Decentralized Fleet Monitoring and Tracking System

Mahek Shah
Computer Engineering
K.J.Somaiya College of Engineering Mumbai, India

Darshil Shah
Computer Engineering
K. J. Somaiya College of Engineering Mumbai, India

Dhruv Vyas
Computer Engineering
K.J.Somaiya College of Engineering Mumbai, India

Ronak Vadhaiya
Computer Engineering
K.J. Somaiya College of Engineering Mumbai, India

Prof. Gopal Sonune
Co-author
Computer Engineering K.J.Somaiya College of Engineering Mumbai, India

Abstract:- **In our day to day life, transportation plays an important role and managing those transporting vehicles (fleets) is very important and crucial for the service providers. Major parts of transportation in India depends on buses, trucks, and while some on cars. So, we have proposed a smart device which would help the fleet owners to keep the track on the movement of their fleet and also analyze the drivers driving behavior. The device is based on IOT comprising of pi and sensors. Our solution will also help to store all the fleet related documents securely and tamper proof in a decentralized drive over blockchain. This would provide the total control to fleet company managers, and can be examined on regular intervals.**

I. INTRODUCTION

With the onset of new technologies and the moto being "Digital India", our proposed solution is fully digital and convenient that can be used at the user's ease. In a progressive nation like India where the fuel prices changes dynamically every day, route planning and management plays a crucial role. The driver could no longer manipulate the route thus saving the fuels of each fleet and making it profitable to the company. Keeping the current trend in action, we are developing a smart product that could track the current location of the vehicle and note the driving behavior of the driver. The driver would have no direct access to the system. This information will be manipulated using the raspberry pi 3 and the longitude and latitude of the fleet will be stored on the cloud. Using the maps API we get the exact location of the fleet. We have also introduced blockchain to securely store the fleet related documents, so that they could be accessed when required and thus requiring no physical proof, and improving the security of the overall process. The trusted person of the organization will hold the login credential detail and can access the information as and when needed.

II. LITERATURE SURVEY

The services provided by food delivery application or cab service provider are popular not just for convenient services or easily availability of cars but also for the sense of safety. The driver knows that the car is being tracked by GPS; after all, when you book the car, user can see it approach your location on the map while they wait. The truth however, is that these cars are not being tracked by standalone GPS systems that would be hard and impossible to disable by a driver - instead, going off the radar is apparently as simple as turning a phone off. That's because these services uses a phone-based GPS system, which it uses to track its cars in much the same way that it tracks the location of a user. However, the cab service provider/ food delivery applications don't use standalone GPS systems fitted in the cars to track the vehicles. Instead, drivers say they are given a smartphone that have the respected service provider's application loaded in it. This application works differently from the version which consumers use. Since the tracking is done solely through the mobile signals, switching off the mobile, or deleting the application from the mobile or even not giving permission to location will take them off the radar. Of course, in applications like Uber, it acts as a platform, and does not own the cars in its fleet, connecting users with private taxis instead. In case of a stand-alone GPS, ephemeris and almanac data is to be downloaded from the satellite GPS Signal itself. Due to slow data rate of the GPS signal, it takes significantly more time for determining the device position but is more accurate then mobile GPS. While a GPS that is associated with at least 3 satellites can follow an area with an deviation of 1 meter, a cell phone can just find an down to 10 meters. It will be worse for objects that are continuously moving and the number of cell towers in the area play a huge role in determining their exact location. Dedicated GPS tracking devices are far more superior to other tracking options in every aspect. Coupled with a smartphone APP, you will have constant access to the exact location of the object of desire with the push of a few buttons. Standalone smartphone APPs may be cheap or easier to access but they will never give you the peace of mind and the accuracy that even a basic GPS tracking unit can provide.

This feature added externally could result in warranty void and a lot of wirings to be done. This could however result in to high maintenance cost and require daily maintenance of the system.

Daily accident takes place on the national

Highway and most of the accidents are of busses or trucks where the driver is drinking and driving or the trucks are heavily loaded. The OBD will have a greater impact on this as the managers of the fleet will know the driver behavior and can be cautious and alarm the driver before this. OBD could play a huge roe in minimizing the daily road accident. It will also note the time the driver was on duty and can manage the river hit more efficiently.

