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Fleet Management IOT

Shiva Prasad Gupta[1], Saumya Vatsyayan[2]

[1]BBA, School of Business, Galgotias University
[2]Guide, School of Business, Galgotias University

Abstract

The Internet of Things (IoT) and big data have become popular subjects in recent years. New applications, like predictive maintenance, are possible with all this data being created. For a fleet of public transportation buses, consensus self-organized models approach (COSMO) is an illustration of a predictive maintenance system that aims to identify malfunctioning buses that diverge from the rest of the fleet. The current work suggests an innovative IoT architecture for preventativemaintenance and a semi-supervised machine learning method that aims toenhance the COSMO sensor selection process.

Fleet maintenance is a crucial exposure to improve availability in fleet management. One such important factor that is taken into account regardless of the actual flaws sets up the need for repair and replacement costs as well as the time associated with them. This is periodic and preventative maintenance. As technology has advanced, IOT and big data have been discussed. With all the data being generated, this system can be used for predictive maintenance. Through better maintenance planning and the elimination of pointless maintenance jobs, IOT-based predictive maintenance can improve fleet availability, stability, and efficiency.

Introduction

Recent years have seen incredible growth for e-commerce. Supply chain management is a method for meeting customer expectations and lowering supply chain costs spanning suppliers' and consumers' activities, from the acquisition of raw materials to product manufacturing, shipping, and sales. Reduced transportation costs, which include fleet management and maintenance, make up only one-third of the total operating costs. As a result, fleet management is essential for cost savings because it enhances fleet scheduling, operational efficiency, and effectiveness. This also provides data management for maintaining the fleet. Allocating and scheduling resources based on repair, replacement, and preventative maintenance are among the actions involved in fleet maintenance management. Fleet managers and businesses with sizable fleets invest a lot of money, time, and resources in maintaining their

The world is expanding so quickly that people are even looking into waysto colonies Mars. In addition to digitising everything, we are working to make sense of the data collected by these gadgets and sensors. One of the technologies we utilize on a daily basis is the internet of things (IoT). In reality, IoT is leading the way for many enterprises when it comes to fusing connectivity with digital capabilities. In 2025, there will be 41.6 billion linked IoT devices, or "things," producing 79.4 zeta bytes (ZB) of data, according to a forecast by International Data Corporation (IDC). IoToffers a wide range of uses in business and industry, including infrastructure, agriculture, home automation, and other fields.

IoT is important for logistics and transportation as well. This article will discuss the advantages of IoT applications for fleet management. Hence, fleet management can be defined as the large-scale management of commercial vehicle operations. Any type of vehicle, including buses, ships, trucks, and cars, can be included in a fleet. Fleet management is notan easy task; in fact, if a fleet is not operating effectively, its owner may incur significant costs or losses. Even so, a lot of fleet businesses track their fleets using antiquated ways, which is completely ineffective. IoT can help in this situation. The fleet management system could undergo a complete transformation thanks to IoT. IoT sensors or devices are widely available in.

Statement of the problem

When evaluating fleet management in the context of IoT (Internet of Things) involves the need to effectively manage and optimize the operations of a fleet of vehicles using IoT technologies. This includes the challenges of monitoring the performance and health of individual vehicles, tracking their location and movement in real-time, managing fuel consumption and maintenance schedules, ensuring driver safety and compliance with regulations, and optimizing route planning and dispatching.

Additionally, fleet managers need to deal with the large amounts of data generated by IoT devices such as GPS trackers, sensors, and cameras, andmake sense of this data to make informed decisions about how to improvefleet efficiency and reduce costs.

Other challenges include ensuring the security of data transmitted over IoT networks, managing the complexity of integrating different IoT devices and platforms, and providing training and support to drivers and other personnel who use IoT-enabled fleet management systems. Ultimately, the goal of fleet management in the IoT era is to improve the overall efficiency, safety, and profitability of fleets while reducing their environmental impact.

