

IOT BASED VEHICLE TRACKING AND MONITORING USING - GPS

1

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Project Purpose:

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ABSTRACT

Generally the rise in vehicle tracking systems highlights the urgent need for improved security measures against increasing concerns of vehicle theft. The proposed system introduces an anti-theft feature, marking a significant advancement in vehicle security. This versatile tracking system extends its protective benefits to personal vehicles, taxis, cabs, school buses, and various modes of transportation, aiming to offer a reliable means for users to monitor and safeguard their vehicles. In this project, we develop an efficient vehicle tracking system using NodeMCU ESP8266, a GPS module. Our system provides real-time location tracking, speed monitoring, and remote-control capabilities. By interfacing the GPS module with NodeMCU, we extract accurate latitude and longitude coordinates. These coordinates are then transmitted over Wi-Fi to a local web server, allowing users to monitor the vehicle's location from anywhere in the world.

INTRODUCTION

Internet of Things (IoT)-based vehicle tracking using GPS is a technology that leverages the connectivity of devices to monitor and manage the location of vehicles in real-time. By integrating GPS (Global Positioning System) technology with IoT, vehicles become part of a network that enables remote tracking, monitoring, and data analysis. This system relies on GPS satellites to accurately determine the vehicle's location, which is then transmitted to a central server through the Internet.

Having GPS vehicle tracking is akin to having a watchful guardian for your vehicle, and its significance spans various facets of convenience, safety, and efficiency. Imagine always knowing precisely where your vehicle is located in real-time – it's like having a constant tether to your car or fleet. This becomes especially vital in situations where you need to find your vehicle quickly, whether it's parked in a vast lot or potentially stolen. Beyond mere convenience, the safety aspect is paramount. In emergencies or accidents, GPS tracking enables swift responses, ensuring timely assistance.

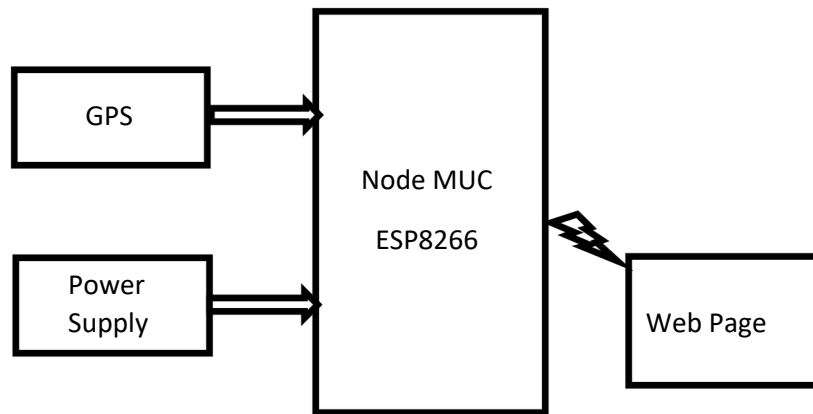


Figure.1 Block Diagram

LITERATURE SURVEY

GPS Technology and Its Applications:

Investigate research papers and articles that discuss GPS technology and its applications in vehicle tracking and monitoring.

Look for studies that describe the principles of GPS operation, accuracy considerations, and various applications in navigation, location-based services, and asset tracking.

Design and Architecture of IoT-Based Vehicle Tracking Systems:

Review literature on the design principles and architecture of IoT-based vehicle tracking systems using GPS.

Explore studies that discuss the integration of GPS modules, microcontrollers, communication protocols (e.g., GSM, Wi-Fi, LoRa), and cloud platforms to enable real-time tracking and monitoring of vehicles.

Real-Time Tracking and Location Updates:

Examine research papers and articles that discuss techniques for real-time tracking and location updates in IoT-based vehicle tracking systems.

Look for studies that describe how GPS data is collected from vehicles, transmitted to central monitoring servers, and visualized on maps or dashboards accessible to fleet managers or vehicle operators.

