REAL TIME VEHICLE FLEET MANAGEMENT AND SECURITY SYSTEM: A STUDY OF GLOBE ECOLOGISTICS PVT LTD

Niraj C Paunikar[1*], Dr. BVKhode[2] and Dr. S D Ghodmare[3]

Abstract.
Cities in emerging nations have mobility problems, like heavy traffic congestion, high levels of traffic accidents, especially high levels of air pollutants & sound. Numerous of those issues are a result of public or commercial transit. These Fleet Managed Controls Services (FMCS) are accountable for regulating vehicles operations & assessing adherence to schedule. A FMCS watches cars in real-time & sends out notifications if certain occurrences occur. In general, Fleet Management Systems (FMS) decrease hazards, enhance serval, & boost operating effectiveness at a low price. In these articles, we would examine the foundations of fleet management & related application in order to reduce commercial vehicle servicing expenses.

Keywords: mobility problems, traffic congestion, traffic accidents, commercial transit, fleet management systems

[1*]Research Scholar (M.Tech in Transportation Engineering), Civil Engineering Department, G. H. Raisoni College of Engineering, Nagpur, Maharashtra, India, E-mail:[1]ncpaunikar@yahoo.com
[2]Professor and Head of Department, Civil Engineering Department, G. H. Raisoni College of Engineering, Nagpur, Maharashtra, India, [2] bhalchandra.khode@raisoni.net
[3]Associate Professor, Civil Engineering Department, G. H. Raisoni College of Engineering, Nagpur, Maharashtra, India, [3]sujesh.ghodmare@raisoni.net

*Corresponding Author: Niraj C Paunikar
*Research Scholar (M.Tech in Transportation Engineering), Civil Engineering Department, G. H. Raisoni College of Engineering, Nagpur, Maharashtra, India, E-mail:[1]ncpaunikar@yahoo.com

1. Introduction

This organization of motorized vehicles including as automobiles, vans, & trucks, among others, constitutes vehicle fleet managing. Fleet managing enables businesses that depend on mobility to reduce the risks involved by enhancing transportation effectiveness, security, & profitability, as well as lowering the total transportation &employee expenses. Fleet (vehicle) management could encompass a variety of tasks, including vehicular leasing &financing, vehicle maintenance, licensing & conformance, supply chain, accident management & subrogation, vehicle telematics (tracking & diagnostics), driving management, velocity management, fuel management, health &safety management, & vehicle re-marketing. Shipping Management is a part that enables businesses that depend on commuting to eliminate or reduce the risks connected of vehicular in vestor, thereby enhancing efficacy, profitability, & lowering their own cumulative transportation & staff costs, as well as ensuring complete conformance with government regulations (duty of care) & numerous other benefits.

1.1. Commercial transport vehicles

A commercial truck is anything vehicle that transports commodities or paying passengers for compensation. The Union Nations describes a "professional vehicle" as anything identity or towing vehicles operated on a public roadway in interstate to convey persons including equipment whenever the vehicular has a gross vehicular weigh trating(GVWR)of10,000 pounds or more:

- Having a gross vehicle weight restriction of at least 4,536 kilograms (10,001 pounds).
- Is designed or utilized to carry greater exceeding eight people (including the driver) for remuneration;
- Is designed or utilized to transfer fewer then fifteen passengers (including the driver), but never for remuneration;
- Is utilized to carry materials deemed hazardous by the Secretary of Transport.
- Although the federal concept is strictly adhered to, it is intended to be accommodating & adaptable to state conceptions.
- Fleet management is the administration of commercial motor vehicles including automobiles, vans, trucks, specialized vehicles (such as mobility construction vehicles), forklifts, & trailers.

1.2. Vehicle platooning

Fuel economy & pollution reductions may be accomplished in avariety ofmethods, including engine &propulsion technology advancements, reductions in vehicle rolling reluctance, including proactive driver guidance. Vehicle platooning research began in the 1990s due to its advantages of improving road capacity, promoting safety,& conserving fuel. The most recent analysis & testing indicate that platooning applications may reduce fuel consumption by up to 15 percent & dramatically reduce carbon footprint sof big vehicles due to a decrease in aerodynamic drag. Consequently, platooning has become an essential aspect of fleets, particularly for heavy-duty/ commercial vehicles and is a dynamic researching field which draws the attention of several transports take holders, particularly HDV manufacturers & freight fleet operators.

1.3. Transport systems

A transportation systems is the mix of factors & their interactions that generate the need for travel within a specific region plus the availability of communication solutions to meet this need. That concept is sufficiently comprehensive & adaptable to be employed in many settings. The precise architecture of the platform is determined by the nature of the issue (or collection of issues) for which it is designed.

1.4. How does fleet management work

Any firm which leases or owns a fleet of cars use fleet management in much the similar way. The method& approach of fleets managing are designed to keep activities running smoothly & efficiently, including include the following fundamental techniques:

- Vehicle procurement: That's the procedure of acquiring or leased fleets resources to satisfy a fleet's unique requirements. Fleet managers must develop procurement which are compatible with your present fleet activities & overall business objectives.

