

A cost-efficient solution for fleet tracking

A smart device tracking solution

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Abstract: It is a location-based service that helps to track the safety and location of vehicle/ group of vehicles, while in action. It is ideal for any transport-based companies and third-party logistics service providers, those benefiting from a real-time update of their vehicle in action. It helps to get real-time location information of the valuable business assets & on and off-site consignments.

A service that helps organizations track their on-ground group, anytime, anywhere in a cost-effective and simple manner. This assist group operators manage their operations effectively and efficiently. Along with the above mentioned an integration of AI for making the application smarter and more tactful while keeping the UI and designing at the simplest possible terms that helps achieving the goals for business while resulting in a steep pocket performance and managing their assets smartly. AI integration helps with the smart choices of the vehicles in perforating the environment and collecting the necessary data from the same (GPS location) and feeding it to the server to show the results in a highlighted format. This helps to view the assets or fleet all at a time while minimizing the threats and taking control over all at the same time.

Index Terms – GPS (Global Positioning System), Location, Transport, Vehicle

I. INTRODUCTION

The need for tracing one's assets when on and off field always comes with a heavy price to fix. This includes the hardware cost of the device and software maintenance, installation charge along with the annual maintenance. Once done with the same the imposition of heavy duties on one who assists and the one who thoroughly administrates the whole scenario. To a point it is all good till multiple devices come up and to handle all at once is quite a task, merging of multiple data and duplicated results are a possibility considering the predictability of the roads and device accuracy which may lead to a confusion.

Directing the problems towards solution may need more man power and all of them with some basic knowledge to understand the system and emulate the possibility of every outcome and reporting that to the administrator that interprets the result for the owner or sometimes the owner does the job for himself. The problems if to count are enormous and ever-growing with each instance and upgrade in the technical facilities each day the cost increases exponentially while the progress chart may not be said the same for progress chart.

To overcome all the above-mentioned problems, we propose a solution favorable to all and being produced in the market. A device that will be available on rental basis ranging from hardware to software, which culminates the properties of pricey hardware, software solutions further adding to that will be the cost for the manufacturing of the device. From this benefitting both the parties i.e., manufacturer and one's using the solution. With that in mind, the frustration of managing several devices perforated under a roof will be eased through a continuous look of highlights that marks the inception of good era which requires no knowledge to operate considering we get the most popular thing in the market at an efficient price.

A plug and play style device that needs no skill to operate it assists & guides admin for the efficiency, speed, maintenance through a software which only the administrator has access to. However, considering the current market conditions the software alone costs the company half the profit they make each year. With the constant need of surveillance and security of the assets for any transport-based company it is essential that they hire a software that lets them track their on-ground vehicles and also maintain a report for the same considering the speed, location, driver details, Areas (source, destination), On map location, Security (SOS, Anti-theft), Real-time location access, vehicle session, productivity and other business details.

This software comes with a GPS-based tracking device that alongside your vehicle's travels providing a location through geo coordinates. This helps the device to be traced making the system possible. It also comes with a pre-built SOS button that alerts the admin to take necessary action. Several AI based features such as live tracking estimation and updates, that keeps the admin updated with various highlighting options, that are easy to understand.

II. PROJECT NEED

A. Problem Statement

The occurred problem of tracking a device or a vehicle in the moving state or in the conditions of fast-paced vehicle in low network areas and providing a live feed for the vehicle on the map locating it through the GPS co-ordinates on the map. Performing all the actions while posing a friendly nature for the operation, which leads to better understanding and optimal operation from the device. To aggregate all the mentioned functions packed in a cost-efficient solution which provides a high throughput and optimal efficiency through a dedicated system.

B. Current problems

Although a lot of assessment to the business owners has been made by providing a digitized way to monitor the tracking for group of vehicles this may increase the faith dilemma of faith amongst the drivers. The technical faults include the ever-growing cost and the use of same old technique has raised lot of questions with no specific answers. The use of more advanced technologies such as A.I. has not yet been integrated into the system which makes it more difficult for the admin to maintain sequential records and update information of the running process

III. PROPOSED SOLUTION

Real-time tracking: The proposed problem of tracking multiple vehicles at a time is addressed using our application. It lets you track your vehicle and assets with the efficiency as high 1/10th of a second to the location. Providing a complete watch over to the on-field assets. With the latest technology and the highest quality equipment's that gets you running your business as smooth. With the help of mega-maps, the tracking can be done of all your assets/ vehicle mega-maps

AI-based application: With the advancement of A.I. nowadays the technology is been used in several business, enhancing the overall productivity and learning to adapt your data with intelligence that helps you boost your success graph exponentially. We are providing estimation of the time based on location enhancing activity made by the software and reducing human efforts for example if your vehicle has a route from Mumbai to Goa, every minute detail with the speed, direction and ETA that helps you track weather or not the vehicle is going on the path set and with what speed is or not the driver drunk? It also provides a specially curated highlighting system that pops the vehicle to be stressed on with schematic colours.

Android-based application: A specially designed application for the employees and the employers so that the management of the system can be carried out anytime-anywhere. Similarly, the employees get the benefits of updating their daily work so that the track record for the same is maintained. An Immediate notification to the nearby places (such as Hospitals, sheds, petrol pumps etc in case of mishap/ emergencies) admin control centre, route detection, speed management colour markers to highlight the precision of the vehicle running and many more features that bring out the best of business.

