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Fleet Management System using Android

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ABSTRACT—

This paper presents the Fleet Management System using Android, that can be used in the management of fleet task operations. It also serves in monitoring the rental vehicles. With this system, the real-time tracking of the bus, car, or any other vehicle can be done and this information is given to the remote admin who wants to know the real-time location information. Fleet administration refers to all movements that want to take vicinity to maintain a fleet jogging successfully on time, and inside budget. Any organization such as schools, colleges, software or hardware companies, marketing industries, banks and any other organization with vehicle fleet can use this application for fleet management. Using mobile application for fleet management makes it handy to monitor and also eliminates the man power, equipment such as computers and space for computer room. Every smart phone can get its own geo location with the help of satellites. Mobile phones are now the most widely used and prevalent technology. Information fetching and communication would be much easier with the android application in the smart phones when GPS is triggered in it.

In traditional vehicle fleet management, there exists a web-based fleet management systems provided by most of the well-known organizations. These systems have some major drawbacks. To overcome these drawbacks we are introducing two mobile applications, one for the organizers, managers at work place i-e., Smart Fleet and one for the driver i-e., Smart Driver. The company is able to constantly monitor the whereabouts of its cars thanks to this technique. This is accomplished by sharing the geolocation of the phone with the installed smart fleet application and the installed smart driver application. Organizer or manager who is having our application installed in his phone that has android operating system, can monitor the vehicles, and update the data. The excellent fleet administration software program suggests pinpoint-accurate areas of the cars in your fleet, notifies you of upkeep and gasoline updates, and presents analytics that assist enhance your approaches and save money. This will help you build trust and reward your safest employees.

Key Words: Remote admin, Global Positioning System (GPS), Smart Fleet, Smart Driver.

I. Introduction

Nowadays, almost all companies have their own fleet of vehicles for their purposes, e.g. for business or private travel, transporting goods or providing cabs for employees. Building and maintaining a fleet of vehicles can be stressful and time-consuming. You take a risk when you give your employees control over an expensive asset like a vehicle. This can cause anxiety in even the calmest managers, no matter how trustworthy the driver.

Fleet administration refers to all moves that want to take area to maintain a fleet walking effectively on time, and inside budget. In distinction to character or family-owned vehicles, fleet automobiles are a series of motor motors owned or leased through a company, authorities agency, or different organization. Examples of fleet motors embody these used with the useful resource of car condominium agencies, taxicab companies, public utilities, public bus companies, and police departments. Fleet administration is the techniques used via fleet managers to screen fleet things to do and make choices about suited asset management, dispatch and routing, and car acquisition and disposal. Companies, security, and emergency forces ought to maintain song of their vehicles and automobiles and understand anywhere a car is at a flash in time, and when, at any place and for a way lengthy a automobile stopped.

Organizations need to keep an eye on their vehicles and stay in touch with drivers. Communication between the organization and its vehicles is very important during emergencies. Every smartphone is capable of determining its own location using the satellites available to it. Cell phones are the most widespread and widely used computers on the market today.

Users can include their cell phones in their daily lives because they are very easy to use and offer many possibilities. Smart phones reach all people because of their growing ease of use. Nowadays, in order to reach the common people, people use information and communication technology. Using a mobile application allows the organization to stay in touch with its vehicles and track them from time to time. Using geolocation capabilities, the Smart Driver application shares its live location with the Smart Fleet application.

As a fleet manager, efficiency is key. Unfortunately, most fleet managers find themselves performing tasks that are both time-consuming and contribute little, if anything, to the company's bottom line. The project is developed in favor of the organizations using vehicles for any kind of transport or even individuals to manage their vehicles on their fingertips.

II. Related Work

[1] Mining fleet management systems: a review of models and algorithms, 2017:

The objective of this endeavour is to review and record the algorithms and designs of systems for fleet management for mines. The goal is to understand the methods underpinning fleet management systems as well as the educational solutions which have been proposed in the field in order to determine any holes in the current literature and providing openings to pose research issues that need to be discussed in an inclusive methodological approach for simulation and optimization techniques of operations planning. This article includes both the systems and the key academic methods for commercial systems for fleet management. The fleet management systems' three main difficulties are real-time dispatching, production optimisation, and shortest path. Last but not least, it is shown how the present fleet management methods are constrained in their application to mining activities and their capacity to offer the best answers to challenging problems. The results of this literature review allow us to evaluate the logical linkages between the fundamental components of an integrating process simulation methodology for planning activities and the prevalent concept of systems for fleet management.