- Monitoring fuel efficiency: Fuel is frequently one of the major expenditures for fleets, making its management crucial. Fleets must monitor vehicle idle, speeds, tyre pressures, route, including vehicle size, weight, & kind in order to maintain fuel effectiveness & save expenses.

- Addressing vehicle usage: This is the process of knowing where their fleet vehicles are, where they are performing, who is operating those, whether there are usage, whether they are in use, & ways to handle these activities more effectively.
- Managing driver behavior: In order for fleets activities to be effective, drivers must adhere to the guidelines specified by their business. Our fleets

may be highly profitable by involving drivers via coaching, incentive, achievement indicators, & feedback.

• Minimizing operational costs and risks: Whether crashes to overhead expenses, penalties for noncompliance to excess fuel utilization, many fleets must evaluate the largest expenses of their activities & try to decrease them using fleets processes. Consistent effort exists to lower total costs of operation, maintain driving security standards, limit risk, & boost production. Managers use telematics technologies, data analytics, & programming to assist them face the numerous business difficulties.

1.5. Fleet management requirement
Telematics is often incorporated into fleets using vehicle on-board diagnostic (OBD) connections to deliver information to technology platform. Telematics could be utilized to promote safer, more eco-friendly driving behavior & impact fleet policy compliance. Moreover, telematics may
• Provides in driver instruction, risk & driver behavior reporting, collision alerts, reconstruction, & location tracking for lost or stolen cars or equipment. Employ predictive maintenance & remote diagnostics to expedite maintenance & remote diagnostics.

• Manage fuel use by measuring idling & other driving practices

• Simplify compliance using simple electronic tracking, Hours of Service (HOS), & driver vehicle inspections reports systems (DVIR)

• Interact with other software systems, like as onboard camera technologies or customer relationship management software, and even develop new apps.

• Manage electric vehicles (EVs) while lowering the fleet's carbon emissions & environmental effect

1.6. Advantages of fleet management
The objective of fleets management is to manage the whole lifetime of commercial vehicles so as to reduce related risks, increase profitability, & boost performance. A business with few cars may handle this manual, but a business having millions of clients & hundreds of vehicles needs technology for effective administration. So the necessity or fleets managing develops immediately. In addition, fleet management automation is necessary to-
• Reduce fuel cost: Increasing automobiles on the

road results in increased fuel consumption & costs. Nevertheless, the issue is solvable through good fleets. Utilizing fleet management software, managers may detect fuel-saving opportunities, including minimizing engine idle caused by traffic congestion. Additionally, they may maximize each vehicle's capability so that more deliveries can be made with fewer cars. That would also assist reduce gasoline usage, therefore, costs.

• Minimize vehicle maintenance cost: Fleet maintenance expenses may place a significant strain on a company's budget. By keeps track of traveled kilometers, machine hours, fuel consumption, among various significant parameters, fleets management may prevent a variety of vehicle-related issues from occurring. They may schedule preventative maintenance appropriately & decrease maintenance costs, which may normally be higher owing to the emergence of a more severe car problem.

• Track fleet in real time: Because via the automating of fleets is real-time fleets monitoring feasible. It may assist managers in understanding the current state of every vehicles. Additionally, they may give them rapid notifications to in form them of crucial matters, such as the cancelation of a purchase at the last minute. It may therefore aid them in monitoring driver behavior.

• Improve driver safety: The security of drivers is a top priority for fleet management. Using fleets managing automated, they may evaluate every driver's performances, skill, background, behavior, &various criteriabe for eassigning them trips.

• Deliver orders on time: Management fleets effectively will expedite operations such the choice of the appropriate vehicles for the specific kind of goods, the scheduled pickup of the items, & many. That might facilitate the timely completion of subsequent procedures & guarantee that each products is produced inside the stated time frame.

• Ensure more deliveries in a day: Choosing the ideal vehicle for delivery & monitoring each vehicle with real-time tracking will boost efficiency. The drivers may not only arrive to the location on time, but also return to the facilities on schedule. This would aid fleet managers in facilitating supplementary travel scheduling.

1.7. Types of fleet management
Larger & smaller businesses & organizations from avas tarray of sectors utilize fleets managing systems such as Geo tag to monitor & track a

variety of vehicles, including passenger cars, trucks, aircraft, off-road construction equipment, & others. In addition to freight to delivery, sales & service, oil & gas, urgent solutions, & various businesses, they perform in a variety of fields. Fleet vehicle management may be performed internally or by a third-party fleets managing firm. Fleet managed businesses offer diverse solutions like:

- Vehicle leasing
- Supply chain management
- Fuel management and Maintenance services
- Safety programs and Garage management
- Tolls and compliance services

1.8. Technologies that can be implemented for managing commercial fleet

Fleet management software (FMS) is computer or cloud-based technology which enables a person or team to handle fleets vehicle-related duties. These particular responsibilities range from vehicle acquisition through disposing.

