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FLEET MANAGEMENT SYSTEM USING IoT

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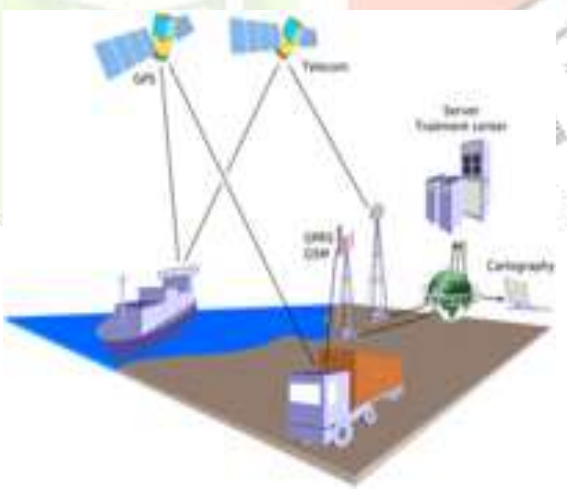
Abstract: Internet of things (IoT) in automation trade is proving to be a gamechanger for automation corporations. Industrial automation corporations that use IoT solutions will reap new edges. The web of Things (IoT) helps to make new technologies to resolve issues, enhance operations and increase productivity. The first drive for automation by IoT is to considerably plunging the operating expenditure once automation devices, sensors and actuators become Internet enabled devices and increase the productivity of the available resources. In this project, the total process of planning and maintenance of supply and increase the productivity of the available resources is automated by implementing IoT enabled devices. The transfer and storage of information are handled by Arduino, GPS and GSM modules. Our project will focus on the increased productivity and efficient utilization of the available resources.

Index Terms - IoT, Arduino, GSM,GPS

CHAPTER I

Introduction:

Fleet Management System includes a wide range of function such as supply chain management, driver management, fuel management, driver behavior, vehicle maintenance and vehicle telematics etc., Fleet Management system is a scientific approach which allows the companies that are rely on logistics business to eliminate or reduce the risks associated with vehicle investment, improving productivity and efficiency and reducing the overall logistics cost and staff cost. According to market research from the Automotive Research Association of India (ARAI), the number of light commercial vehicles and heavy commercial vehicles registered in India as of 2018 was 16 million.



The wide range of functions involved in fleet management system are generally integrated and highly interrelated. Some products and services can be engaged separately, an overall system that integrates and collects the data from various functions is required for optimal performance. Vehicle tracking systems provide a number of data points regarding engine diagnostics, driver behaviors, fuel consumption and geo-location.

Maintenance Data, Fuel Consumption and Transaction Data, Individual vehicle documents such as Registration certificates, travel permits, supply chain data including vehicle specification, warranties, vehicle identifying data, driver centric data such as safety training completion details, acceptance of company policies, as well as demographic data on job types, all contribute to fleet data. The more specialized functions a fleet management system performs, the more systems and data points are involved in integration.

Vehicle Tracking System is as key component in Fleet Management System. This component is usually Global Positioning System (GPS) based, but sometimes it can be based on Global Satellite Navigation System (GLONASS) or a cellular triangulation platform. Once direction, speed and Vehicle location are determined from the GPS components, GSM module transmits the information to a fleet management software application database.

Methods for transmission of data include both terrestrial and satellite. In satellite tracking communications is more expensive and critical if vehicle tracking is to work in remote environments without interruption. Users can see real time, actual locations of their fleet on a map. This is often used to quickly respond on events in the field.

CHAPTER II

Problem Definition:

The major problem in the logistics industry is management of assets and tracking of vehicles and efficient utilization of vehicles. Maintaining the records and document of the assets is the big task for Logistics Company. In a busy business world it is important that you can monitor, control and efficiently utilize and digitalize the data of assets in the company. There is lot of technologies used for controlling and monitoring process. Among those technologies, Internet of Things plays a major role in transmitting data and visualization of data.