Objective of the study

- To research how Internet of things (iot) helps in fleet management.
- TO research fleet management effect in future

Research Methodology

Preliminary data mining

Technical issues and trends are obtained from surveys, technical symposia and trade journals. Technical data is also gathered from intellectual property perspective, focusing on white space and freedom of movement. Industry dynamics with respect to drivers, restraints, pricing trends are also gathered. As a result, the material developed contains a wide range of original data that is then further cross-validated and authenticated with published sources.

Statistical model

Our market estimates and forecasts are derived through simulation models. A unique model is created customized for each study. Gathered information for market dynamics, technology landscape, application development and pricing trends is fed into the model and analyzed simultaneously. These

factors are studied on a comparative basis, and their impact over the forecast period is quantified with the help of correlation, regression and time series analysis. Market forecasting is performed via a combination of economic tools, technological analysis, and industry experience and domain expertise.

Econometric models are generally used for short-term forecasting, whiletechnological market models are used for long-term forecasting.

Using IoT for Fleet Management The four steps that an IoT fleet management system follows are as follows:

1. Data collection and filtering:

IoT devices gather a lot of data, and it's critical to know which types of data are relevant to our businesses. The fleet management system places aspecial emphasis on data like driver behavior, idle time, vehicle speedand location, fuel, load, and temperature data. Data from the vehicle is collected by the GPS and OBD sensors and transmitted to the localgateway over a mobile connection.

2. Data transmission:

For further analysis, the captured data is sent to cloud storage. Depending on the preferences of the users, there are numerous data transfer methods available. NFS, GSM, WiFi, Bluetooth, RFID, and other communication technologies are among them.

3. Analysis & Insights:

After receiving the data from the vehicles, every parameter—including idle time, fuel efficiency, tire pressure, etc.—is thoroughly analyzed. Thisanalysis supports the fleet management system's efforts to develop abetter plan of action and implement efficient measures to increase vehicleutilization.

4. Action:

The final step is to carry out the required action in accordance with the information gathered from the IoT applications. For instance, if a sensor notices that the back tires have low air pressure, it alerts the driver to check the air pressure right away and fix the problem.

Use cases and features that can be combined with telematics include:

1. Real-time fleet visualization: Real-time fleet visualization aids in pattern recognition and provides insights that lead to lower costs, greater safety, and better compliance. The fleet system generates a lot of data, which can be used to generate a lot of insights through big data.

2. Route Optimization: Offering the best route possible for a number of pickup and drop-off points. Finding the shortest path between two points on a map is much simpler than this.

3. Advanced Vehicle Health Monitoring (AVHM): Using the right sensors, AVHM aids in the detection of events in and around the immediate vicinity of the vehicle. It considers complete event detection, determining the severity of the damage, prioritizing damage action, determining the cause of the event/damage, and offering the appropriate diagnosis for the same.

Data points from the fuel, propulsion, energy and power, electronic,guidance, navigation, and control (GNC), communications, and othersystems are used by AVHM.

4. Risk and Collision Management/ Collision Avoidance System (CAS): A forward collision warning system keeps track of a car's speed, the speed of the car in front of it, and the space between the cars and objects so that it can alert the driver if the cars are getting too close to each other and

thereby prevent a collision.

5. Vehicle Utilization & Fuel Management: Data-based findings and reminders about routine fuel use help in reducing unnecessary fuel outages, improving service quality and increasing vehicle utilization (due maximum on/run-time).

6. Driver Behavior Analytic & Leaderboard : Detecting risky driving behavior and figuring out a vehicle operator's actual driving patterns to spot unsafe procedures or rules violations. Drivers are encouraged to make safe decisions by creating leaderboards based on driving behavior and offering incentives for doing so.

7. Reminding owners and the fleet operator : to perform maintenance tasks based on data-based predictions of those tasks' requirements.SMS notifications or alerts to customers about service status.

8. Fleet Manager Dashboard and App: Timely and customized reports, unique KPIs, call to action options, Smart recommendations to improve Fleet Utilization, and Insights for the entire Fleet system.The Fleet Manager would have easier access to all fleet services with a single integrated app.