Fleet management technology collects, stores, processes, monitors, generates reports, manipulates, & exports fleet data. Through reporting & analyses, fleet management software can measure fleet performance & provide fleet data. Vehicle, driver, maintenance, incident management, & tracking were specific duties which fleet management technology could monitor. FMS is meant to simplify & enhance fleets managing & automation from beginning to finish.

• Electric vehicle fleet management: Electric vehicle fleets management is that procedure of managing batteries electric vehicles (BEVs) including plug-in hybrids electricity vehicles (PHEVs) including their drivers (PHEVs). Using telemetry technology, fleets managers could control multiple gas-powered & electric cars from a single interface.

Examples of electric vehicle tracking metrics include: Fuel and EV energy usage, EV charging status and Battery charge

1.9. Future Scope

Fleet management is a responsibility of corporations & organizations whose goods or services depend on transportation. It aims to minimize expenses, maintain performance, & mitigate risks. Fleet managing may provide significant advantages for a business, like increased effectiveness in vehicle procurement, energy management, strengthened compliance, increased employee safety, & decreased carbon emissions.

2. Methodology
This chapter provides an overview of the research methodologies & procedures utilized to conduct this study.

This provides information on the participants' female beneficiaries & societal organizations selected for research using sampling techniques. In addition, the chapter discusses the many procedures & stages of the research, including material on the technique used to conduct the study, as well as the validation & explanation for its use. In addition, it describes the instruments utilized in data collecting including the execution process of data analysis, including includes selecting procedures, tests conducted to support the hypothesis, etc.
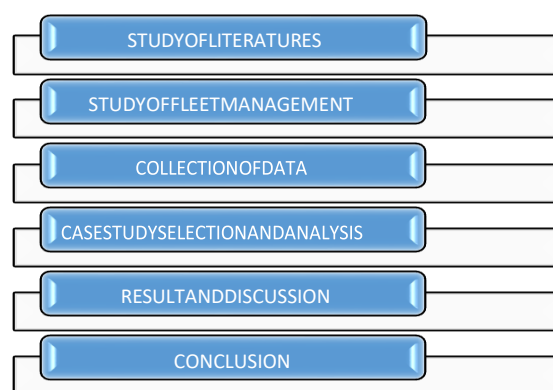

Figure 1. Research Methodolgy

2.1. Scope of research
This study's designated subject is the Fleets management system for commercial transport vehicles. A comprehensive literature research was done to identify the concept & practical ties between the fleets management systems for commercial transportation vehicles with the literature. Using Science Directly, Scopus, Google Scholar, among the sub sequent digital databases, a search was conducted.

2.2. Research Approaches
Quantitative, qualitative, & mixture techniques are the three types of investigative methodology. The selection of the most appropriate approach would depend on the purpose of the research & the required precision of the system.

2.3. Quantitative Research
The quantitative investigation was an objective evaluation of phenomena or issues focused on the test of a thesis or hypothesis via the collection of numerical data & statistical analysis to establish its validity. The route flow for this method is shown in Figure2. In addition, this strategy is frequently applied while determining the viability of a theory,

hypothesis, or when obtaining realistic data is essential. This kind of research involves closed surveys, experiments, regression analytic methods, & correlation.
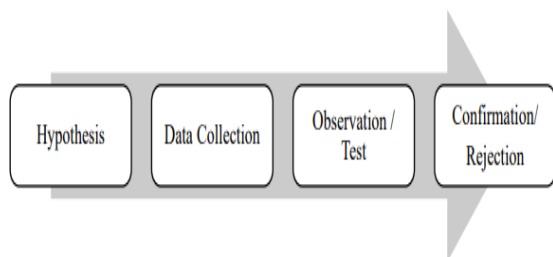

Figure 2. Work Flow Path

Figure 3. Case Study of Globe Ecologistics Pvt. Ltd.

Location: Ahmadabad Gujrat (Website-http://www.globeecologistics.com/)
No. of Vehicles:300+ and No. of Drivers: 400+

Globe Ecologistics (GEL) is a Public Limited Company with a lengthy history of supplying transportation& project services (trailers, trucks, cranes, forklifts, etc.) to various companies across India, including those in the agriculture, creation, consumer products, oil & gas industry, & engineering industries. Vehicles crews, operators, engineers, technicians, technicians, crane providers, as well as an experienced & conscientious office personnel, are the company's TM assets & constitute the foundation of GLOBE. GLOBE's pillars are its dedicated leadership, steward professionals, and superb infrastructure.

Shri Ram swaroop Agrawal, a pioneer & a technocrat in the area of Transportation Services, established GLOBE prior to the 1960s via his relentless efforts & unbeatable attitude. In 1958, a group of merchants connecting Ahmedabad & Jaipur founded the organization and began typical commercial operations. In 1959, the first complete vehicle were purchased with a debt of Rs. 23,000/-

In 1963, the Indian Banks Association acknowledged our superior profitability & service excellence. As a consequence, financial conditions improved. In the 1960s & 1970s, the corporation gradually expanded to encompass north-west India as its primary moving region. By 1975, it were one of the top 10 parcel transport services provider sin the North West.

