



# FMS Dashboard - Descriptive Analytics and Preventive Maintenance

Monci Arulraj, K. Kalaivani, K. Ulagapriya

**ABSTRACT:** Fleet tracking or vehicle tracking allows businesses in a variety of industries to keep track of their vehicle fleet in a convenient and cost-effective manner. But with IOT devices connected to each vehicle, it produces huge amount of data, which is an overload to the users of Fleet Management System (FMS). This data itself is not valuable unless it can be analyzed and interpreted correctly. Quality data can help fleet owners to understand the efficiency, driver safety, expenses and profitability of owning and managing their fleet. In this proposed work, we developed a dashboard for the existing Fleet Management System which will provide descriptive analytics and support in preventive maintenance of the fleet. The FMS Dashboard is a key module of the FMS system. This module uses GPS data like vehicle starts, stops, and idling, fuel consumption, engine running hours, vehicle speeds and location from each vehicle to provide real-time useful insights on vehicle activity, driver behavior and tracking of fleet. Based on historic data, descriptive analytics will summarize past performance of the vehicle to enable users to plan for maintenance to perform. Also preventive maintenance reports helps the fleet owners to estimate, when the vehicle service is due and plan for the same. Apart from this, vehicle can be tracked real-time in Google Maps.

**KEYWORDS:** Fleet tracking, Descriptive analysis, Preventive maintenance.

## I. INTRODUCTION

Fleet Management is an imperative tool used by the public sectors as well as privately owned organizations; we admit the fact that numerous public establishments have to be able to manage a fleet of vehicles in order to function the community. For example, a private transport service company has its own fleet of vehicles which has to be managed in the preeminent way. The Fleet Management that is in use now is being materialized through a Fleet Management System (FMS). The Fleet Management System takes account of all the necessary resources and equipments for a company or a public firm for it to manage its fleet with the target to lessen the threats accompanying with the vehicle investment, expand efficiency, productivity, implement just-in-time and decrease the total transportation and staff expenses.

If this is associated with the above cost slicing, in addition to the fact that the cost for a Fleet Management System can be reduced dramatically due to the manifestation of new technologies, it reflects a rapid pay back for the investment on a FMS. This is the motive why these systems are becoming very prevalent in recent times.

## II. LITERATURE SURVEY

Jacek Mazurkiewicz [2] suggests that the performance of the system can be compromised by quite a few types of errors associated to the transport vehicles, communication infrastructure or even by traffic overcrowding. The transport system is scrutinized from the functional opinion, focusing on business service comprehended by a system. In this paper a heuristic approach and the neural network based clarification is stated to solve this problem. The system is defined by the recognized model, which consists of reliability and functional constraints of transport system. The proposed, novelty approach can aid for practical unraveling of critical management hitches related to an organization of transport systems. The advantages of this proposed paper are simulated Traffic, using processing logic and models unfolding vehicle driving conduct such as car-following and lane-changing models. It is used to track the real-time traffic state and then, to describe strategy to cut congestion in urban transportation networks.

Iman M. Almomani[4], proposes a framework that does not just give the conventional web-based tracking software, but it also provides a mobile software that qualifies anytime and anywhere tracking services for an extensive range of users. The framework additionally means to make vehicle following serene and progressively open for a particular user in addition to fleet enterprises. The proposed framework licenses individuals to find the area of their vehicles, speed, stops and movements. A key concern is for the parents who wish to monitor their teen drivers. The framework is utilized in observing a given car when someone else is driving it. The checking procedure contains setting speed and topographical points of confinement, achieving history reports of the vehicle's exercises or continuous following of its area. In addition to getting SMS alerts informing certain events, this framework can likewise be utilized to evade vehicle burglary by combining the gadget with the vehicle caution and furthermore achieving a guide including the vehicle area if the vehicle is believed to be stolen. Following vehicles in this framework requires utilizing a wide scope of new advances and correspondence systems containing the Internet or the World Wide Web, General Packet Radio Service (GPRS), Global Positioning System (GPS) and Global System for Mobile Communication (GSM).

Manuscript published on 30 September 2019

\* Correspondence Author

**Monci Arulraj**, Department of Computer Science and Engineering, Vels Institute of Science, Technology and Advanced Studies (VISTAS).

**K.Kalaivani**, Department of Computer Science and Engineering, Vels Institute of Science, Technology and Advanced Studies (VISTAS).  
kakai.se@velsuniv.ac.in

**K.Ulagapriya**, Department of Computer Science and Engineering, Vels Institute of Science, Technology and Advanced Studies (VISTAS).

