GPS GEO-FENCING

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Abstract: This paper presents a study on a GPS-based vehicle location monitoring system with geo-fencing capabilities. The system provides high-security message against their ward's vehicle movement and issues alerts to users based on location boundaries using Internet of Things (IoT) technology. The system can easily monitor and track a ward's vehicle's location and issue alerts when the vehicle exits the geo-fenced area. The system has two main components: hardware and software. The hardware includes an Arduino nano, NodeMCU and GPS module. The software uses Google Maps and an IoT platform. The parent can monitor the vehicle via mobile phone. Registered phone number alerts are sent to the parent when the vehicle exits or enters the geo-fenced area. The prototype system was tested by moving the vehicle around the geo-fenced area. Results showed correct location tracking of the vehicle and phone number notifications upon exiting or entering boundaries.

Keywords: GPS location monitoring, geo- fencing, internet of things, vehicle tracking

I.   INTRODUCTION

Security systems and navigators have always been essential tools for human life. Advancements in electronics have led to revolutionary changes in these fields. Vehicle tracking is a serious issue faced by many parents, especially parent whose child having a vehicle. There is currently no reliable way to monitor vehicle movement or determine a vehicle's present condition and location. A GPS-based vehicle tracking system is one clear method for keeping track of vehicles. The Global Positioning System (GPS) is a satellite-based navigation system that always provides dependable location and time information anywhere on Earth and in all weather conditions. The goal is to solve the location tracking problem by employing a GPS monitoring system with geo-fencing capabilities to track vehicles. This system would comprise several key components combining satellite communication technologies to relay a vehicle's location to remote users. Geo-fencing enables remote oversight of geographic areas surrounded by a virtual boundary (geo-fence) with automatic alerts when tracked mobile objects enter or exit these areas. Geo-fence applications and tools monitor devices or other physical objects entering or exiting established geo-fenced areas, alerting administrators of any changes in device status.

II.   DISCUSSION

The system has been tested for its reliability, functionality, stability, and accuracy. The results were separated into two parts which were the hardware and software. The hardware components used were the Arduino nano, NodeMCU module and GPS module.

For the software, Arduino IDE IoT cloud was used as a platform for this system. The hardware was tested for its efficiency, functionality, and compatibility with the software. The whole system was then tested for the stability of the hardware and software interfacing with one another. The system was tested in real- time to make sure that the functionality of the hardware and software was in a stable condition.

III.   SUMMARY

This paper proposes a GPS-based vehicle monitoring system with geo-fencing capabilities to track vehicles and alert parents when their child's vehicle exits predefined boundaries. The system consists of hardware and software components. The hardware includes an Arduino nano, NodeMCU, and GPS module. The software uses Google Maps and an IoT platform. Parents can monitor the vehicle location via mobile phone. When the vehicle exits or enters the geo-fenced area, SMS alerts are sent to registered phone numbers.

The system was tested by moving the vehicle around the geo-fenced area. The tests showed that the system correctly tracked the vehicle location and sent notifications upon exiting or entering boundaries. The hardware components worked efficiently and compatibly with the software. The whole system was stable and functioned properly in real-time testing, demonstrating the reliability of the GPS monitoring system with geo-fencing capabilities.

IV. CONCLUSION

The proposed GPS-Based Location Monitoring System with Geo-fencing Capabilities efficiently located vehicles on a map by integrating multiple communication technologies, including hardware and software components. The system Sent alerts through message displayed vehicle positions on Google Maps . This could help reduce child's movement during their class hours by providing accurate tracking. Testing demonstrated excellent results for this system. It can monitor position and navigate vehicles within 100 meters of accuracy. This positioning and navigation capability offers utility for monitoring vehicle location.

REFERENCES

[1]. M. Mukhtar, "GPS-based advance vehicles tracks and vehicles controls-systems," Int, J. Intell, Syst, Appl., vol. 7, no. 3, p. 1, 2022.

[2]. A. Damani, H. Shah, K. Shah, and M. Vala, "Global positions-systems for objects tracks," Int, J, Comput. Appl., vol, 109, no, 8, p. 3977–3984, 2022

[3]. M. Rouse, "What is geo-fencing (geofencing)? Definition from WhatIs.com", WhatIs.com, 2021. [Online] Available.

[4]. Le-Tien, T. and Phung-The, V. 2010. Routing and tracking system for mobile vehicles in a large area. Içlude Proceedings 5th IEEE International Symposium on Electronic Design, Test and Applications, DELTA 2010 297–300.

[5]. Beeco, J. A., Hallo, J. C., and Brownlee, M. T. J. 2020. GPS Visitor Tracking and Recreation Suitability Mapping. Tools for understanding and managing visitor use. Landscape and Urban Planning, 127, 136–145.