As a result of its 1980 incorporation as a pvt. ltd., the firm had a new & improved rebirth. Over time, GLOBE's unceasing efforts have added a feather to its crown by achieving a remarkable role in the establishment of a competent transportation services firm organization. Shri Ram ratan Agrawal joined the firm in 1982 with new technological ideas of ODC & turnkey projects, ushering in the following generations. State-owned corporations, such as GAIL, ONGC, etc., provided us significant employment. In 1989, Shri Basant Agrawal, the younger son, joined the company. He began to concentrate on enhancing the company's business expertise. In 1980, Globereachedapeak offivebillion dollars.

Throughout the 1990s, additional territories were acquired as a consequence of the new management's strong focus on growth and profitability. In 1998, Volvo automobiles were released, while HCV technology was also improved. By 1999, an impressive 125 cars had been added to the fleet, which had grown to an impressive size. Moreover, additional trucks being added for turnkey & erection activities. In August 2000, the Delhi zonal office similarly began bulk trading. In 2000, we initiated wind turbine transportation with Suzlon. In 6to 7 days, we carried over-dimensional cargoes of 100 tones and more than 2,000 kilometers that would have taken 20+ days to deliver normally.

Their fleet grew to include 450 heavy-duty commercial vehicles, 70 cranes, including contemporary equipment including telescopic & hydraulicaxles. Globes presently serves more than 70 places through out India.

3. Problem statement
In above case study of company, we are trying to implement vehicle entry in Vehicle fleet manager 4.0, following vehicles are selected for fleet management implementation as shown in Table 1.

COMMERCIAL VEHICLE FLEET MANAGEMENT									
Sr No	Vehicle Type	Vehicle Plate No.	Driver	Fuel Type	Fuel Capacity	No. of Tyres	Payload	Wheel Base	Engine Capacity
1	Mahindra Bolero Maxi Truck Plus	GJ-12 JH 5624	Harjeet Rao	Diesel	45 ltr	4	1200 Kg	3095 mm	2523 cc
2	Isuzu D-MAX V-Cross Pickup	GJ-01 CM 2103	Kalpit Varughese	Diesel	30 ltr	4	800 Kg	3095 mm	1898 cc
3	Mahindra Bolero Maxitruck Plus	GJ-01 GS 2024	Mustafa Thomas	Diesel	45 ltr	4	1200 Kg	3095 mm	2523 cc
4	Tata Ultra 3021.S BS6	GJ-04 JK 6052	Abhishek Varkey	Diesel	60 ltr	6+4	14-16 Ton	3320 mm	5660 cc
5	Isuzu D-MAX V-Cross Pickup	GJ-01 RG 2280	Siddharth Dad	Diesel	30 ltr	6	800 Kg	3095 mm	1898 cc
6	Mahindra Bolero Maxi Truck Plus	GJ-01 FW 6013	Jagat Upadhyay	Diesel	45 ltr	4	1200 Kg	4750 mm	2523 cc
7	AshokLeyland 1920 BS6	GJ-01 GD 8287	Akash Pandit	Diesel	48 ltr	6	11 Ton	3095 mm	5660 cc
8	Tata Ultra 3021S BS6	GJ-01 GF 3773	Bahadur Mahadeo	Diesel	60 ltr	6+4	14-16 Ton	3320 mm	5660 cc
9	Ashok Leyland1920 BS6	GJ-03 HN 4903	Raj Choudhary	Diesel	48 ltr	6	11 Ton	4750 mm	5660 cc
10	Ashok Leyland 1920 BS6	GJ-01 FC 8130	Naseer Borah	Diesel	48 ltr	6	11 Ton	4750 mm	5660 cc
11	Mahindra Bolero Maxi Truck Plus	GJ-01 IH 5981	Tushar Dhawan	Diesel	45 ltr	4	1200 Kg	3095 mm	2523 cc
12	Mahindra Bolero Maxi Truck Plus	GJ-01 CM 1348	Nikhil Desai	Diesel	45 ltr	4	1200 Kg	3095 mm	2523 cc
13	Ashok Leyland 1920 BS6	GJ-22 CF 8004	Ajinkya Modi	Diesel	48 ltr	4	1200 Kg	4750 mm	2524 cc
14	Isuzu D-MAX V-Cross Pickup	GJ-01 GD6582	Jayesh Jaiswal	Diesel	30 ltr	6	800 Kg	3095 mm	1898 cc

Table1. Commercial vehicle data sheet

3.1. About software

That research would use the vehicle fleet managing 4.0 software. Using a single application, fleet management software allows fleets managers to continuously monitor their cars, technology, including drivers. Using predicted analysis & precise reports, software may assist fleets managers gain real-time insight into their operations, increase driver happiness, & reduce fuel use. Using these program, they could tackle the managerial issues of a good fleets management systems, which takes a solution-oriented rather than hardware-based strategy to fleets. By adopting a solution-oriented strategy, the systems would be more suited for problem-solving & satisfying the demands of every individual users.