[2] Design and Implementation of a wireless OBD || Fleet Management System, 2016:

This article discusses the conception and creation activities for a cordless on-board diagnostic methods (OBD II) for the system for fleet management. The system is designed to measure speed of the vehicle, distance, and fuel use for monitoring and analytical purposes. An OBD II scanner is used to monitor speed and mass airflow, and from those measurements, distance and fuel usage are also calculated. Thereafter, this information is sent to a remote server over a WiFi connection. The system also includes a system that uses GPS to find the car. A database system is set up on the remote server to handle and store the provided data, and an user interface with graphics is developed to analyse it. To verify the system's functionality, many qualification tests are conducted. The results show that the system can read a variety of parameters and process, transmit, and display the measured data.

[3] Identifying key factors for introducing GPS-based fleet management systems to the logistics industry, 2015:

Consumption patterns have altered as a result of globalisation and the growth of e-commerce. The logistical needs of different sectors vary. In order to meet demand with diverse timetables, logistics is crucial. The logistics business gains a competitive edge by offering seamless service. Technology based on the global positioning system for fleet management achieves a variety of management objectives, including monitoring and tracking the distribution of commodities, and benefits transportation businesses, energy saving, safety, and quality. A case firm that runs Taiwan's largest shipping line and is a subsidiary of a well-known food and retail conglomerate suffered from the unsatisfactory implementation of GPS-based fleet management systems in recent years. Consequently, the purpose of this study is to pinpoint the crucial elements that will enable the example company to apply the right processes. We are able to pinpoint not only important components but also the relationships between those aspects utilising DEMATEL and ANP. The findings reveal that although management support is the most crucial criterion, it performs the least well of the essential variables. It was discovered that engaging with highly specialised consultants, promoting user purpose, and creating an appropriate annual budget might all assist boost senior executives' confidence in their ability to successfully implement the systems.

[4] Intelligent fleet management system with concurrent GPS & GSM Real-Time positioning technology, 2007:

The proposed intelligent fleet management system combines the real-time locating capabilities of the Global locating System (GPS) and the Global System for Mobile Communications (GSM), an intelligent front end, and web-based management software. The proposed system can follow the target even in areas with weak or unstable GPS signals, and it provides greater precision in positioning than systems that simply depend on GPS positioning. The terminal is powered by Front-End Intelligent Technology (FEI), an all-encompassing embedded system with the necessary artificial intelligence to replicate the brain's abilities in decision-making for faster responsiveness, greater accuracy, and reduced reliance on a back-end server. A fleet management system can be executed more successfully on a big scale with less reliance on the backend. At University Teknologi Malaysia, the suggested system has been successfully installed and tested on 20 vehicles, including buses and autos (UTM). The findings demonstrate that consumers can utilise the Internet or Instant Message Service to monitor and track the whereabouts and condition of their automobiles in real time (SMS). The user was capable of handling their fleet more efficiently thanks to the internet fleet management software.

[5] Dynamic coordination in fleet management systems: towards smart cyber fleets, 2014:

Systems for fleet management are frequently used to plan transportation and quality service in a range of contexts. In contrast, in open and dynamic situations where scalability, proactivity, and autonomy become crucial for their success, their conventional top-down navigation systems becomes a bottleneck. The authors describe an abstract, event-based framework for fleet management systems in this article. They use the example of emergency medical management to demonstrate how this architecture facilitates the adoption of adaptive control systems for fleet vehicle coordination. When they conceptualise fleet management systems as computer systems and introduce the idea of "cyber fleets," they advance the transition to computerized or automated fleets.

[6] Trends in models and algorithms for fleet management, 2011:

Fleet management is an important activity at the tactical and operational levels that private companies and public entities involved in passenger and freight transportation must deal with. For the purpose of meeting consumer demand while minimising costs, mathematical models and computer methods have been created to optimise and mimic the functioning of transportation fleets. Routing and vehicle scheduling are two common fleet management issues that are combinatorial optimisation problems, which are notoriously challenging to solve even in static situations. Dynamic fleet management also comprises managing unforeseen events that can have an impact on the efficiency of the transportation system as well as actual

requirements on the operation being given. The purpose of this study is to outline current advancements in both the development of mathematical models and the design of computing algorithms, as well as to identify the key fleet management issues associated to various transport modes, each of which has unique characteristics.

