Campus Navigation and Fleet Management Application by Using GPS

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Summary
In contemporary era the location-based technologies are emerged abruptly to organize efficient business functions and to ease human lives. In the same line of action, educational institutions and universities having the bigger geographical area tend to use tracking and monitoring system for their vehicles/points. In this paper, a new system devised with help of application for smartphones for fleet/vehicle management. The term Fleet management system can be elaborated as systems which are used by organizations and institutions to manage their vehicles, and all day-to-day operations, such as, vehicle management, maintenance, risk and information management, HR management, disposal management and driver's behaviour. The aim of this paper is to provide a detailed description of how technology can assist us in present android-based fleet management systems using GPS. Fleet management system GPS uses cartography, to calculate the distances and area covered. Navigation, to guide the user where to go and where they are presently. The main purpose to use such efficient technology is to improve accuracy, save time, better vehicle management, maintenance and tracking for autonomous organizations and institutions. The android-based university campus application developed to provide Campus information; this data contains the details of all the nearby points to campus, routes available to the vehicle driver, dashboard and the user (generally students and faculty), information regarding the map of departments and also identifies the distance from department to the current location provided in the palm of the hand of the users, the dashboard and the screen provided to the driver within the vehicle. By using this application, student can able to locate their desired point and their schedule implemented to demonstrate the field data set. Moreover, the survey conducted in a bid to get the feedback of students and drivers after effective usage of this application and new system. Apparently, this smart system of fleet/vehicle management proved more convenient travelling and navigation around the MUET.

Key words:
Fleet Management; GPS; Campus Navigation, smartphone applications.

1. INTRODUCTION

In a real world scenario such as university campus, information is provided as notification; printed or written manuals; verbal communication is spread to the desired recipient [1].

Today, it is essential, not only use the traditional forms of communication, but also newer forms such as android mobile technology for quicker and easier communication [2]. As this application is particularly for MUET campus Jamshoro, it will help for the people who do not belong to this university and new comers as well as can assist many students easily to find the way and can search the other locations as well as use the map type.

An android-based university campus is an application that can be accessed throughout the organization and especially by the students in user-friendly ways. By using this application, students will be able to stay updated with available vehicles and nearby points and in case of road blockage due to construction, alternative accessible points.

2. RELATED WORK

In [1] a GPS based navigator application is used for a Campus using positioning technologies to cover Size of location coverage, and location coverage ability. In [2] the mapping of Jain University global campus is finished fruitful with the perceived region data by using IRNSS. The data is anglicized and the plots are obtained for altitude variation, carrier to noise ratio and satellite visibility includes various terrain features such as vegetation, plain fields, high and low altitude regions, power house and of different size buildings using software and algorithms to obtain the maps and plots of the area surveyed. [3] offers a smart design of tracking and monitoring the busses which helps the bus companies to offer high superiority of service. This design can provide the location of the busses of the service with an error less than 10min the case of slow speed and clear environment and the system.

In [4] the applications were made pointing to help the Land Officer and people to know the location of the land digitally. The implementation of GPS technology is used to establish the coordinated points of the boundary informs of latitude and longitude in line with the existing situation in the field. The benefit of mapping digital land certificates is to not only know the land site, but also to get the statistics contained in the map and map-making is less costly because they do not

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need to use many devices for maintenance including storage media practically. In [5] of this paper the system follows the pollution levels using discrete sensors and data from the module is sent to the server by TCP/IP protocol in order to find the location of the vehicle traced by the RTO. Therefore, the chief aim of monitoring pollution caused by the vehicles can be accomplished which in turn will create awareness amongst the mass about this global issue. In [6] Internet of things in fleet management logistics is provided to monitors the status of the vehicle using fuel sensors, GPS based Odometer provides status related information of the vehicle to the fleet control management. The control management from remote place using IoT platform can provide precautionary measures for driver in maintaining the vehicle time to time by using different Sensors, provide to initial control measures for the driver for the proper maintenance of the vehicle. This will be implemented in the routes where fuel economy is required. It will reduce resource for maintaining vehicles. In [7] project has built a school bus security system that provides comprehensive security to the commute. The system has real time tracking, student identification, and provision to monitor excess speed, detours, unscheduled stops, delays, accidents, and student absence by using microcontroller.