4. Applications of software
4.1. For Cab Services
- Why Cab service providers must monitor operating cabs in real time in order to deliver superior client service.
- That technology enables online surveillance &

safety
- With functions include driver identification, a Physical panic button, &
- Transmission of camera images to the base station & voice alert
- A technology that could be remotely controlled

4.2. For school bus monitoring
- That technology would assist school administrators with internet monitoring of school buses, allowing them to check for speeding, etc. Parents may choose the vehicle's position
- Through SMS or a website link that would include the
- Present position of the school bus where their children will be picked up

4.3. For cargo carrying trucks
- Companies transporting goods must monitor these vehicles online, particularly improves warehouse use.
- By evaluating fleets data, they would know the time required to reach a destination.

- Deliver the goods at various times of day.
- Choose the least congested routes & times to reduce the Transportation costs
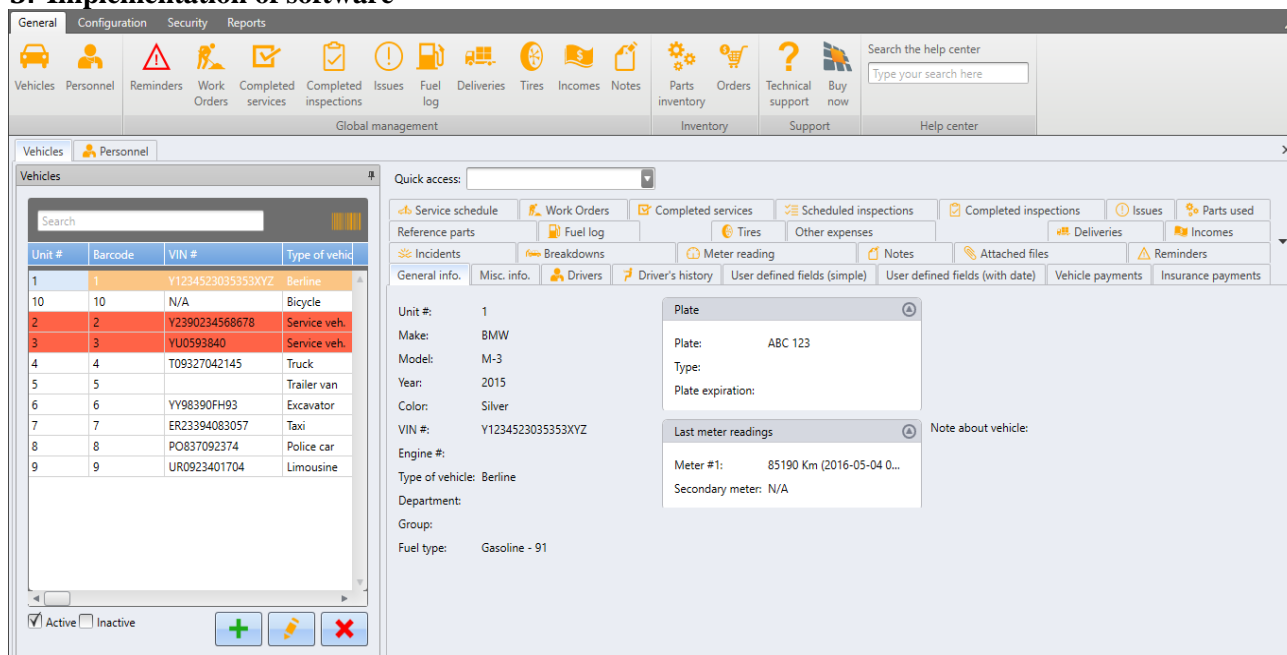
5. Implementation of software

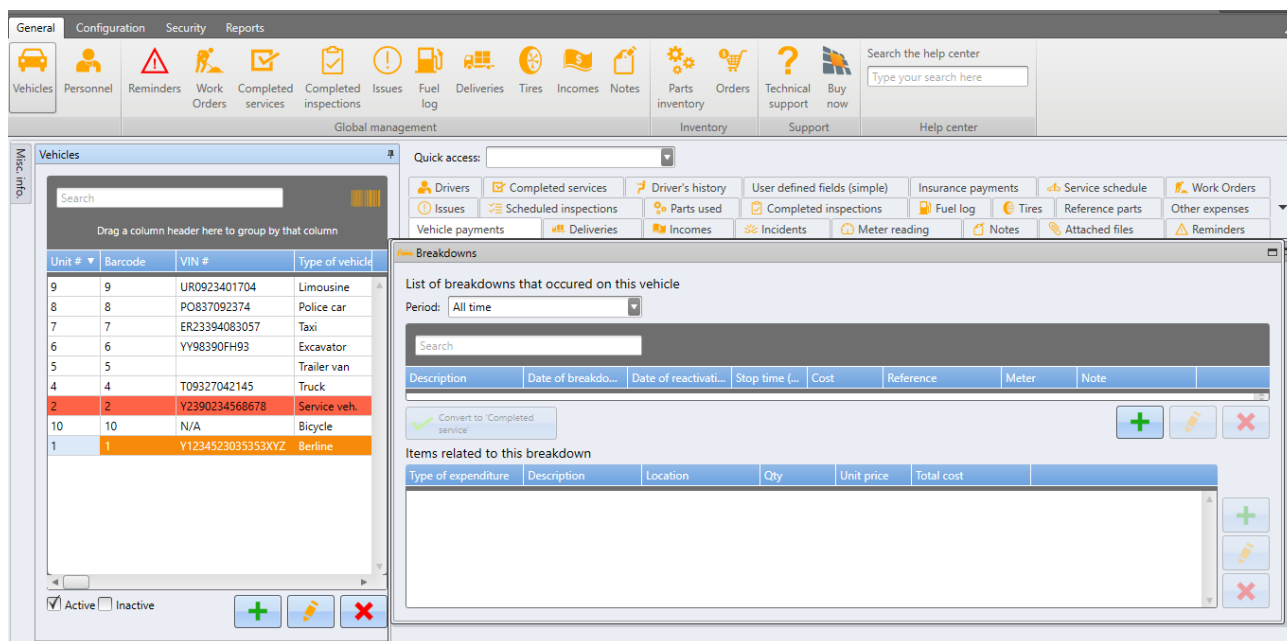**Figure 4.** Commercial interface of fleet manager 4.0 software