Route Optimization and Fleet Management:

Investigate literature on route optimization algorithms and fleet management techniques used in conjunction with GPS-based vehicle tracking systems.

Explore studies that discuss how GPS data is analyzed to optimize routes, schedule maintenance, monitor driver behavior, and improve overall fleet efficiency.

Vehicle Health Monitoring and Maintenance Alerts:

Review research papers and articles that discuss methods for monitoring vehicle health and generating maintenance alerts using IoT technologies.

Look for studies that describe how GPS data is combined with vehicle diagnostics sensors to detect abnormalities, predict failures, and schedule preventive maintenance tasks.

PROPOSED SYSTEM

Nowadays, security is the utmost concern for us, whether it is related to our assets like vehicles, homes or our children. In this case, GPS tracker devices are very useful. They can be easily used to track the real-time position of the vehicles or assets in case of any emergency like theft, accidents, etc. They can also be kept with children to track their location.

Here we are building the same GPS tracking device to monitor the real-time location of the vehicle from anywhere. Here in this IoT Vehicle Tracking System, we will also display a link on the webpage which will take the user to Google map showing the vehicle location. The NEO-6M GPS module is a popular GPS receiver with a built-in ceramic antenna, which provides a strong satellite search capability. The GPS module will be receiving the signal from the GPS satellites.

In the serial monitor you will be able to see some information like whether the WiFi is connected or not. If it is connected you will get the local IP address, here it is 192.168.237.42.

Now open a webpage from your computer (just open a page in Google chrome, Firefox or any browser) and type the IP address that we collected from the serial monitor in the address bar and press ENTER. Now you will be able to see the location, date and time displayed on your computer screen as below

