Keep In Track: An IoT Based Fleet Management System

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ABSTRACT

In today's world, to be concerned about the safety of your product is everyone's first priority. To be in touch with the driver while delivering your product, to know the real time changes with your product gives customer a satisfaction. Keep In Track (KIT) helps to track the vehicles along with the product status and notifies you with the changes being done with the product. In case of accident KIT will notify you through messaging system. Aside these all IoT devices, KIT has its management system.

Large organizations face problems while delivering their product like not able to contact there driver, or know about the total products or orders, or find difficulties in managing the work manually.

KIT comes up with the solution to organize the work remotely in a single desk to make work efficient and organized. Moreover, to know the current status of the driver the app will help in contacting the driver via chat and know his live location.

IoT is implemented to know more about the driver and vehicle current status. Three types of sensors will be implemented. Hit alert for accident alert, weight alert for weight knowledge and temperature sensor for specific product.

Keywords: Fleet Management System, GPS, GMS, Internet of Things

INTRODUCTION

The Internet of Things (IoT) has become important parts of our lives. Looking around to all the smart technologies we have around us, IoT plays great role in these (Salih et al., 2022).

IoT is a new paradigm that is rapidly getting momentum in today's wireless telecommunications landscape. The concept is the widespread presence around us of a variety of things or objects such as radio frequency identification (RFID) tags, Sensors, actuators, cell phones, and so on that can interact with each other and cooperate with their neighbors to achieve common goals via unique addressing schemes (Salih et al., 2022).

IoT is being used in different industries example: Monitoring environment, Supply chain management, Industries like Agricultural, Commercial, Health, Energy, Aviation, Manufacturing, Transport (Aleksic, 2019) etc.

Tracking vehicles have become more common in our society, it gives us the satisfaction of tracking somebody or getting to head to places. These all are conceivable through IoT, which permits clients to communicate over the network. Fleet management system with IoT not only helps with tracking the vehicle but also helps in maintaining the records, connect all the devices, and exchange data on physical devices. Taking a look around the new era KIT presented a new IoT-based technology that will help organizations assist work remotely.

KeepInTrack is a fleet management system with IoT. It will track the vehicle and the product while it is being delivered to the receiver. The IoT devices we will be using are: Weight sensor, Hit Alert sensor and Temperature sensor. These are sensor will be embedded to the system with their specific usage. Like Hit alert sensor will be used to notify if any accident occurs, the weight sensor will notify the weight of the

product being delivered and if any changes with the set range occurs, it will be alerted to the sender and temperature is used to track some sensitive products which need to be in specific temperature and if the temperature decreases an alert will be generated. The GPS and GSM will be used to track and receive messages.

Besides all these IoT, KeepInTrack has its management system which will help you to manage the drivers, the vendors, the expenses one has, Maintenance alert if any vehicle needs repairing, status of the vehicles, chatting with the receiver, driver and vendor. Through KIT's application and web application orders can also be viewed and placed.

LITERATURE SURVEY

Year, Author	Research objective	Discussed Problem	Solution
(Lyapin et al., 2020)	In this research they focuses on saving fuel consumption by the vehicle. There idea describe in the paper is to embed a fuel sensor which will provide information about the fuel and GPS odometer will notify about the distance covered by the vehicle. All the information collect in the database and a report is being generated which will be reviewed by the user.	• Systems of intelligent transportation and logistics • Security and anti-theft systems	• Smart vehicles can efficiently perceive and share traffic data and schedule drivers' journeys with great efficiency, reliability, and safety. • They can also share that data with other vehicles. • incorporating the IoT to make the vehicle • more cost-effective, secure, and dependable
(Mallidi, 2018)	In this research they proposed a research on preventing accidents. They have also used machine learning to find the severity of the accident. The system uses GPS and GSM module to find the vehicles location	• The major deaths are due to lack of immediate medical attention during accidents. • The accident prevention and detection mechanisms are all static measures like speed breakers, road signs etc.	• Accident detection • Severity detection • Controlling vehicle during theft • Data collection& image classification
(Menon et al., 2021)	They proposed the idea that if any vehicle or ambulance get into an accident and the driver is helpless to call for help this will reduce the time between the accident occurred and hospital receive information about the accident so the rate of blood loss can be reduced.	• Accident • Due to not receiving assistance at a certain point in time, the driver became helpless and lost their life. • Costly vehicles	• the implementation of a cost-effective active vehicle control system which was incorporated into the steering wheel column, which specifically eliminates abundant idle engine vibrations transmitted to the steering wheel.
(Christian Widerspick, 2018)	They proposed the paper to monitor and analyze vehicle status along with if any fault occurs. The hardware GPS will gather the data and software will arrange it and store it into the server.	• Fault occurrence in vehicles. • Data management	• To monitor and analyze vehicle status along with if any fault occurs. The hardware GPS will gather the data and software will arrange it and store it into the server.
(Singh et al., 2019)	They present their idea about fleet management system which includes mainly all the problems a vehicle related person face. It maintains Vehicle, multiple Shipment Tracking, Driver, Health and safety and fuel.	• Driver safety/behavior • Fuel costs and efficiency • Fleet Tracking and Theft • Material Damage and Identifying Fake vs Genuine Customer Insurance Claims	• Driver Face Authentication • Identification of driver's driving patterns & • traffic rule violations through vision techniques • Driver Safety & Assistance dashboard • Vehicle Detection • Estimate and draw bounding box for vehicles detected • Average speed to fuel consumption