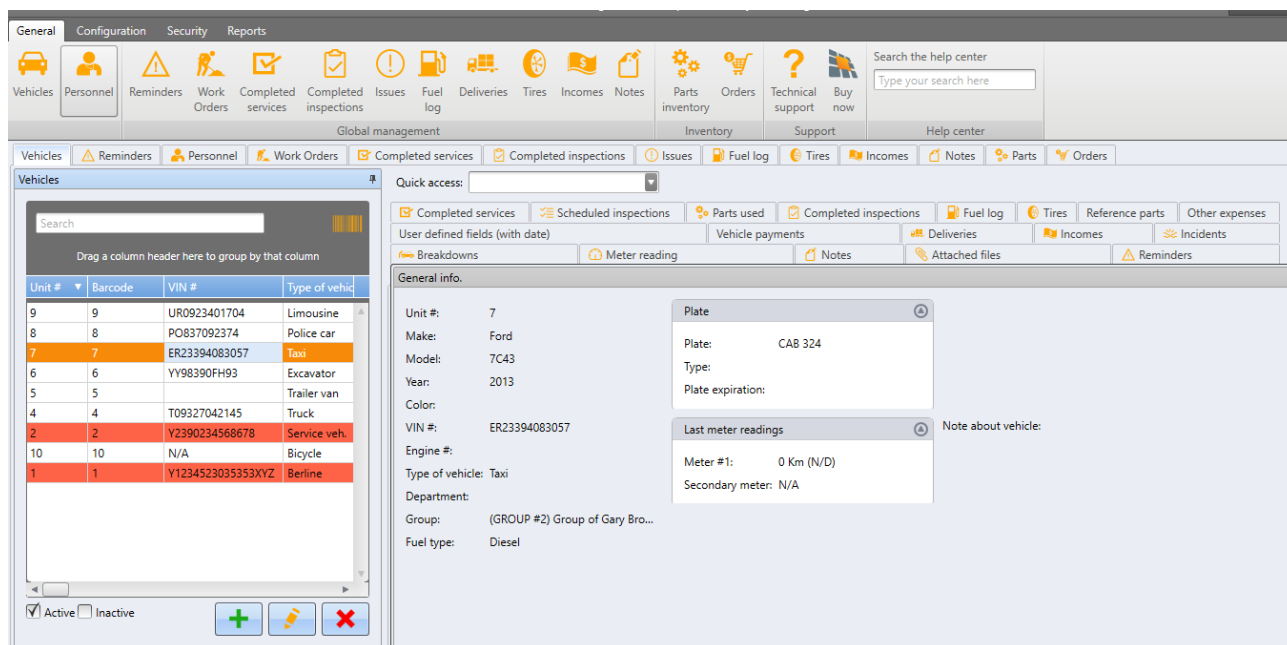**Figure 5.** Evaluation of fleet manager 4.0 software
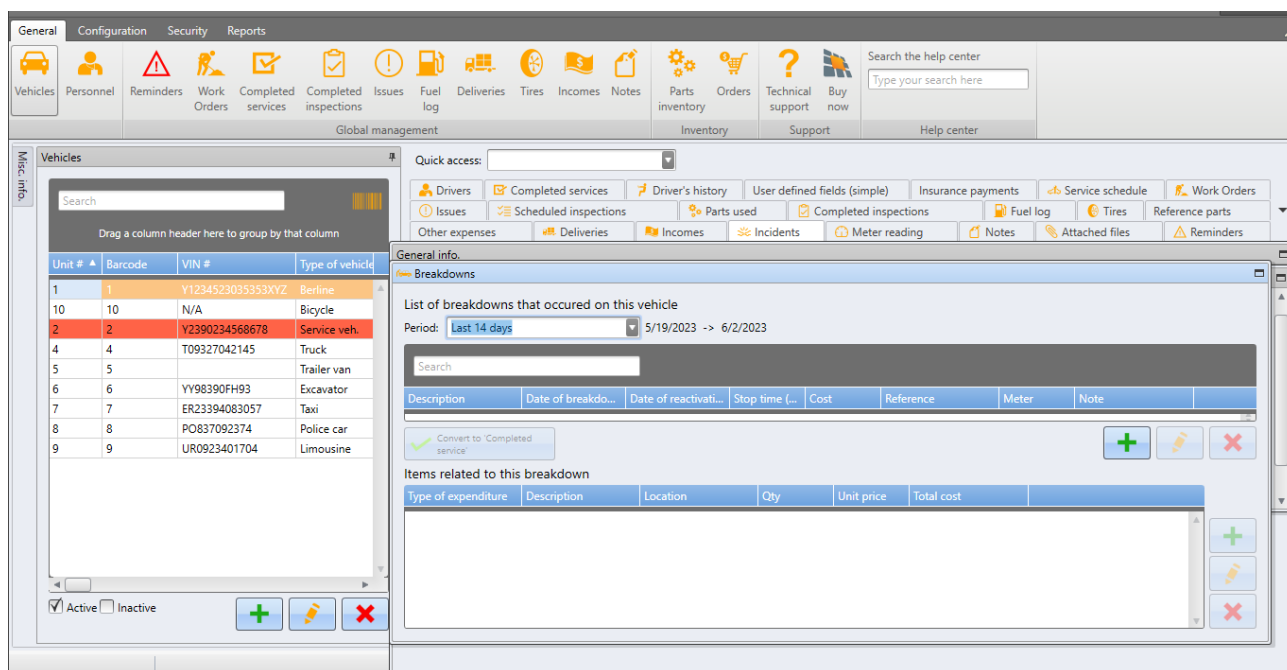
Figure 6. Reading of fleet manager 4.0 software