[7] Centralized fleet management system for cybernetic transportation, 2011:

In this study, we introduce a centralised fleet management program (CFMS) for cyber automobiles, also known as cybernetic vehicles. Cyber cars are mechanically driven passenger conveyances used in specialised networks like theme parks, retail establishments, etc. The CFMS organizes the cyber cars to grab consumers at their various stations at the predetermined intervals after receiving reservations from users by contact, Web, booth, etc. The routing network is under the direction of the CFMS, which also aggregates client requests, schedules and routes cyber cars to consumers, routes emptying cyber cars to additional services or parking spaces, and routes vehicles whose batteries are low enough to require charging to recharging stations. The difficulties for CFMS are to guarantee conflict-free routing, fulfil urgent customer requests, proactively modify vehicles trajectories, and reduce network congestion. We outline the strategies CFMS employs to guarantee these features and provide a numerical example using a test network.

[8] Monitoring the chipping and transportation of wood fuels with a fleet management system, 2013:

Managing and planning the intricate fuel wood supply network from the forest to the user is a difficult challenge, particularly for the chipping and shipping operations. To be lucrative, truck fletchers and transporting trailer should be planned with the fewest possible delays. A fresh approach to boosting effectiveness and productivity is provided by order management inside the supply chain, which also platform made that utilizes machine actions. To find and examine any potential gaps and enhance the supply of forest fuel, detailed data are however required. In most cases, statistics on the fuel wood distribution chain are gathered from in-depth time studies that concentrate on a particular stage in the process. Time studies only describe particular time periods, but they might nonetheless disclose details during the generation of forest fuel. Seasonal and transient effects might be included in long-term data gathered all year. This study seeks to track semi-automated forest fuel provisioning procedures, particularly in terms of time and fuel use. Huge data sets were efficiently and effectively gathered without much work on the part of the drivers and operators. Using fleet management equipment, data were logged for more than 14 months. During one-minute intervals, vehicle data were captured, including GPS data. Data administration was carried out in a prepared databases that was run by the Vienna Institute of Forest Technology and includes prepared reports. Using raw data from machine operations and GPS, Structured Query Language (SQL) routines were used to assign task steps. More than 240 cargo' chipping and transport processes were examined, with a focus on traffic, time requirements, and fuel use. An average of 54 kilometres separated the chipping site from the factory. 50 l/100 km of fuel were used during the transportation process. The chipping plant had an operational hourly fuel usage of 58 litres and an efficiency of 12.8 odt/PSH15.

[9] Physical security for fleet management systems, 2019:

In a typical FMS design, utilizing SUC tech as data security anchors has predicted technical ramifications that are examined in this study. It is demonstrated how to securely connect material monitoring, and manpower in such an system using a number of generic security protocols connected to SUC and tailored to the FM context. The combination of other biometric fingerprints is also demonstrated, with the goal of streamlining personal liability and enhancing security administration in such internationally active automated procedures. The key security vulnerabilities in the current FMS can be addressed, according to the security research of the upcoming FMS that has been given. Device makers may be entirely eliminated as security actors, which is a significant benefit of the SUC approach. The SUC solution requires the use of FPGA technology, which is now unavailable and is only going to be made accessible in the future. When self-configuring non-volatile (flash-based) mechanism smart components are utilised in future mass-produced electronic items, the idea will finally be applicable. These devices won't lose any data while they are shut off, making them predicted to lead upcoming ultra-low power application in the Internet of Things (IoT). A vast class of globally running protection mechanisms like to those of the examined FMS situations may be covered by the suggested SUC technique since it is extremely adaptable, scalable, and versatile.

[10] Fleet management for vehicle sharing operations, 2010:

In order to produce the least expensive vehicles redistributing strategies for shared-vehicle systems that satisfy a fraction of all particular need eventualities, an astochastic mixed-integer programme (MIP) with concurrent randomized restrictions has been created. In shared-vehicle systems, when flow of traffic of one location to the next hardly matches traffic moving in the opposite direction, the model seeks to address the short-term inequality of demand. When demand exceeds supply, the model generates partial redistribution plans that take demand stochasticity into account. There is a nonconvex viable region for this stochastic MIP. The issue is transformed into a collection of discontinuous convex MIPs, and an unique divide-and-conquer algorithm is proposed to generate efficient points and handle twofold problems. A quicker cone generating approach is also described, presuming that the unpredictable desire in every location is independent. The promise of redistributing like a fleet management tactic and the significance of accounting for innate stochasticities are illustrated using a working prototype for such a system located in Singapore.