OBJECTIVE

KeepInTrack aims to provide an easy and save environment for the manager and the driver. KeepInTrack's goal is to:

- Reduce the maximum problems face by today's organizations while delivering their product.
- Help to perform work more efficiently and easily.
- Provides computerized maintenance and management system.
- Alert if any emergency occurs.
- Alerts the driver about the fuel status.
- Help to calculate cost related data via graph.
- Purchase the product easily through web application and mobile application.
- Help to manage product and vehicle status.
- Monitor drivers' location.
- Monitor the weight of the product and appear notification if changes occur.
- Help driver to see near petrol pump if needed.
- Real time communication between driver, manager and vendor.

METHODOLOGIES

Every project needs a methodology to satisfy customers need. Methodologies are selected on the basis of previous experience or survey.

a) IoT methodology

IoT methodology is an iterative methodology whose objective is to make smart innovations. It uses several steps as follows: Idea, Q&A, Prototype and Deploy.

b) Scrum Ban

Scrum is an agile method which is an iterative approach, which helps the team members to understand the work in order to make changes flexible.

Kanban is continuous method of agile, which visualizes the workflow , working progress, implement feedback loops.

KeepInTrack is using Scrum Ban which means it is using Scrum and Kanban at a same time to meets the customers need.

KIT Hardware System Working

Through GPS the sender will know the driver's current location and GSM will help in communication between them. If the driver went through such places where the network won't be available, the last active location will be saved until the driver gets active.

The Hit alert sensor uses a vibration sensor, GPS and GSM which will let the sender know about the accident after 30 second it will occur. The message will be sent via text as well as on the application due to the reason if the sender doesn't have an active internet connection.

The temperature sensor will be attached on the part where the product is and will be set on some range that if the temperature decreases or increases to some aspects the notification will be generated to the application on the sender's side.

The Weight sensor will be place on the board below all the products to weight the products. If the sender sends product of weight 5kg and if the weight increases or decreases on the way to the receiver of difference 3kg or above the sender will get notification on the application and he can contact the driver or any other action he wants to take (Zlatanov, 2017).

All the data related to the sensors and their alerts will be save on the database. Real time database will be used for temperature and weight sensor is shown in Figure 1.

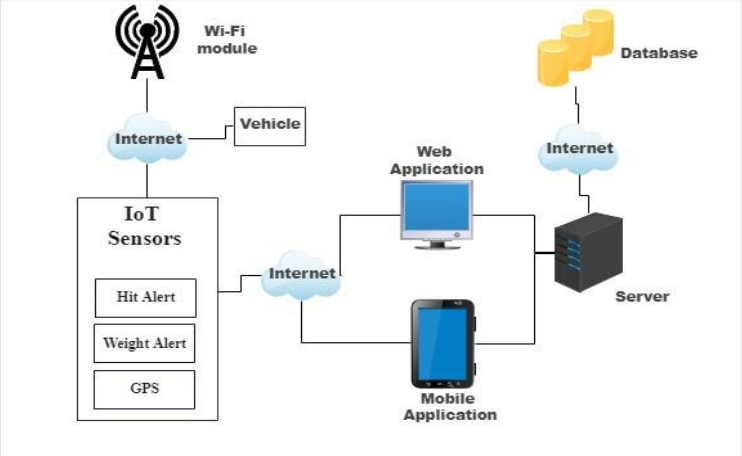

Figure 1. Architecture Diagram of KeepInTrack

Software System Working

Besides all these hardware working, KIT presents a mobile application and Web application which will be used as a management system. It will manage all the registered vehicles and show their current status, maintenance of the vehicles, chatting with the driver, Order status and details and the graph of monthly expenses.

The mobile app will allow the user to chat and communicate. Through mobile app manager can track the vehicles, Chat with vendor and driver, get updates about orders and drivers and get sensor data/updates.

Driver can track his location, chat with the manager and status about the current delivery.

Vendor can get orders and get status about the availability of the products and orders.

Through web app the manager can maintain all the data about vehicles, orders, purchases and expenses. Moreover, a manager can chat via web app.

CONCLUSION

The system will help in tracking the vehicle status and location. It will manage the work related to the vehicle maintenance and consumption. The sensor will help with the alert. The system will help the driver and the sender to be in contact via live chatting. KeepInTrack helps to organize the work in a single desk in an organized way.

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