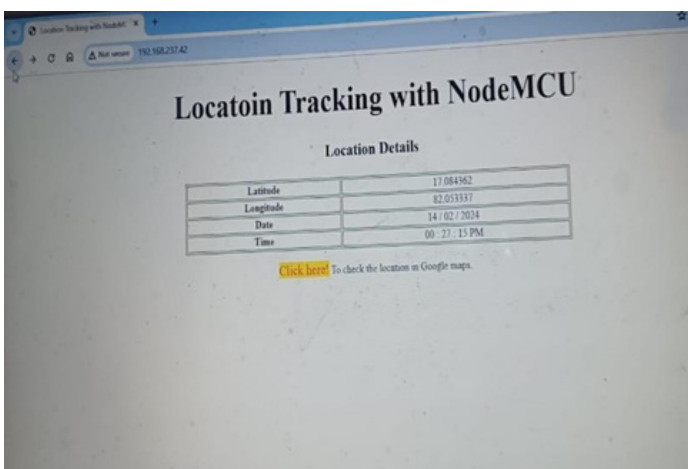


Figure.2 Webpage

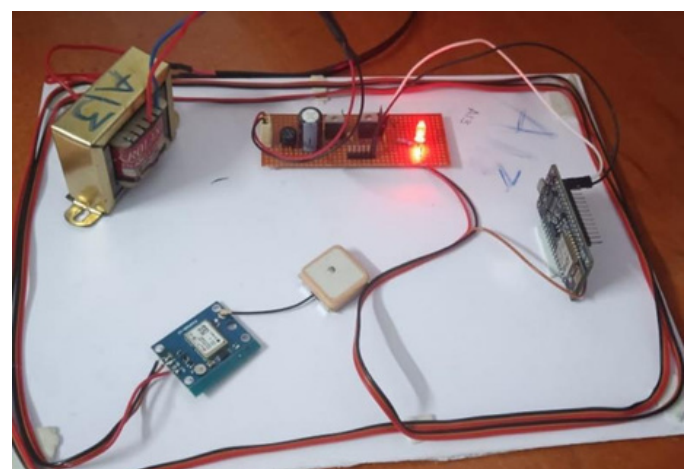


Figure.3 Working kit

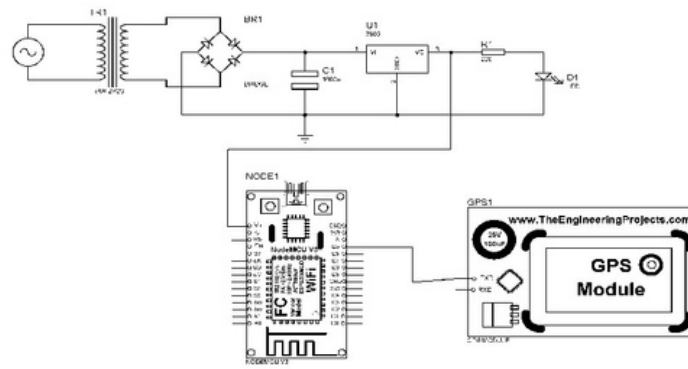


Figure.4 Schematic Diagram

RESULTS

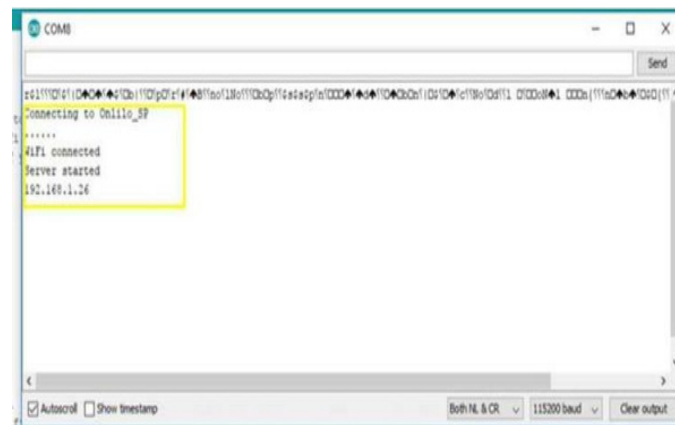


Figure.5 IP Address on Serial monitor

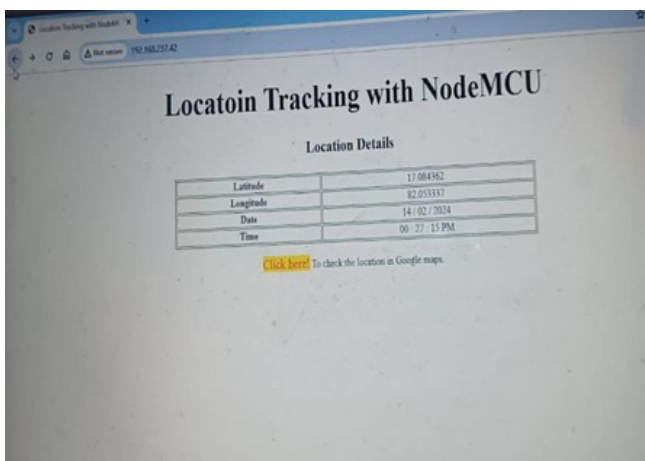


Figure.6 Location details webpage

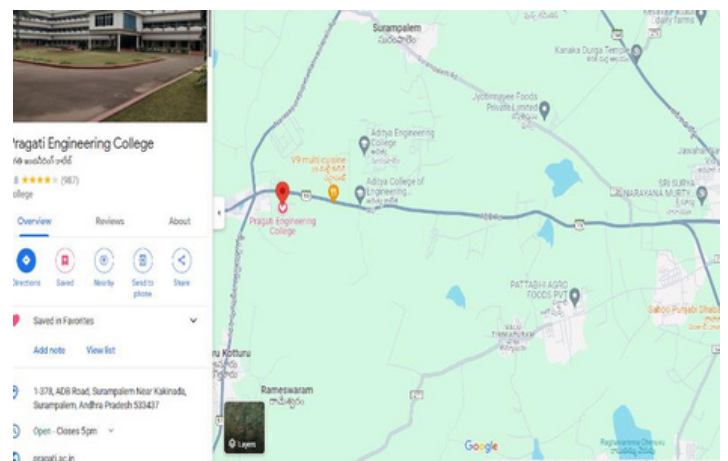


Figure.7 Location in Google maps

APPLICATIONS

Vehicle tracking is the process of locating and monitoring the movement of vehicles using GPS and other technologies. Some of the applications for vehicle tracking are:

Fleet management: Vehicle tracking can help businesses manage their fleets of cars, trucks, buses, or other vehicles more efficiently and effectively. Vehicle tracking can provide data on vehicle location, speed, fuel consumption, driver behavior, and more. This can help optimize routes, reduce costs, improve safety, and increase customer satisfaction.

Public transportation: Vehicle tracking can also help improve public transportation systems, such as buses, trains, and taxis. Vehicle tracking can provide data on vehicle availability, arrival time, occupancy, and more. This can help improve efficiency, reliability, and accessibility of public transport services, as well as reduce traffic congestion and pollution³.

Personal mobility: Vehicle tracking can enable new forms of personal mobility services, such as car-sharing, ride-hailing, and micro-mobility. Vehicle tracking can provide data on vehicle location, availability, price, and more. This can help users find and access the most convenient, flexible, and affordable mobility options, as well as reduce the need for private car ownership.

Smart city: Vehicle tracking can be integrated with other smart city technologies, such as sensors, cameras, and cloud platforms, to create intelligent solutions for urban challenges, such as parking, traffic management, road safety, and environmental monitoring. Vehicle tracking can provide data on vehicle movement, status, and impact, and help optimize the use of urban space and resources.

ADVANTAGES

Some of the advantages for IoT based vehicle tracking and monitoring using GPS are:

Real-time visibility: You can track the location, speed, and status of your vehicles in real-time, which can help you optimize routes, make quick decisions, and respond to emergencies¹².

Improved asset utilization: You can analyse data on vehicle usage, idle time, and mileage, and identify underutilized assets and optimize their allocation. This can help you maximize the efficiency and lifespan of your vehicles, and reduce fuel and maintenance costs¹².

Enhanced route optimization: You can plan intelligent routes based on factors such as traffic, weather, and road conditions, and minimize travel time and fuel consumption. This can help you reduce operational costs and environmental impact. Overall, the vehicle tracking and monitoring using gps module can be done

CONCLUSION

IoT-enabled GPS trackers can enable new forms of personalized mobility services, such as car-sharing, ride-hailing, and micro-mobility. These services can offer users more convenience, flexibility, and affordability, as well as reduce the need for private car ownership. IoT-enabled GPS trackers can also be used to monitor and manage public transportation systems, such as buses, trains, and taxis. This can help improve efficiency, reliability, and accessibility of public transport services, as well as reduce traffic congestion and pollution³.

FUTURE SCOPE

Vehicle tracking and monitoring using GPS in IoT is a rapidly evolving field that has many potential applications and benefits. Some of the future scope for this technology are:

Enhanced fleet management: IoT-enabled GPS trackers can provide real-time data on vehicle location, speed, fuel consumption, driver behavior, and more. This can help fleet operators optimize routes, reduce costs, improve safety, and increase customer satisfaction¹².

Improved public transportation: IoT-enabled GPS trackers can also be used to monitor and manage public transportation systems, such as buses, trains, and taxis. This can help improve efficiency, reliability, and accessibility of public transport services, as well as reduce traffic congestion and pollution³.

Personalized mobility services: IoT-enabled GPS trackers can enable new forms of personalized mobility services, such as car-sharing, ride-hailing, and micro-mobility. These services can offer users more convenience, flexibility, and affordability, as well as reduce the need for private car ownership