III. Methodology Used

The United States government owns and manages the satellite-based radio gps system known as the Global Positioning System (GPS), formerly known as NAVSTAR GPS. Despite the fact that these technologies can increase the usefulness of the GPS position data, the GPS doesn't quite ask users to submit data and operates without telephone or internet reception. The GPS system offers vital location capabilities to users in the military, civic society, and business sectors worldwide. Everyone who has a Transceiver can access the system for free because it was created and is maintained by the US government.

The advantage of GPS is that it is available anywhere in the world where satellites are visible. The fact that these receivers is readily available and are all interconnected to other digital equipment, such as cell phones, is another major use of GPS. Using GPS for vehicle tracking makes it easy for developers to determine the location of the vehicle. Another major advantage of GPS is its speed. GPS receives the location very quickly and accurately. GPS works in all weather conditions. Regular updates make it even more efficient. GPS the biggest advantage of is that it covers 100% of the planet.

The two mobile applications, one for the organizers, managers at work place i-e., Smart Fleet and one for the driver i-e., Smart Driver. The company is able to constantly monitor the location of its vehicles thanks to this technique. This is made possible by sharing the geolocation of the phone with the smart fleet application and the phone with the smart driver application. The manager or organiser who has our programme installed on his Android-powered phone can track the vehicles and update the information.

System Configuration

1. Windows or Linux Operating System:

Microsoft Windows, usually referred to as Windows, is a grouping of many different apparent OS versions that are all produced and marketed by Microsoft. Each family concentrates on a certain area of technology. There are two current Microsoft Windows families: Windows NT and Windows IoT. Subfamilies like Web Servers or the Windows Embedded Compact may also be included in these families. On November 20, 1985, Microsoft introduced an operating system called Windows, which functioned as a graphical OS shell for MS-DOS, in response to the increasing need for graphical user interfaces. (GUIs).

Ubuntu is a Debian-based Linux distribution made up primarily of software that is open-source and free. The three official editions of Ubuntu are Desktop, Server, and Core for IoT, devices, and robots. Both the PC alone and a virtual machine can run any edition. With support for OpenStack, Ubuntu is a well-liked os for cloud services.

2. Microsoft Visual Studio:

Microsoft created the open code editor Visual Studio Code for Windows, Linux, and macOS. Debugging support, syntactic marking, code finishing, snippet, debugging, and embedded Git are among the features. Users can customise the look, adjust the keyboard commands and settings, and add extensions to add more functionality. The MIT License, which is permissive, governs the source code, which is available for free and open source. The produced binaries can be used for anything at no cost.

3. Flutter SDK:

Google created the transparent UI tool for software development known as Flutter. Applications can be created for Android, iOS, Windows, Mac, Linux, Google Fuchsia, and the web using this platform. Flutter's initial release, code-named "Sky," utilised the Android OS. Its stated goal is to be able to render reliably at 120 frames a second. It was announced at the 2015 Dart Development Summit. The first "official" edition of the framework, Flutter 1.0, was presented at the Flutter Live Show on December 4, 2018. At the Flutter Interactive event on December 11, 2019, Flutter 1.12 was made available.

4. Android Studio:

The primary IDE for Google's Android operating system is called Android Studio. It is built using JetBrains' Intelligent IDEA software and is intended just for Android development. On computers running Windows, macOS, or Linux, it may be downloaded. Beginning in 2020, it will also be accessible as a subscription-based service. Being the main IDE for creating native Android applications, it takes the position of Eclipse Android Development Tools (ADT). On May 16, 2013, Android Studio was unveiled first at Google I/O conference. Beginning at versions 0.1 in May 2013, it stayed in the early release testing stage until entering beta at versions 0.8, which was made available in June 2014.

5. Android SDK:

The process of creating new applications for gadgets that use the Android OS is known as Android software development. With the Android SDK, Google claims that [3] "Android apps may be created in Kotlin, Java, and C++," however other languages may also be used. Platform tools for the Android SDK are a part of the Android SDK. It includes Android platform-interface utilities like adb, fastboot, and systrace. The creation of Android apps requires these tools. They are also required if you wish to put a fresh system image onto your device and unlock the bootloader.

