Chapter 4
Fleet Management System Using IoT and GPS With Fuel Monitoring

Karuturi Sri Mani Krishna

http://orcid.org/0009-0001-9938-0562
Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India

R. Rajesh
Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India

B. Surendra
Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, India

ABSTRACT

The rapid advancements in Internet of Things (IoT) and Global Positioning System (GPS) technologies have revolutionized fleet management systems, enabling real-time monitoring and optimization of vehicle performance, fuel consumption, and overall fleet efficiency. This chapter explores the integration of IoT and GPS with fuel monitoring systems, highlighting their transformative impact on fleet operations. By leveraging IoT sensors and GPS tracking, fleet managers gain valuable insights into vehicle health, fuel usage, and driver behavior, leading to data-driven decisions that reduce operational costs and enhance productivity. Predictive maintenance algorithms further optimize performance by identifying potential issues before they cause breakdowns. The chapter also examines the environmental benefits of optimized

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fuel management and the role of data analytics in improving fleet decision-making. Case studies highlight the real-world impact of these technologies in enhancing fuel efficiency, reducing downtime, and improving maintenance strategies.

INTRODUCTION

Fleet management plays a critical role in ensuring the smooth operation of transportation and logistics sectors, where efficient management of vehicles and resources directly impacts operational costs, safety, and productivity (Nagesh et al., 2025). Traditionally, fleet management has faced challenges such as poor visibility into vehicle performance, inefficient fuel consumption, and maintenance management (Rudrusamy et al., 2023). These inefficiencies often lead to increased operational costs, vehicle downtime, and a lack of real-time insights into fleet performance (Farahpoor et al., 2023). In response, emerging technologies like the Internet of Things (IoT) and Global Positioning System (GPS) have provided solutions that allow fleet managers to overcome these obstacles (Hapsari et al., 2021). Integrating IoT sensors and GPS tracking technologies into fleet management systems has revolutionized how fleets are monitored, optimized, and maintained, providing real-time data on vehicle performance, fuel usage, and location (Rathnayaka et al., 2021).

IoT-based fleet management systems enable continuous, real-time monitoring of various vehicle parameters, such as speed, fuel levels, engine health, and tire pressure (Chaganti et al., 2024). Sensors installed in vehicles transmit this data to a central server, where fleet managers can access it remotely via cloud-based dashboards (Degadwala et al., 2023). This integration enhances visibility, allowing fleet operators to track each vehicle's location, monitor fuel consumption, and analyze driver behavior (Prabhu et al., 2022). By leveraging these data points, fleet managers can identify inefficient driving habits, optimize routes to reduce fuel consumption, and pinpoint maintenance needs before they lead to costly breakdowns (Tulloh et al., 2021). IoT and GPS have shifted fleet management from a reactive to a proactive system, enabling early identification and resolution of problems (Chandana et al., 2023).

Several recent studies have explored IoT and GPS-based fleet management systems from different perspectives; however, their approaches vary in scope, implementation, and effectiveness. For instance, some studies primarily focus on real-time vehicle tracking and monitoring, emphasizing location accuracy and route optimization, while others concentrate on fuel consumption analysis and theft detection using sensor-based approaches. Although these models demonstrate improved operational visibility, many of them lack integration with predictive analytics for proactive decision-making. Existing research often treats key components such as