on-chip boot programme running on the AVR core can reprogramme the programme memory in-system using the on-chip ISP Flash's SPI serial interface.Any interface can be used by the boot programme to download the application. programme in the flash memory used for applications. While the Application Flash area is being updated, the software in the Boot Flash section will still be operational, enabling genuine read-and-write functionalityThe Atmel ATmega328/P is a potent microcontroller that offers a highly adaptable and affordable solution to many embedded control applications by combining an 8-bit RISC CPU with in-system self-programmable memory on a monolithic chip.

There are numerous applications and systems available to support the ATmega328/P. C compilers, macro assemblies, programme simulators, in-circuit emulators, and evaluation kits are examples of development tools.

V. VEHICLE TRACKING SYSTEM DESIGN

VI. SYSTEM ARCHITECTURE

GPS Device: The GPS device is installed in the vehicle and is responsible for obtaining the vehicle's real-time location.

Communication Network: The communication network provides connectivity between the GPS device and the server. This could be a cellular network or a satellite network.

Server: The server is responsible for receiving the location data from the GPS device and processing it. It stores the location data in a database and provides access to it through an API.

Web/Mobile Application: The web or mobile application is used by the end-users to view the real-time location of the vehicle. The application communicates with the server to retrieve the location data and display it on a map.

Data Analytics: Data analytics tools can be used to analyse the location data collected over time. This can help in identifying patterns, predicting future movements, and optimising vehicle routes.

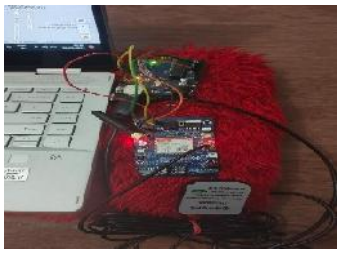
Security: Security measures should be put in place to ensure the integrity and confidentiality of the location data. This can include encryption of data during transmission and secure storage of data on the server.

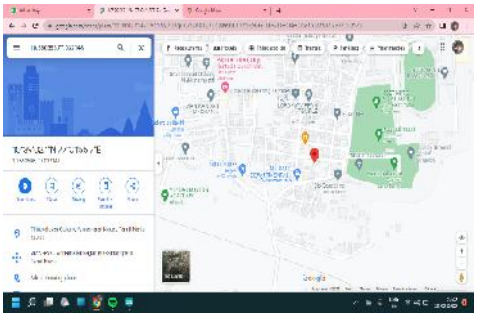
Overall, the system architecture for a vehicle tracking project should be designed to be scalable, reliable, and secure to ensure that it can handle large volumes of data and provide accurate and timely location information to the end-users.

VII. WORKING PRINCIPLE

- Obtaining GPS Data: The GPS device installed in the vehicle continuously collects location data such as longitude and latitude coordinates, speed, and direction.
- Transmitting GPS Data: The GPS device transmits the location data to the server using a communication network such as a cellular or satellite network.
- Data Processing: The server receives the GPS data and processes it to extract relevant information such as the location of the vehicle, speed, and direction of movement.
- Storing Data: The processed data is stored in a database for further analysis and retrieval.
- Accessing Data: The end-users access the data through a web or mobile application that communicates with the server. The application retrieves the location data and displays it on a map.
- Data Analysis: Data analytics tools can be used to analyse the location data over time. This can help in identifying patterns, predicting future movements, and optimising vehicle routes.
- Security: Security measures such as data encryption and access controls are put in place to ensure the integrity and confidentiality of the location data.

VIII. SIMULATION RESULT





IX. CONCLUSION

In conclusion, a vehicle tracking project involves the use of a GPS device installed in a vehicle to collect real-time location data, which is transmitted to a server for processing and storage. End-users can access the location data through a web or mobile application, allowing them to monitor the location of their vehicles, optimise routes, and improve overall efficiency. Data analytics tools can be used to analyse the location data over time, enabling fleet managers to identify patterns and optimise vehicle routes. Security measures are put in place to ensure the integrity and confidentiality of the location data. Overall, a vehicle tracking system can help improve the efficiency and safety of fleet operations, reduce fuel consumption and maintenance costs, and enhance the overall customer experience.

X. FUTURE SCOPE

- Advanced Analytics: With the increasing use of machine learning and artificial intelligence, future vehicle tracking systems can use these technologies to improve data analysis, predict maintenance needs, and optimise routes.
- Autonomous Vehicles: As autonomous vehicles become more common, vehicle tracking systems can be used to monitor and control their movements, improving safety and efficiency.
- IoT Integration: Vehicle tracking systems can be integrated with other IoT devices such as traffic sensors, weather stations, and road condition monitors to provide more comprehensive data and insights.
- Real-time Monitoring: Real-time monitoring of driver behaviour can be integrated with vehicle tracking systems to improve driver safety, reduce fuel consumption, and enhance overall efficiency.
- Blockchain Integration: Blockchain technology can be used to create secure and tamper-proof records of vehicle movements, providing an additional layer of security and transparency.
- Smart Contracts: Smart contracts can be used to automate certain aspects of fleet management, such as maintenance scheduling and payment processing, reducing administrative costs and improving overall efficiency.

REFERENCES

[1] “Vehicle tracking system using GPS and GSM modem," by A. K. Shrivastava and A. Gupta, 2014.
[2] "Real-time vehicle tracking and tracing system using GPS/GSM/GPRS technology and smartphone application," by N. O. Bassey and O. S. Samuel, 2016.
[3] "Design and implementation of a vehicle tracking system using GPS/GSM/GPRS technology and smartphone application" by M. O. Adigun, O. A. Olaniyan, and A. O. Akinola, 2018.
[4] "Real-time GPS vehicle tracking system using Arduino and mobile app" by S. Siva Subramani, S. Ramesh, and S. Karthikeyan, 2020