A Fleet Tracking Analytics and Visualization System Using GPS and SMS Technologies with Dijkstra-Based Route Optimization

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Abstract

Efficient fleet management is essential for transportation and logistics organizations to optimize vehicle utilization, reduce operational costs, and improve service delivery. However, conventional fleet monitoring methods often rely on manual reporting and fragmented communication, resulting in delayed information and inefficient decision-making. This study developed and evaluated a Fleet Tracking Analytics and Visualization System that integrates Global Positioning System (GPS) technology, Short Message Service (SMS) notifications, and Dijkstra's Algorithm for route optimization. The system was developed using the Waterfall Software Development Life Cycle (SDLC) and implemented through a web-based dashboard and a mobile application. Data were collected from twenty-three (23) respondents, including fleet managers, dispatchers, and drivers, through interviews, surveys, and observations. Evaluation using the ISO/IEC 25010 Software Quality Model yielded an overall mean score of 4.50, indicating that the system was acceptable to its intended users. The findings demonstrate that integrating GPS tracking, SMS communication, route optimization, analytics, and visualization improves fleet visibility, communication efficiency, and operational decision-making. The proposed system provides a practical solution for enhancing modern fleet management operations.

Keywords

Fleet Tracking, GPS Technology, SMS Technology, Fleet Analytics, Data Visualization, Dijkstra's Algorithm, Route Optimization.