SOS: A special SOS(Alert) signal will be sent to you in case of any mishaps with our special SOS button on the device that informs the administrator immediately.

Alerts and updates: Choose your alerts and update as your choice keep it according to your convenience. The best of services tailored to suit your needs. Led notifications to notify the driver in case of any change in plans.

Security: Specially made hardware devices that are monocentric and is made for just work no extras. An alarming security that not just lets track but also allows to see if the vehicles are on the wrong path and correct them accordingly. cased protection for the surviving most of the conditions and accidental drops.

Ease & convenience: Like a plug and play device just as easy for everybody to understand and as convenient for to adapt.

Data backup: Don't worry about the back-ups it will be generated with our specially designed software at the end of the day waiting to be reviewed.

Graphical representation: Forget boring numbers and figures, say hello to a new and fresh technology that makes you understand more and crunches your brain less. Colored bars and charts to notify the AI developed vehicle lacking system that highlights the vehicle in fault

A. Field Study

According to some of the logistics owners, a combination of both simple and attractive UI design can help to catch up the data in no time. With the constraints of market competition an ETA can be effective for proposing the speed of the vehicle and pitching the guarantee of services.

Another problem that may be faced during the on-field tracing is the prediction of the situation. If any mishap were to occur as proposed earlier, the SOS button can come in handy notifying the admin about a mis-occurrence and through the app, the driver about the nearest help.

B. Survey

The survey was actually carried with an inspection to verify about the different car services that provides it on rental basis. The constant surveillance of the car can be effective for determining the location at which the rentals prefer the most. Another survey helped us to identify the problems by the driver that led to the creation of the application. (android for time being) According to the reports and the experiments and surveys earlier.

C. Equations

The delay in the time can be calculated by,

Delay = Current Estimated time – (Original Estimated time – time spend)

Delay is the total extra time taken from the estimated time.

Current Estimated time determines the current position of the vehicle and the time to cover the distance

Original estimated time is the time determined from the start position of the vehicle.

Time spend is the total time the vehicle has spent on the field/ road.

IV. PROPOSED METHODOLOGY

The use of Google maps API makes the software set of things possible for the calculation of ETA and other features such as live location tracing through the software. The issue starts if the hardware is not efficient enough or it stops emitting signals.

For the software set of projects we have used, Google maps API for its precision and accuracy. The estimated time would be through the native use of the API i.e. the function of maps. Once a subject is in the range of the trace, the ETA, distance, etc. are calculated. With the knowledge of the same to show the smooth connects, a highlighter would be used as soon a subject is delayed from the estimated time. Not just the delay but also it can estimate if your subject is been robbed or hijacked.

The hardware is a GPS module for tracking the location and direction of the subject or perhaps object in focus. The information that we get through this GPS is processed to Node MCU via STM32. This also includes a power circuit that helps in regulating the power of the circuit and also providing a charger to the battery included with it in case of a sudden power failure.

The application (Android application that is) is a perk for the drivers, it helps to find the nearby services in case of a mishap or mis-occurrence. It also dedicates a SOS button that notifies the admin/ owner about the miss happening.

V. SYSTEM ARCHITECTURE

Data enters the system through a time precision of less than 15sec. Data that enters the system is the current position in longitudes and latitudes, speed, date and time of that instance in UTC, with the direction in which the vehicle is headed. The mode of the vehicle is checked after this in the system i.e. idle, running, threaten, freely movable and under consignment.

Idle mode – If the vehicle is in idle mode, i.e. +-50 m radius our intelligent system will detect the difference through the co-ordinates set to be at idle. If moved above the limits mentioned the vehicle will be highlighted.

Freely movable – The admin is free to make decision in either i.e. let the vehicle move freely or can assign it right away for a consignment.

Rental basis – This mode is specially created for tracking the vehicles that are freely available on rental basis so these vehicles are under freely movable mode until the date of returning is not reached.

Assign consignment – In consignment period we will find the current estimation of the time to the vehicle with the formula:

Delay = Current Estimated time – (Original Estimated time – time spend)

Delay mode – The delay for any particular consignment on the basis of environmental parameters.

Here the sensors will be the hardware for the system which includes an integrated setup of GPS and Node MCU module with a microcontroller also the device would be configured manually by the admin and hence the data that would be provided by the admin will be considered

The estimated time of arrival will be based on current time and traffic near the area, using distance matrix API.

VI. SOFTWARE

Through a detailed analysis of the technologies that is updated into the market almost every day. Precision driving through the soft-codes running in the market at a very strong pace, with java being the front runner in almost every market. We decided to use java technology in our system for the backend while running java-FX with CSS and FXCSS running the front end while tech such as hibernate, JavaScript, Spring, JSON running the whole show for creating the amass structure and the exoskeleton on which things run. The tools used for the development of the same is Eclipse (STS).

The assembler's hardware i.e. the system hardware is a quick guide to the system that explains a lot in the case of given system, the system is well defined under the pretext of a node MCU alongside with a data card to provide the internet facility to the system for sending co-ordinates of the said location and uploading the same onto the server in less than every 5 seconds. The location longitudes & latitudes alongside with the speed, current date and time in UTC format and the direction for which the vehicle or the device is headed not necessarily in the same order. The data is then uploaded to the server via the data card. Sending the above mentioned in this system evokes the system onto cultivating the source

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