6. A web browser such as Chrome:

A cross-platform browser created by Google is called Chrome. It was initially made available for Microsoft Windows in 2008, and subsequently versions for Linux, macOS, iOS, and Android were added. The browser also makes up the bulk of the Chrome OS operating system, which functions as a gateway supporting web apps. Chrome is licenced as proprietary freeware, while the majority of its source code is taken from Google's open-source and free Chromium software project. The initial rendering engine was Web-Kit, but Google later forked it to create the Blink engine, which is now used by all Chrome versions except from iOS.

IV. IMPLEMENTATION

The Fleet Management System project is an Android-based application where we are developing a two-sided application. One application is for the organization where they are able to log into the application and they can assign routes, add drivers, track vehicles and more. The application is called smart Fleet. There is another application called smart Driver. This application is designed for the user. Here he can move to the destination he needs to reach. A map will be visible for him so that he can reach the destination.

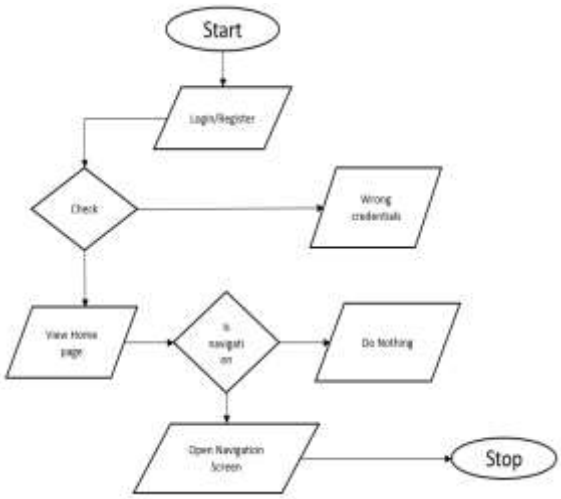
Control and data are best suited for real-time and data-driven systems. These flow analyzes convert the text of logic and data requirements into graphical flows that are easier to analyze than the text. PERT examples of control flow diagrams are state transition diagrams and transaction diagrams.

The CFD (control flow diagram) of the Smart Vehicle Fleet Management System can be represented in two different diagrams because the system includes two applications. One is for the management of the organization and the other is for the driver of the vehicle used by the organization.

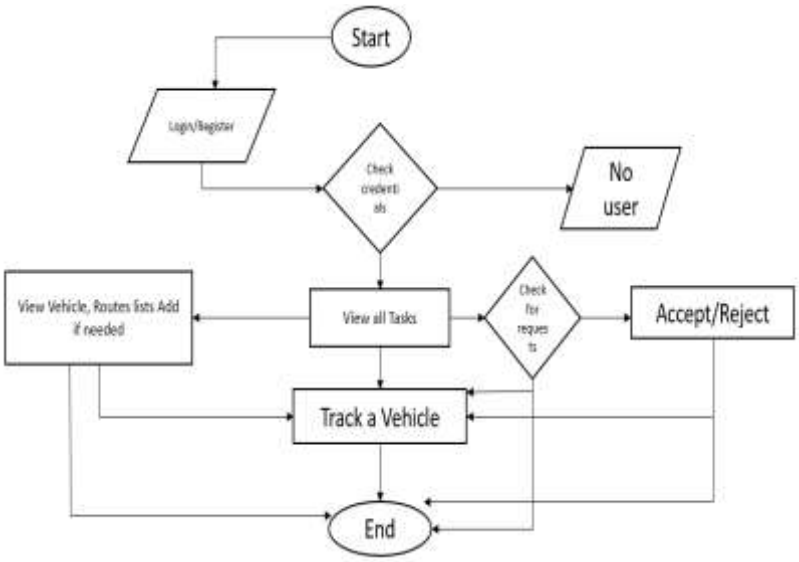
The applications involved in the system are:

- Smart Driver

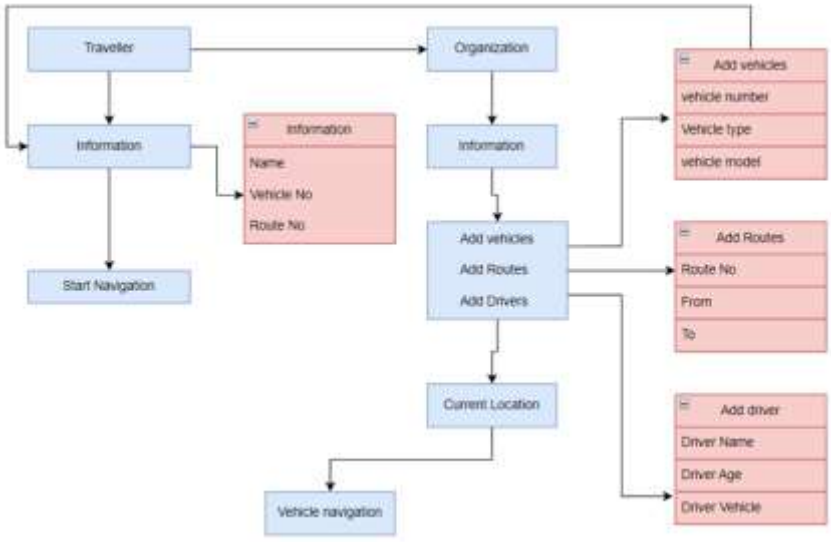
- Smart Fleet



Control flow diagram for Smart Driver.



Control flow diagram for Smart Fleet



Architecture diagram for Fleet Management System.

V. Results and Discussions

- Splash Screens

Fig. 5.1. Smart Fleet & Smart Driver Splash Screens

- Login Screens

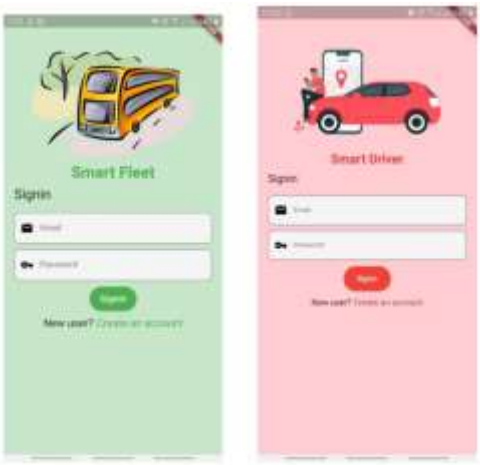


Fig.5.2. Smart Fleet & Smart Driver Login screens

- Tracking Screen

Fig.5.3. Vehicle Location

VI. Conclusion

Due to traffic, weather, or other factors, the travel of university busses, school buses, office taxis, and other transport vehicles may be impacted by numerous dangerous situations. Our suggested method may perform actual surveillance of a bus, car, van, or any other vehicle with the aid of a fleet monitoring system that utilizes smartphone software, and this information will then be exchanged with a faraway admin who needs to know the real-time position information.

The path for distribution and pickup vehicles may be planned using this system, which is used to manage fleet duties. In addition, rental car monitoring uses it. The creation of a vehicle guiding model is made possible by the LCD connection. The study demonstrates the benefits of the access point and is done to implant the localization method into the mind.

The result of our project has met our actual expectations and can be used by any organization to manage their fleet systems. Any organization like schools, colleges, software or hardware companies, marketing industries, banks and any other organization with fleet of vehicles can use this application for fleet management.

VII. Future scope

This Mobile Based Fleet Management System can be greatly developed to make it advanced. There are many features that can be added such as panic alarm, live chat.

These advancements can be expected as future updates. Some of the most expected advancement features are listed below.

- Panic Alarm:

This alarm allows drivers to alert the administration and even the police and emergency services in the event of an accident. This can help save the lives of many people and the driver. The system is programmed to send a message to the police, fire department and administration with the exact location of the vehicle and when to alert them. In this way, the rescue and police services can arrive in time and save many people.

- Live Chat:

This live chat option provides a communication channel between the driver and the fleet administrator. This way, all the needed information can be transferred very easily and efficiently. Since this chat is voice-based, there is no risk of drivers being distracted from safe driving.

- Third Application for Passengers:

This third application can be called Smart Passenger, as it is used by passengers of the vehicles. This application provides passengers with schedule information, current location, and driver information. Here, information about the driver is provided to the passengers to make the driver more responsible when dropping off passengers at home, office, school, or college, especially in the case of girls and women.

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