In [8] this research explored a way to improve the performance of bus travel time prediction at any distance along the route. The multiple distances from bus average speeds were inputs used in the two models, DNN and OLS. To assess the execution of the model, buses' travel information was collected from bus. In [9] the Android-based application was created to measure the actual area through with the coordinated area can be drawn and to determine the coordinated Points of a ground area. In Ref [10] the goal was to design a system that provides a real-time data of exact location of local bus transport that tries to decrease wait time at bus stop or at station and find unnecessary crowding. The users can track the current location of vehicle using the user-friendly mobile application and can plan their travel accordingly. Many types of sensors are used to extract the updated information and results. In [11] worked on android application and on IoT structure for guidance of the students where they achieve seamless outdoor and indoor navigation between buildings in a campus. To add, it keeps construction cost low by using live surveillance cameras in the campus and lessens the total searching time for finding a specific event/target in the campus by reducing time-taking labor overhead to evaluate a vast amount of video data. In [12] search on the cars dynamic destination was done, for track similarity calculation and detection by using different algorithms, so that destination of the cars instantaneous decision maintains for dynamic fleet management.

In [13] a system for the company which will allow to determine diverse routes used is designed that also calculates the efficiency of fuel consumption with different types of cargo, because some companies don't have their vehicles, so this system can monitor the vehicles fuel and their speed and to minimize costs generated by lodging and feeding the drivers. In [14] worked on Autonomous navigation for which a mobile robot was designed to navigate the location by using GPS, cameras, and other sensors. In addition, used GPS based global waypoint following and vision algorithm based on local pedestrian, the robot is in communication with a cloud server and web interface for the users. In [15] We used server less architecture to design a system to navigate the destination without any server, used mobile app, a microcontroller and databases, low power GPS and micro service-based software development technique to smart the track. In [16] we designed a system using GPS system and different sensor software and hardware equipment. Meanwhile logistic vehicle safety detection, Driver Behavior Analysis, Travel Time Analysis and work progress is calculated, so that both the logistic enterprise and the merchandise shipper can easily track deliveries, merchandise-related temperature and humidity monitoring, to prevent goods from being damaged. Combination of beacon technology with GPS for monitor of delivery processes, charts and graphs survey that can help in businesses to enhance their strategies. In [17] explains about the fairy circles, circular patches of barren soil forming large clusters in the arid grassland of South Africa. In [18] we present a bus with the details of the driver; bus number and the distance required for the user. In [19] a centralized and an allotted manipulate approach for cost ideal battery control that encompass the electrical automobile battery model. Distributed manipulate is used to obtain private and obvious charging prices for every automobile at the same time as nevertheless attaining the equal stage of sales because the centralized control of fleet control.

In [20] This Paper present about Transport companies are working to improve the management of their fleets by focusing in particular on vehicle's maintenance, which affects the vehicles uptime and generates the most important cost. Predictive Maintenance is a prominent strategy for dealing with maintenance issues given the increasing need to minimize downtime and associated costs. In [21] this paper best fleet management will yield operational price savings for noble metal operators, expressly considering time period disturbances, including delays, service disruptions etc. check results primarily based upon a real-life state of affairs showcase. In [22] prototype of a low-cost fleet tracking machine that would be used for non-industrial applications. The machine consists of a tool, provider software, and Web software. The tool reads information such as velocity and gasoline from the inner community of the connected automobile and the place of the automobile and sends them to a far-flung provider. In [23], we consciousness at a part of the deliver chain among wholesaler and pharmacy. In particular, our contribution is to endorse a mathematical version for helping the maximum not unusual place operational choices associated with a pharmaceutical

wholesaler: what number of automobiles to use, which routes to use, what carrier degree to assure to pharmacies.

3. Different Use Cases

A. Use Case-I

In this Case , the application will assist the students to find their department and destination , and while moving to their destination , student will able to calculate their footsteps , application contains the pedometer , as well as they will able to calculate the area calculation and perimeter calculation and distance by putting the markers in the application, students can able to know that where the desire points are , and their location as well as in how much time the desired point will reach to them this make students more reliable in their daily routine.

B. Fleet Management with Static Route

The location of places within Mehran University Jamshoro Campus can be tracked and traced by means of a GPS system embedded in Smartphone's with the purpose of displaying information to know the current position of a place by using android application and JavaScript programming languages and by collecting data via Firebase. Smartphone developed application is developed and can easily be installed on the smartphones, where users can download and select rides. The flow of the developed application is shown if Fig. 1.

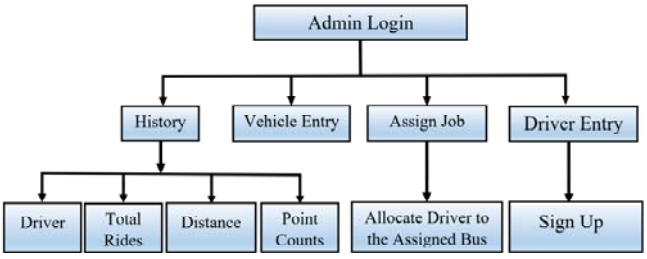

Fig. 1 Flow chart of the developed mobile application.