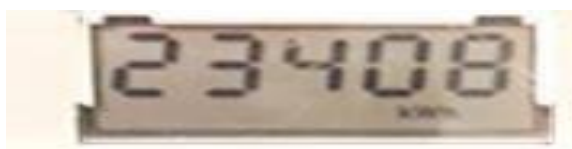**Figure 7.** Vehicle breakdown entry
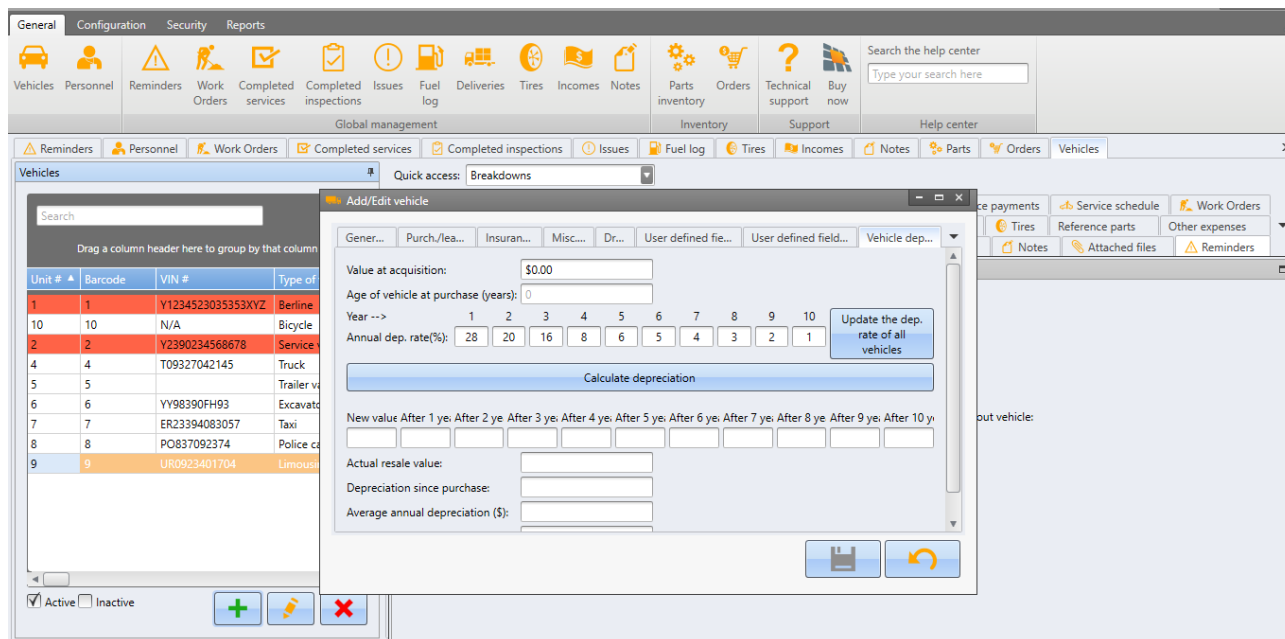