III. OBJECTIVES

- Have a better planning of routes.
- To provide the exact location of the fleet to the fleet owners.
- To prevent road accidents.
- To provide a secured bridge within the organization.
- To provide transparency in the field of logistics and be game changer for the companies.
- To design a system that is designated to do all above tasks with higher reliability, greater security and comparatively less cost.

IV. PROPOSED METHODOLOGY

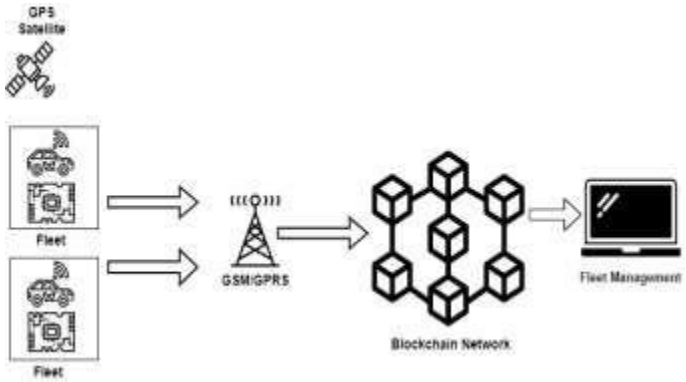

Fig. 1. Working Model

Traditional tracking systems make use of mechanical and electrical components of the fleet. Whereas we are providing a product that captures each set of data by just placing it in the fleet. No internal connections will be required. All the parameters necessary for the fleet owner to track their fleet will be available on our fleet management interface.

On adopting a standalone GPS module, one can not only track the vehicle but also get various details about it which can be used for its effective maintenance as well as for determining the driver's behavior. This will aid us to interpret the quality of service that the driver provides.

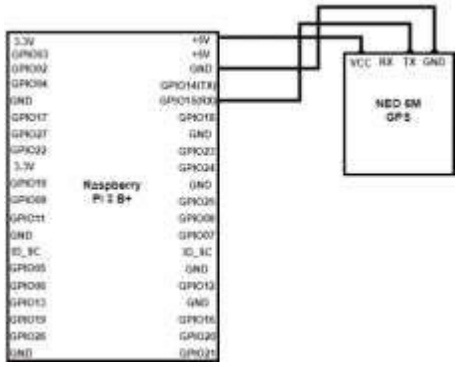

Fig. 2. Circuit Connection

Decentralized Fleet Monitoring and Tracking System employs Internet of Things (IoT) for observing and tracking the fleet. All the data is sent and stored over the Internet. Since the Internet is not secure nor trustworthy, our proposed solution has made use of the emerging blockchain technology as it is able to achieve various security principles.

The system uses Neo 6m GPS sensor to get the latitude and longitude of the fleet which can we used for Realtime tracking purpose. The sensor takes the data from the environment and stores it in the cloud and later the latitude and longitude is mapped on the maps.

The ELM327/OBD (On Board Diagnosis) sensor is used the get various details about fleet like speed fuel status, engine RPM, harsh braking etc. which can be used for deciding the driver's behavior. The ELM372 acts as an interface between the OBD protocols and raspberry pi. OBD protocols helps in communicating with the raspberry pi.

Storing the fleet related data and documents in a secure and tamper proof way in a decentralized environment over blockchain. Blockchain helps to provide security to all the fleet related documents and there by securing the overall process.

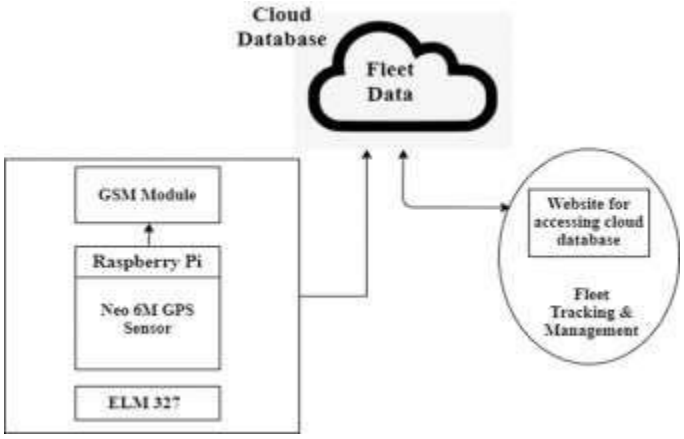

Fig. 3. Block Diagram

V. COMPONENTS USED

1) Raspberry Pi:-

Fig. 4. Raspberry Pi

Raspberry is a micro-computer that allows you to connect sensors and communicate with outside environment, and het the output on the monitor or store the output on the cloud.