This organogram tell us about the admin rights , that how admin will able manage the management of fleets by using this application , as well as by creating the vehicle and assign the vacant vehicle of the campus to the vacant driver and by using the recorded history admin will manage the vehicle and driver consumption , admin have the right to delete and create the vehicle as well as driver , and can see the history of the rides , distance travelled and the rides completed by an individual vehicle.

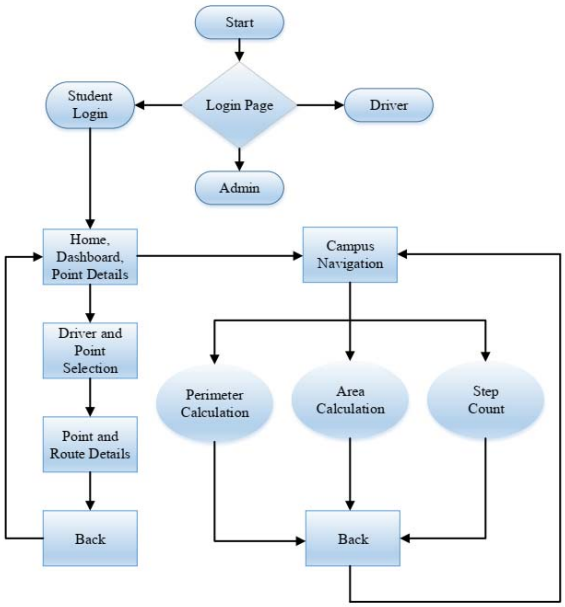

Fig. 2 Flow chart of the Fleet Management System.

Fig. 2. Is the flow chart of developed application, which contains Admin side, driver and students user part in a single application, Admin has main control to create rides in details e.g. Images, model and vehicle number, and assign the vacant vehicles to the driver as well assign the static routes to the driver, Admin side have the dashboard to see the history of the driver and number of completed rides by the driver , and number of rides and distanced completed in a single day .Whereas the Signed up Drivers will get the notification of the assigned job by the admin and static route destination they using the GPS in the smart device only, while driving , driver will get alarming notification of the vehicle on certain kilometers e.g. change the tire, gear oil, fuel and change the parts of the vehicle , to make the vehicle more efficient by using the application and aware to change the part of the vehicle time to time. Whereas student will see the location of the driver, point and routine distance and navigate the campus and while navigating the campus can measure the perimeter calculation, area calculation, distance and footsteps counts.

- First Admin will sign up as admin, and then assigns a vehicle with the brand name at no of vehicle after creating the vehicles admin task is assigned to the drivers who are waiting for the rides and vehicles assigned by admin driver will get a notification that you have assigned rides.
- Drivers will sign in by their phones, and can see the assigned task, for where he would have to go and pick up students/users.
- Driver will get the notification, about refueling the bus, change the tire of the bus, change the gear oil, and other notifications while driving after certain kilometers so that they can easily know how much petrol is consumed from the vehicle and when he has to service the bus parts and other engine parts which will be more efficient for the bus and driver performance.

- Students can also locate their desired points and navigate campus as well, can measure the perimeter and distance of the campus, and as well can make sure of their footsteps as well after reaching their department.
- When driver check in at the gate of campus, application will mark the timings of check in and checkout, with the number of assigned rides to the driver, it would be monitored by admin.
- Admin can add and delete the assigned rides, so that admin can assign different vehicles to different drivers.
- Admin is assigning the rides and vehicles to the desired driver.
- Driver gets assigned rides notification.
- Driver can see the Static route where he will be going to arrive while driving student can also the point destination.
- When driver left zero-point checkout timings will be submitted.
- After Getting the Assign Rides from the Admin While leaving checkout timing will be there.
- Admin can see the details of points, driver and their route so that Admin can check that which rides he assign to the individual Driver.
- Distance will be calculated in Kilometers from University to the routes.
- After completing the rides, there is history of rides, driver and distance travelled.