CHAPTER III

Proposed System:

Within a decade the number of users using web have been rapidly increased. Internet of things (IoT) is latest and emerging technology that creates lives simpler and happier. We can connect, interact and command any device which is connected to internet with the help of IoT. It is an enormous network of connected Devices. Fleet Management System involves in Tracking and identifying defects and maintaining the record of assets. Arduino, GPS and GSM modules are to handle and transmit the data to the remote server. A user interface will be there for visualization of data which is present in the remote server.

Global Positioning System (GPS):

Fig.3.1: Global Positioning System (GPS)

Global Positioning System (GPS) is a satellite based radio navigation system. It is operated by United States Air Force and is owned by Unites States Government. Global Navigation Satellite System (GNSS) provides time information and geolocation coordinates to a GPS receiver anywhere on or near the Earth where there is no obstruction in the line of sight to four or more GPS satellites. Mainly the obstacles are tall buildings and mountains which cause relatively weak GPS Signal. GPS operates independently without any telephonic or internet reception and it does not require the user to transmit any data to get location and it can enhance the usefulness of the GPS positioning information. GPS provides critical positioning capabilities to civil , military and commercial users around the world. United States Government created and maintaining the GPS system and made it freely accessible to anyone with a GPS receiver.

United States Department of Defence started GPS project in 1973 with the first prototype spacecraft launched in 1978 and 24 satellites in operation in 1993. Initially the usage was restricted to United States military and in later 1980s civilian use was allowed.New demands on the existing system and advancement in technology have now led to efforts to modernize the GPS and implement GPS Block III A satellites which is the next generation of GPS and Next Generation Operational Control System.

United States Government providing the GPS service which can selectively deny the access to the system. As happened to Indian military in 1999 during Kargil War or degrade the service at any time. In earlier 2000, U.S. government removed the selective availability of GPS. Latest version of GPS receiver uses L5 band which has a higher accuracy of 30 centimetres or 11.8 inches was released in 2018

Global System for Mobile Communication (GSM):

Fig.3.2: Global System for Mobile Communication (GSM)

The European Telecommunication Standards Institute (ETSI) described the protocols for the second generation (2G) cellular networks used by mobile devices such as mobile phones and tablets called Global System for Mobile Communication (GSM). GSM was first successfully deployed on December 1991 in Finland. In Mid of 2010 it become a global standard for mobile communications.

Second Networks (2G) was developed as a replacement for first generation (1G) analog cellular networks. Full duplex voice telephony was originally described in GSM standard. Later this expanded over the time to provide data communication. Initially data transmission is done by circuit switched transport then later on it is enhanced by packet data transport via General Packet Radio Service (GPRS) and Enhanced Data Rates for GSM Evolution (EDGE).

Open source GSM Implementaion have some problem with patents, because it is not possible to give guaranteee immunity from all lawsuits by the patent holders against the users by free software distributor.

Arduino UNO

Fig.3.3: Arduino UNO

Arduino is the open source hardware and software company. Its products are licensed under General Public License (GNU), permitting the manufacture arduino and software distribution by any one. Arduino Uno is a 8 bit microcontroller based on ATMega 328. Arduino Uno is equipped with the set of analog and digital inputs and output pins. It has fourteen digital pins out of which six are capable of Pulse Width Modulation (PWM) and six analog input pins. Arduino can be powered by an external battery of 9v or by USB cable. Arduino Integrated Environment is a cross platform application that is written in Java. Arduino IDE is used to write, compile and upload the program to Arduino compatible devices and also with the help of third party codes to other development boards

Pin Diagram:

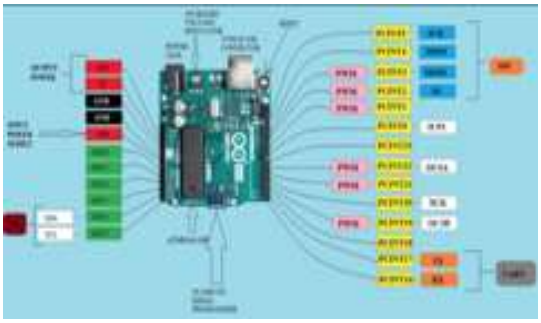


Fig.3.4: Pin Diagram of Arduino UNO

CHAPTER IV

Block Diagram:

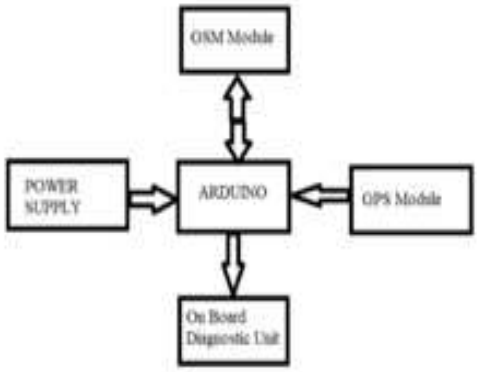


Fig.4.1: Block Diagram of the Proposed Work

Working:

Arduino is the Microcontroller which process all the inputs received from the endpoint that is the sensors and Electronic Control Unit. For every particular interval of time it transmits the real time data such as location coordinates, fuel levels, harsh acceleration, harsh braking, over speed, fuel level, vehicle health and service alerts to the database which located in the server through the GSM module. Fuel theft can easily found using this system.

Once the data is available in the database, a software program will analyze and process the data and provide useful information such as Vehicle Performance, Mileage, Driver behavior, location history, fuel consumption to the end user.

User Interface is created in such a way that all the information of the vehicle are computerized and stored. It also has the service which reminds the user for the tax pending, service alerts, EMI repayments and scheduled maintenance. Django, a framework of python is used to create the user interface which is responsive on web as well as on mobile.

Geo location stored in the database is processed and it can be used to track the vehicle over the long period of time or for the selected duration of time.

Merits:

- Estimated time of arrival (ETA) can be calculated.
- Computerizing the records of the assets.
- Scheduling of vehicles is made is easy.
- Efficient utilization of the available resource is possible.
- Location of the vehicle can be tracked and location history can be search for a interval of time.

Application:

- The application of the project are in military navigation, automobiles, fleet management, remote monitoring etc.,
- Company using Fleet Management system can easily predict the driver behaviour and vehicle health.
- This system can be used in cabs for scheduling the cab to nearest user available and cab driver and to show the estimated time of arrival to user. This is helpful in cab industry to increase the client service at reduced cost.

Some advantage of implementing this system are:

- Driver Behavior Monitoring
- Vehicle Monitoring
- Route Monitoring
- Geo fencing
- Accident Alert

Limitations:

- Predicting the live traffic is very difficult and hence calculating the Estimated Time of Arrival is very difficult in that case.
- Location of the vehicle mayn't be available if it is parked near the tall building or there is an obstacle for the GPS to connect to minimum of four satellites.
- During poor network connectivity Microcontroller cannot send the data to the remote server. It might lead to data loss for certain interval of time.
- Battery fails it will be better if we use auto alert system to regain power.

Future Scope:

For further enhancement, we can develop a Fleet Management System with high speed processors. The system will have latest technology and optimized algorithm with moderate cost. This system can be installed in busses, cars and trucks. It helps to analyze the performance of the vehicle and also the performance fo the driver which will result in increasing the revenue for the company. Adding alcohol detector with the system will help to turn off the ignition of vehicle if alcohol is detected. Use of video camera to this system would take this system to the next level in the field of security. It will help to monitor the crimes that happen nowadays which is witnessed by common people every day. This would prove a major breakthrough in reducing the crime rates.

CHAPTER V

CONCLUSION:

This project is very much helpful in the logistics industry. Better scheduling or route planning can enable you handle longer jobs loads within a particular time. Better scheduling results in increasing trips which will economically benefit the company. It helps in maintaining the records of the vehicles and drivers.

It helps the company to provide the real time location of the vehicle to its clients. It uses the basic measurements of distance between two locations and provide the Estimated Time of Arrival. This helps in 100 percent utilization of vehicle.

CHAPTER VI

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