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an [open access](https://creativecommons.org/licenses/by-nc-nd/4.0/) article under the CC-BY-NC-ND license <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

Knowing where the vehicles are, what the drivers doing and checking each occasion continuously is the key limitation for a well-managed decision-making practice. HamedSaghaei [7], proposed a novel methodology for control and checking of a vehicle management system with the executives framework utilizing three segments including GPS/GLONASS-based programmed vehicle locators (called Rad100),

GPRS/SMS GSM cell system and electronic programming (called PayaRadyab) is proposed to demonstrate precise area of the ideal vehicle on various maps and take a thorough report of the mission, voyaged way, fuel utilization rate, speed limits, and other fundamental information as per the clients demands. The most considerable component of the proposed framework is its worldwide covering, high precision of situating, simple task by the client at any area, and easy energy management. In this investigation, it is structured and developed more than 50 Rad100 trackers and furthermore modified electronic web-based PayaRadyab programming in which their execution and exactness have been for quite some time built up by the down to earth results in various conditions.

Yekutiel A. Novik [6], relates Global Positioning System (GPS) tracking software which allows the user of the software to exhibit text data on the computer system. All the more especially, the present advancement identifies with bi-directionally and progressive partner and coordinating the content information, graphical presentation, and intelligent correspondence elements of the following programming. The present advancement is for a framework for following and graphically showing the areas of vehicles in an armada and interfacing with the vehicles from a base station. The vehicles in the organization are braced with a G.P.S. collector and convey the G.P.S. data to a base station. A collector at the base station secures the data. A computer framework associated with the beneficiary at that point utilizes this data to show the area of the vehicle utilizing mapping and the following programming. The framework comprises of updated software which refreshes content information in a database, refreshes the graphical portrayal of the vehicle, bi-directionally and progressively connects and coordinates the content information with the graphical delineation of a vehicle. The content information in the database incorporates data identifying with the vehicle, the driver, the timetable of the armada just as data including the fleet. A client can choose a vehicle utilizing a selector; the update software can convey data identifying with content information. On the off chance that the client chooses data identifying with a vehicle or driver utilizing the selector, the update software gives the graphical portrayal of the chosen vehicle or driver. The framework additionally has various highlights enabling a dispatcher to collaborate with the driver in conveyance and vehicle task.

Ahmad Aljaafreh, MajdiKhalel, et al [5]introduces a vehicular information acquisition and examination framework for fleet managing computerization. This framework configuration is based on remote systems administration innovation (Wi-Fi), which does not require a base station to transfer the gathered information to a web server. Information gathered in a database shapes the establishment for basic decision making, execution checking, remote diagnostics, and vehicle and driver performance optimization. The fundamental pieces of this

structure are in-vehicle inserted framework and vehicle screen server and database. The in-vehicle inserted framework accomplishes the area of the vehicle from the GPS collector, the vehicle status from OBD interface, and the driver ID from the RFID. At that point, the in-vehicle inserted framework associates the vehicle to a web server over Wi-Fi system to transmit the gathered information when the vehicle comes back to the parking place. Other than the steadfastness and cost adequacy of this framework, it additionally can be utilized for inter-vehicle correspondence and traffic observing.

### III. PROPOSED SYSTEM

#### A. System Architecture of Fleet Management System

The fleet management system is responsible for attaining, processing and producing informational reports for better use of the system, the infrastructure, and the amenities. The System architecture is depicted in Fig1.This includes all systems and tools necessary for providing supervision to the vehicles as well as management of the fleet. In case of any inconveniences in the fleet, it can be brought to the notice of the Admin or the owner in prior. By this system the organization can be benefitted in various aspects, it will be cost-effective, competent as it keeps a track on the idling time and the running time of the vehicle. Tracking down the fuel consumption and speed it can help the organization to widen their options based on the vehicle or the driver. When it comes to technical trait, the system application runs irrespective of the system connectivity protocol. An overall analysis based on the reports will reflect an efficient strategy of FMS. It is Real-Time as it keeps a trajectory of the vehicle and it provides the user with the descriptive analysis and preventive maintenance report of the fleet. It keeps a track on all the vehicles present in the fleet and based on the data acquired from the GPS and other sensors a report is generated. This generated report is then analyzed on the basis of the prevailing data from the history and a graphical and statistical representation is produced. It uses Java as a main platform where using spring boot the application is built.