4. Methodology of the Developed System

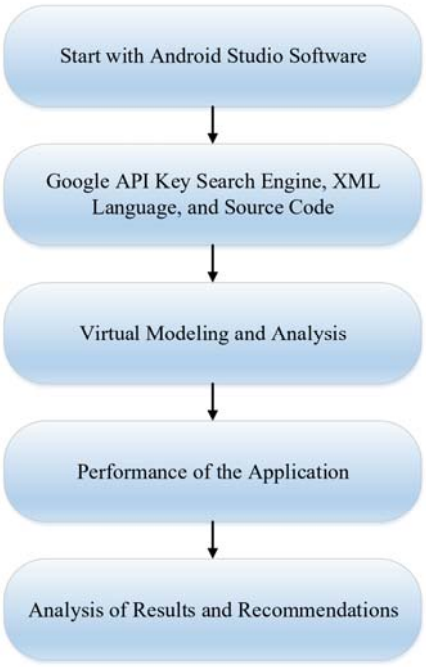

Fig. 3 Flow chart of the Fleet Management System.

5. Performance Analysis

To see the performance of the system, we should see the aspects of the Fleet Managements system and how they are dealt with. Vehicle Tracking: Tracking of vehicles at rest and in motion, also to see how the time is being spent using the vehicle. Health & Safety Tracking: Is the diver in good health? For example, if the driver feels dizzy or has hypertension, there should be an emergency replacement in order to ensure safety of passengers. Fuel & Speed Management: Using GPS systems and laws of basic physics speed can be calculated. If the driver goes to slow, it may trouble passengers, as they will get late. If he crosses speed limit, then it is dangerous for passengers. Route Planning: The application gives the best possible routes to save time and comfortable journey of the passengers. Driver Management: This ensures that the drivers complete their shifts and their over time or absence from vehicle. Vehicle Diagnostics: This part deals with the aspect of the health of the vehicles. Drivers and dashboard receive notification, as to when the oil change, tire change, refueling etc. is required.

Fig. 4. Shows the results of the survey of developed application which has done by the Students of the Mehran UET Jamshoro, they used this application and give a review about this application in real-time.

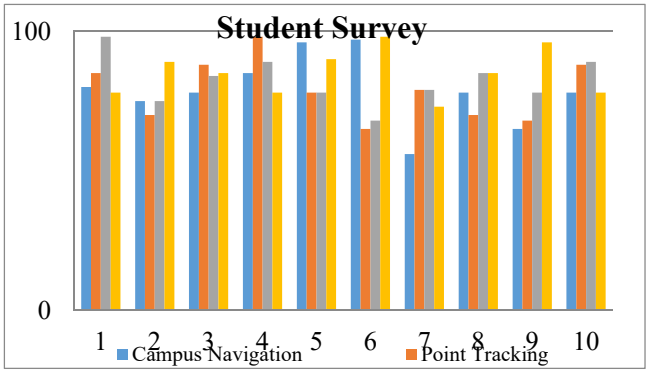

Fig. 4 Student Survey of the Application

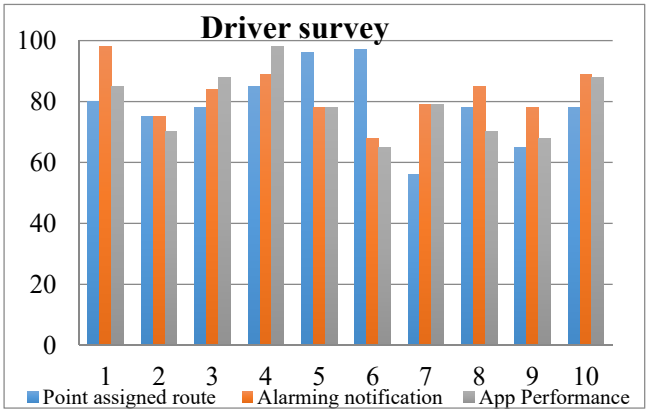

Fig 5 Driver Survey of the Application

Fig. 5. Shows the results of the survey of the driver's experiences using the developed application. This is the

survey of the application, which is done by the drivers of the Mehran UET Jamshoro, they used this application and give a review about this application in real-time.

6. CONCLUSION

The project intends to utilize the full potential of GPS using Android phone for the applications of cartography, navigation and fleet management. This project helps to eradicate the issue of MUET campus navigation system. By using this application, the users are able to locate where they are, and where they need to go at this campus. This will save them from confusions and time consumption.

Another issue addressed with the support of this useful system is the choice for students in movement to and from the campus. The application helps them located and tracks the points and the next vehicle available. As far the last part of the research is concerned, it deals with survey. Interestingly, it is satisfactory, for all the users as they will have all the queries related to their rides, on the palm of their hand as well fleet management of the of the campus vehicle and by this app consumption of fuel and alarming of spare parts that when to change after certain kilometers has been addressed.

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