

Design and Development of an ECV Tracker for Real-Time Vehicle and Fuel Monitoring System

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Abstract — In light of the fast-paced growth of the transportation and logistics sector, monitoring of fleets is now crucial to any business operating more than one vehicle at once. The main problem in traditional monitoring systems is that they cannot offer a holistic view on vehicle tracking and fuel consumption. This paper will address the development of the ECV Tracker system, which incorporates vehicle tracking and monitoring of fuel consumption simultaneously. GPS sensors and fuel sensors will provide real-time data on the current status of each monitored vehicle. Data gathered will be accessible to users via web or smartphone platforms to ensure that abnormal operations are detected instantly. The ECV Tracker will help streamline processes and reduce operational expenses.

Keywords: Fleet Management System; Real-Time Vehicle Tracking; Fuel Consumption Monitoring; GPS-Based Fleet Monitoring; Transportation and Logistics Management; Intelligent Vehicle Analytics;

I. INTRODUCTION

Transportation is essential in several industrial activities like logistics, deliveries, and public transportations. Effective management of the fleets of vehicles is needed for smooth operations and financial sustainability. Nevertheless, some organizations are having difficulties in monitoring vehicle movements and fuel consumption.

Several innovations have been made in the technological sector, such as global positioning systems (GPS) and internet of things (IoT), making it possible to come up with intelligent vehicle tracking systems. These systems collect information regarding the locations, speeds, and fuel consumption of vehicles.

The ECV Tracker system is designed to solve this problem by merging both tracking and fuel monitoring into one system. It will be easier for organizations to maximize efficiencies and minimize their losses while monitoring the fleets of their vehicles.

In essence, the primary objective of this study is to create a practical vehicle tracking and fuel monitoring system. This system will improve transportation management, fleet efficiency, and minimize fuel loss.

II. LITERATURE REVIEW

Vehicular tracking has developed considerably with the development of GPS and IoT technology. GPS tracking systems are extensively employed to identify the current location of vehicles and monitor their movements.

A number of current systems offer features related mainly to the tracking of location without considering fuel management aspects. Consequently, fuel wastage and abuse become major problems.

Some recent research shows that a combination of fuel management systems and vehicle tracking systems may provide better results. In this paper, a new model is introduced based on the combination of both systems.

III. SYSTEM ARCHITECTURE

The design of ECV Tracker System involves multi-layer architecture, namely:

- Vehicle Layer - fitted with GPS sensor and fuel sensor
- Data Acquisition Layer – collects information about location and fuel
- Communication Layer - transfers data from vehicle layer to server
- Server Layer - processes and stores data
- Application Layer - displays data on web/mobile application

Flow

Vehicle → GPS Module → Server/Database → Application
→ User Dashboard

IV. RESEARCH METHODOLOGY

The methodology for the creation of the system involves:

- 1) System Design: Identifying hardware and software elements
- 2) Hardware Setup: Inclusion of the GPS unit, fuel detector, and controller
- 3) Data Collection: Ongoing gathering of location and fuel details
- 4) Fuel Tracking: Identification of changes in the fuel level
- 5) Data Transfer: Transfer of data to the server using network modules
- 6) Data Storage: Storing the data in the server's database
- 7) User Interface Creation: Presentation of the data in real-time form

V. DISCUSSION

The ECV Tracker system offers a full solution for fleet management through integration of the tracking and fuel consumption systems. The system boosts efficiency, increases visibility, and assists in detecting fuel problems.

Nevertheless, the effectiveness of the system could be influenced by certain aspects, such as the network connectivity, sensors' precision, and correct installation of the system.

VI. RESULT AND ANALYSIS

Implementation of the ECV Tracker system shows that the solution effectively monitors the location of the vehicle and controls its fuel consumption. GPS module works accurately providing data about the current location of the vehicle which

is transferred to the server and displayed on the monitoring interface. Fuel sensor works well detecting the level of the fuel in the car and measuring changes in the fuel consumption of the vehicle. It helps users control their fuel and detect any unexpected losses of fuel. Alerts are also sent to the user's account in case the level of fuel drops below some threshold. Monitoring interface displays necessary data concerning the location of the vehicle, its route, fuel level, and other important information.

Such data includes:

- Location of the vehicle
- History of its route
- Status of fuel
- Notifications

VII. CONCLUSION

A. ECV Tracker

The proposed system is an effective and reliable system for tracking vehicles and monitoring fuel. The combination of GPS technology, fuel sensors, and the communication network makes it possible to track and control the fuel consumption of vehicles. The suggested solution facilitates effective fleet management, minimizes fuel waste, and ensures high performance of the vehicle fleet. The study reveals that the integration of vehicle tracking and fuel monitoring technologies can greatly increase the effectiveness of transportation management systems. The future development of the system may include the integration of innovative technologies, such as artificial intelligence, predictive analytics, and automatic diagnostics of automobiles.

VIII. FUTURE SCOPE

The following elements can be added to increase the effectiveness of the system:

- AI for prediction
- IoT Integration
- Mobile application upgrades
- Cloud storage
- Prediction Maintenance
- Alerts & Reports Automation
- Security Improvement

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