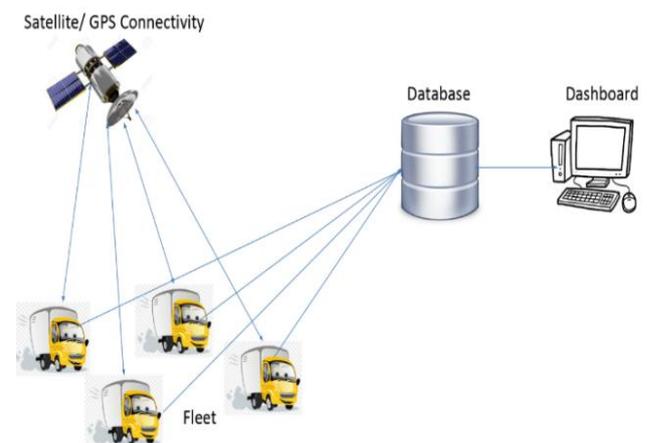


Fig. 1. System Architecture of Fleet Management System

**IV. PHASES IN FLEET MANAGEMENT SYSTEM**

The various phases in fleet management system are

- User Management
- Organization Management
- Fleet Management
- Driver Management
- Device Management

**A. User Management**

User or in most cases the Admin information is taken as the input and retrieved according to necessity. This is done to avoid unauthorized log in. The admin will be able to add new drivers and vehicle or remove the existing ones. The user can view all the primary details and provide an insightful report on the organization and analyze the Vehicle along with the HR requirements.

**B. Organization Management**

Organization management will have a record of all the basic information of the organization to which the vehicles (fleet) belong. It will be used to store and retrieve data such as Organization ID and Name of the Organization. Another set of separate inputs will be taken at the time of logging such as, Created By and Created time in order to maintain a record of system access.

**C. Fleet Management**

This will help the users easily to locate the vehicle; its role is within the organization and to check technical status of the vehicle such as Fuel consumption, Vehicle destination, Vehicle speed, Vehicle activity, Driver’s Id, Driver’s performance.

**D. Driver Management**

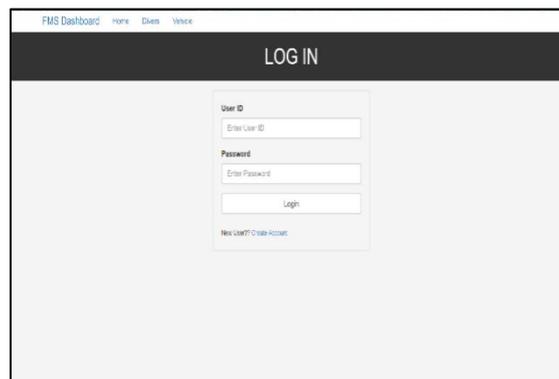
Registration of driver or adding, updating and removing an existing driver is carried out in this module. This keeps a complete registry in the database which includes Driver name, Driver Id, address, contact information and information relevant to the vehicle he has been assigned to.

**E. Device Management**

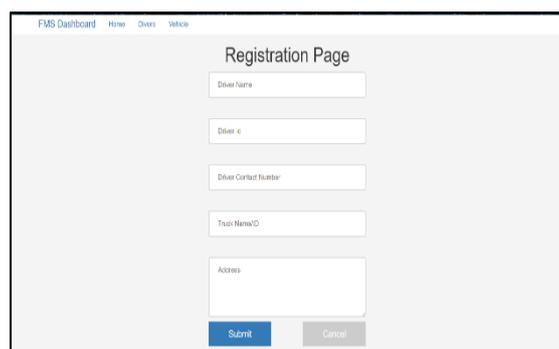
Device management here signifies the GPS device management. The details such as Device id and its associated vehicle is taken as the input. This device also helps in viewing the vehicle’s behavior thus by monitoring the vehicle’s running time and its idling time.

**V. RESULTS**

There are various registration pages through which the vehicles, driver as well as the organization can register themselves. And using the Login page, the registered members of the organization can access the dashboard in order to view and generate the report. The registration pages, vehicle details, driver information, user data table in the organization database and the generated sample reports are shown in fig. 2 – fig.8.