2) ELM327

Fig. 5. ELM327

The ELM327, a programmed microcontroller for translating the on-board diagnostics (OBD) interface found in most modern cars. The ELM327 command protocol is one of the most popular PC-to-OBD interface standards. The original ELM327 is implemented on the PIC18F2480 microcontroller from Microchip Technology.

3) Neo 6m GPS Sensor

Fig. 6. Neo 6M GPS Sensor

Neo 6m is a powerful GPS sensor that will help us to get the exact latitude and longitude of the fleet and thus make the fleet tracking easy.

VI. RESULTS

Tracking the exact location of the fleet using Raspberry Pi and Neo 6M GPS Sensor and storing the data on blockchain as cloud is less secured than blockchain.

Fig. 7. Realtime GPS Tracking

Fetching various fleet data from ELM327 sensor which helps to know the vehicle condition and decide the driver behavior

Fig. 8. ELM327 data

Limitation of the system is it requires constant network for tracking and completing transaction on blockchain network.

VII. CONCLUSION

The designed Prototype would thus help in tracking the fleet in their real time location and diagnosis of the vehicle using the ELM sensor. With the help of this prototype we can eliminate the number of people required.

One major application transportation company foresee is smart contracts between shippers and carriers. With smart contracts, conditions are predefined and recorded on the blockchain. Once conditions meet, the smart contracts are automatically created. Transactions are recorded then after and validated on the blockchain, payments are immediately sent. This streamlines the process by automating the steps and eliminating intermediaries and their associated costs. Store vehicle permits and documents on the blockchain so that the time consumption of checking all permits at different check posts of different states the fleet is travelling, As the permits can be easily reviewed and verified on the network.

REFERENCES

[1]. nehal R Pawar, Ankur B Mokal, Pankaj P Patil. (2015). “Smart Vehicle Management”.International Journal of Technical Research and Applications.

[2]. Rushikesh Gujar, Saket Yadav, MayurJadhav, TusharLimbore. (2014).“Automobile Service Centre Management System”. International Journalof Scientific and Research Puublications.

[3]. Cico B,DashmirIstrefi (June 2013). “Fleet ManagementSolution”. International Journal of Computer Science and Information Technology & Security (IJCSITS)

[4]. Aher S.S. and Kokate, R.D., 2012. “Fuel monitoring and vehicle tracking”. International Journal for Engineering Innovative Technology.

[5]. Gubbi, J., Buyya, R., Marusic, S. and Palaniswami, M., (2013). “Internet of Things (IoT): A vision, architectural elements, and future

[6]. Muhammad Ahmad, Javaid Iqbal, Quart-Ul-Ain, Sumaira Ghazal. (2006).“Real Time Fleet Monitoring System using GSM network”. InternationalConference on Simulation, Modelling and Optimization.

[7]. Gelogo, Y.E. and Lee, S., (2012). “Database management system as a cloud service”. International Journal of Future Generation Communication and Networking.

[8]. Shivashankar, “Design and development of new apparatus in VANETs for safety and accident avoidance”, Proceedings of IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), ISBN: 978-1-5090-0774-5, DOI: 10.1109/RTEICT.2016.7808122, pp. 1695 – 1698, 2016.

[9]. Z. Yang, K. Zheng, K. Yang, V. C. Leung, "A blockchain- based reputation system for data credibility assessment in vehicular networks", 2017 IEEE 28th PIMRC Symposium, pp. 1-5, 2017.

[10]. Sidra Malik ; Volkan Dedeoglu ; Salil S. Kanhere ; Raja Jurdak,” TrustChain: Trust Management in Blockchain and IoT Supported Supply Chains”,2019IEEE International Conference.

[11]. C. Yani, R. Jia, C. Dan and D. Jingguo, "Decentralized cooperative tracking strategy based on the theory of consistency," 2015 34th Chinese Control Conference (CCC), Hangzhou, 2015, pp. 6969-6973.

[12]. A. K. Whitten, H. L. Choi, L. B. Johnson, J. P. How, "Decentralized Task Allocation with Coupled Constraints in Complex Missions", Proceedings of the 2011 American Control Conference, pp. 34-43, 2011.