Unique Challenges and Opportunities for Fleet Management

For the best fleet management, a lot of information must be gathered, including information on fuel consumption, frequency of maintenance, and engine diagnostic codes, as well as delivery ETAs, vehicle position, driver performance monitoring data, and the number of passengers withinthe vehicle or the best fleet management, a lot of information must be gathered, including information on fuel consumption, frequency of maintenance, and engine diagnostic codes, as well as delivery ETAs, vehicle position, driver performance monitoring data, and the number of passengers within the vehicle.With multiple independent data sets that had to be collected and aggregated before being analyzed, fleet managers could not get the visibility or information needed for effective decision-making until after the fact. Additionally, each independent point solution and system was vulnerable to potential security risks, and each device required its own power supply.

Today, advancements in technology, analytic insights, and AI, along withthe increase in e-commerce adoption, are driving digitalization of thefleet. This means transitioning from multiple independent data collection systems to robust single in-vehicle computers that can consolidate data from these disparate systems, process it in near-real time, and transmit it to the cloud for storage and trend analysis.

This consolidation of data and the ability to process it all on one device mean these powerful, central in-vehicle computers can monitor more datapoints and analyze more complex situations more quickly while displaying the results in a single dashboard, including video, road conditions, and cargo management information. Access to this level of advanced telematics enables fleet managers to assist with problem- solving, driver guidance, and decision-making in the moment.

Preparing for the Future

The increasing sophistication of consumers, continued obstacles in the wake of the global pandemic, and growing populations in the world's urban centers will continue to pose significant and meaningful challenges for operators across several industries.

Across the world, government leaders at all levels, together with private and public companies, are turning to IoT and AI technologies to keep pace with the demands of our connected global economy

and address today's transportation challenges.
In addition to the immediate operational and business benefits that IoT- enabled fleet management solutions offer, fleet digitization can help fleet managers, logistics operators, and drivers be prepared to respond to the outcomes of global trends and initiatives.

Literature review

IOT (Internet of Things) is a brand-new prototype that is quickly taking off and linking billions of things online. IOT applications have aided in the development of smart grids, smart cities, smart homes, smart farms, smart transportation, and smart health systems, where gadgets are connected to specific systems via the internet and big data is used extensively. IOT has the potential to revolutionize fleet management in a number of ways, allowing us to conduct environmentally friendly operations that support the monitoring of driver performance and fuel efficiency in addition to all other fleet management norms.

In addition to having a negative impact on the environment, driving too fast or idle increases the cost of gasoline and wear and tear on the car. As a result, we can easily monitor driver behavior using IOT technology and receive automated notifications in real time. Sensor-equipped automobiles can aid with preventive maintenance that extends the life of a vehicle by transmitting automated signals and early warning notifications for low battery, coolant temperature, and engine repair.

Fleet efficiency is significantly impacted by vehicle performance. By integrating it with field engineer optimization and spare parts management, IOT enables the engine to remotely monitor and analyze vital engine and diagnostic parameters. IOT is being used in fleet management to automate a number of activities. For example, the system may send ticket notifications to tow trucks and the closest service stations, collect information about the route, traffic, and vehicle speed, and then generate alerts and display messages to assist passengers in making the best travel plans.

Conclusion

The time of fully autonomous vehicles is rapidly approaching. All business sectors will continue to be impacted by the digitization trend, and companies will seek out cutting-edge digital strategies to stay ahead of the competition and the market. The Internet of Things is already essential in creating the framework for effective workplaces. A variety of stakeholders, including the government, consulting firms, and businesses,can contribute significantly to the development of a strong ecosystem of lots.

Also it helps to decrease downtime and increase vehicle availability, IOT in fleet management functions as an automation for fleet management. Additionally, it has improved fleet efficiency where each vehicle is continuously tracked to create a unique vehicle profile. Additionally, it will cut down on fuel use since good maintenance conserves fuel. Basically, it lengthens fleet life and simplifies the maintenance process.

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