**Fig.2. Login page**



**Fig.3. Registration page**

# FMS Dashboard - Descriptive Analytics and Preventive Maintenance

Fig.4. Driver Registration Page

Fig.5. Vehicle Registration page

Result Grid | Filter Rows: | Edit:

	userid	username	roleid	rolename	cmpnyid	password
▶	001	John	3	admin	841	C@87JK
	002	Ravi	3	admin1	852	Med@89
	003	Rajesh	1	emp	854	Ty12345
	004	Sachin	3	admin	863	hR@197
	005	Azad	4	emp1	882	Po854s1
	006	Peter	1	emp	874	As5486s

Fig.6. Organization Database

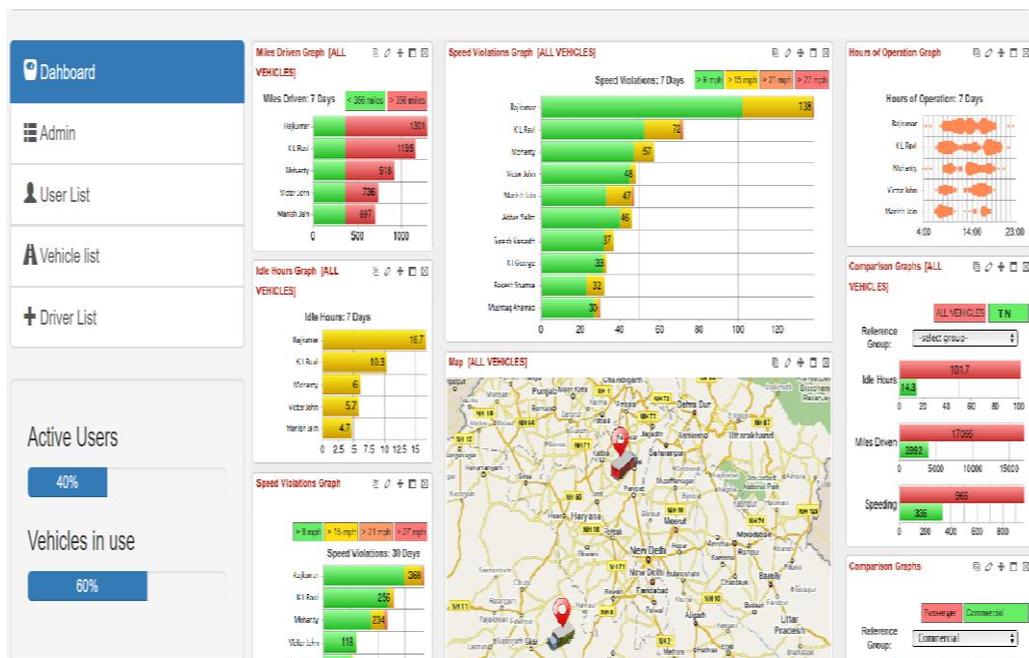


Fig.7. FMS Dashboard



Fig.8. Reports

VI. CONCLUSION

In this proposed work, Fleet Management System using Java web application satisfies all the needs of admin, organization, driver, and vehicle by providing fast and accurate information about vehicles using GPS acquired datasets. It also gives an insight of how the organization can carry out its business efficiently with proper and premeditated plans with its corresponding goal line. Thus by generating the analytical report and presenting it on the dashboard.

REFERENCES

1. Fleet Management System, [http://en.wikipedia.org/wiki/Fleet\\_Management\\_System](http://en.wikipedia.org/wiki/Fleet_Management_System).
2. JacekMazurkiewicz, Tomasz Walkowiak "Fleet Management analysis in discrete transport systems" Transport and Telecommunication, Volume 11, No 3, 2010.
3. J. R. Coffee, R. W. Rudow, R. F. Allen, M. Billings, D. A. Dye, M. L. Kirchner, R. W. Lewis, K. M. Marvin, R. D. Sleeper, and W. A. Tekniepe, "Vehicle tracking, communication and fleet management system," Google Patents, 2003.
4. Iman M. Almomani, Nour Y. Alkhalil, Enas M. Ahmad, Rania M. Jodeh "Ubiquitous GPS Vehicle Tracking and Management System", IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT),2011.
5. Ahmad Aljaafreh, MajdiKhalel, Islam Al-Fraheed, KafaAlmarahleh, Rwan Al-Shwaabkeh, Saja Al-Etawi, WaedShaqareen "Vehicular data acquisition system for fleet management automation",IEEE International Conference on Vehicular Electronics and Safety, 2011.
6. Yekutiell A. Novik "System and method for fleet tracking", Unites States Patent, 2002.
7. Hamed Saghaei "Design and Implementation of a Fleet Management System Using Novel GPS/GLONASS Tracker and Web-Based Software", International Conference on New Research Achievements in Electrical and Computer Engineering, 2016.