Figure 8. Vehicle meter reading

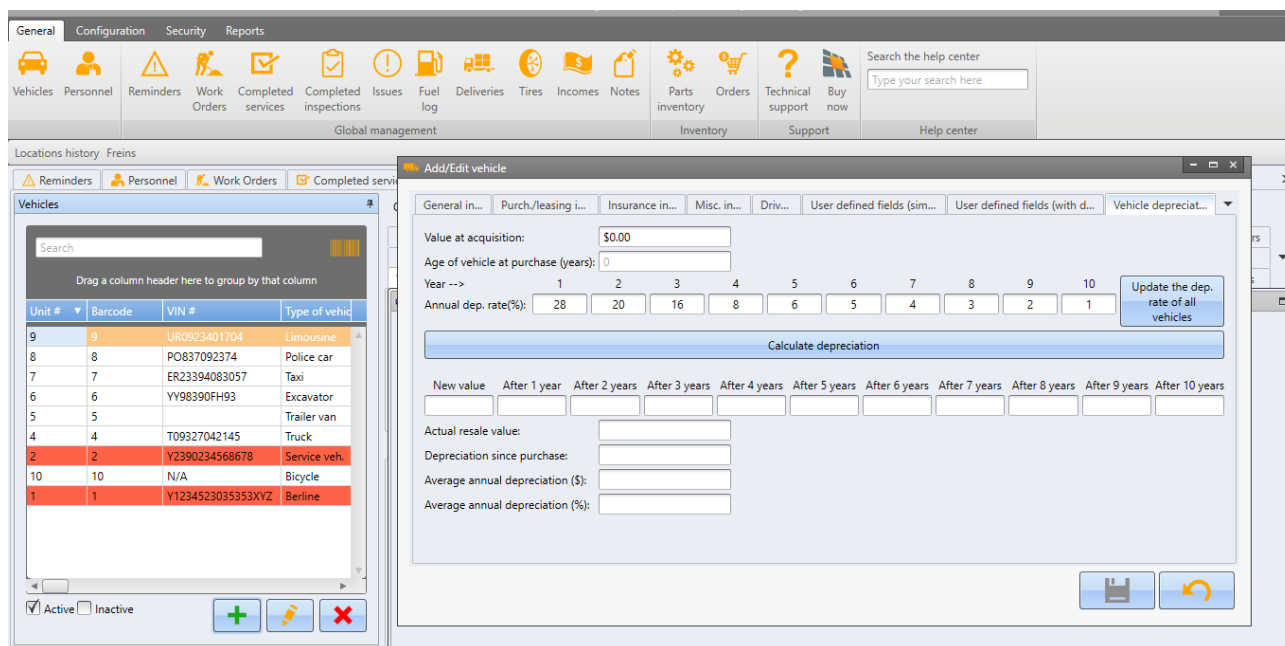**Figure 9.** Vehicle entry in fleet management software

Figure 10. Vehicle reading in software

6. Conclusion

• The Real Time Vehicle Fleet Management & Security System would offer tracking, security, & online monitoring in a single system.

• That system is highly valuable to taxicab businesses owing to its safety features, plus it is also excellent for monitoring school buses, freight trucks, etc.

• Using a 3G/4G-enabled modem, this technology may be modified for live video streaming on public buses. Antenna tampering alarms may be enabled in case the systems or GPS is tampered with or damaged.

• It is possible to construct a GSM jamming protection system i.e., anti-gsm networks jammers,

such that jammers fail to function correctly.

7. References

1. Rojas B, Bolanos C, Salazar-Cabrera R, Ramirez-GonzalezG, de la Cruz A P & Molina J M M2020 Fleet management and control system for medium-sized cities based in intelligent transportation systems: From review to proposal in a city. Electronics (Switzerland)**9(9)** 1–25

2. Button K J, Doyle E and Stough R 2001 *J.Tran. Plan. and Tech.***24(2)** Intelligent transport systems in commercial fleet management: A study of short term economic benefits155–170

3. Regan A C, Mahmassani S H and Jaillet P 1998 Evaluation of Dynamic Fleet Simulation

Framework. Transportation 176–184

4. Surugiu M C and Stancel I N2016 *J.Procedia Technology* **22** Fleet Management Cooperative Systems for Commercial Vehicles 984–990

5. Pedraza-Martinez A J and Van WassenhoveL N 2012 *J.EURO Jour. on Transp. and Logist.* **1(1– 2)** Transportation and vehicle fleet management in humanitarian logistics: challenges for future research185–196

6. Gowda V R C and Gopalakrishna K 2015 *J. RAICS* **2015** Real time vehicle fleet management and security system417–421

7. Billhardt H, Fernandez A, Lemus L, Lujak M, Osman N, Ossowski S and Sierra C 2014*J.IEEE Intelligent Systems* **29(3)** Dynamic coordination in fleet management systems: Toward smart cyber fleets70–76

8. Pedraza-Martinez A J, Stapleton O &Van Was senhoveL N2011 *J. Journal of Operations Management* **29(5)** Field vehicle fleet management in humanitarian operations: A case-based approach 404–421

9. Salazar-Cabrera R, De La Cruz A P and Madrid MolinaJ M 2019*J. 2nd Latin American Conference on Intelligent Transportation Systems2019* Fleet management and control system from intelligent transportation systems perspective

10. Ma X 2013 *J. ITSC* **2016** Towards intelligent fleet management: Local optimal speeds for fuel and emissions 2201-2206