

# A Smart Real Time Ridesharing and Travel Assistance

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**Abstract:** India is the second populous country in the world. India's population is about 1.1 billion with an overall density of 336 people per square kilometer. Indian public transport supports various mode of transport such as transport by land, water, air. More than 30% of Indian population is car owners. Traffic is mainly high during peak hours within the cities [2]. In order to reduce traffic congestion, a real time ridesharing is proposed. This method is implemented by developing an android application which is user friendly and has high mobility. Real-time ridesharing is an extension of carpooling to best suite one's preferences using the data collected from social networking. It enables users especially colleagues, classmates, to share their vehicles for travelling to the same destination or nearby destination. In addition to ride-sharing, the system gives real time navigation guidance in a map. Users can set their travel to be private or make it available to some of their friends using privacy settings. The concept facilitates to include taxis or rickshaws and also other public transport systems which can set their visibility to public. In case of public transport, passengers can request to board a particular vehicle by looking up the available services in the admin processes and the requests from various users, notifies to them the nearest stopping. Implementation requires integration from social networking sites, location identified using GPS, intelligent processing of the data collected and history maintenance. For ease of use this is incorporated in mobile phones which make use of collection of social networking information and GPS data. This system supports the use of mass public transport system and travelling together which in future may become mandatory to control the depletion of fuel, make the environment green and to control traffic

**Keywords:** Carpooling, Ride sharing, Android Application, Social Integration, Google Fusion tables

## 1. Introduction

The growth of recent advancements in technology is progressing day by day. People migrate from one city to another city in search of jobs [2,3,4,5]. This leads to increase in transportation facilities and pollution is increasing at an alarming rate. Another constraint to be noted is that natural resources like petrol, diesel is depleting. To overcome these above problems we suggest a concept called the "CARPOOLING".

In order to sustain fuel, to decrease traffic jam during peak hours and to enhance the parking facilities, carpooling is necessary. Carpooling is a system which shares the ride in a private or a public vehicle with two or more individuals. The application is cost effective as it shares the money by dividing fuel costs among fellow passengers [1]. Real-time ridesharing aids for onetime rideshares within a short span. The System mainly incorporates three recent technologies such as GPS, which is used for determining both the riders and passengers routes. The smart phone, which has created a revolution in this century, is used as a user interface for both the riders and passengers [4]. The social networking, which is a web based online community services, establishes connection between the riders and passengers for trust and accountability. There are different types of carpooling such as designated driver carpool, alternating car pool, employer carpool and vanpool [7]. Real time Ridesharing encourages in utilizing empty seats in the vehicles. The Government should encourage these types of carpools by means of programmes, in which people can be made aware of the system. Carpooling can support areas not covered by the public transport system, which is the greatest deal [2].

## 2. Literature Survey

The growth of urbanization is increasing and people prefer to travel in their own vehicle than using a public transport system. Therefore the problems in global warming, traffic congestion, depletion of fuel arises [2,3,4,5]. A social based community for carpooling has been proposed for both the rider and the passenger in order for reduction of fuel costs by sharing among the fellow passengers [1]. The implications for environment sustainability are sufficiently high [1]. The system elaborates about the usage of carpooling android application and also discusses about the major advantages of carpooling [3]. The System architecture for carpooling is greatly identifies and major implementation of android application relies on GPS based navigation devices, smart phones, social media for trust and accountability [4]. A proposed system for carpooling has been efficiently discussed by prototype design, route matching algorithms and it also discusses about the advantages and disadvantages of carpooling [5].

This paper has mainly discussed about the current scenario of Delhi city. It also includes a brief calculation of growth of motor vehicles and cars in Delhi and also the distribution of population and vehicles in Delhi. This paper mainly deals with the data analysis of the total number of cars. Impact of revenue has also been calculated [6]. This paper mainly describes the innovations of ridesharing service relying on advanced mobile technologies. This type of ridesharing attempts to provide added flexibility to rideshare arrangements by allowing drivers and passengers to arrange occasionally shared rides. It also discuss about the advantages, disadvantages, economic challenges, social/behavioral challenges, Institutional challenges, Technological challenges, Opportunities and challenges of ridesharing. The Rideshare challenge is a series of economic, behavioral, institutional, technological obstacles [7]. A case

study detailing about carpooling has been efficiently proposed [9].

In general there are many algorithms for finding the shortest path to be effected. Dijkstra's algorithm for finding the shortest path is discussed efficiently which is one major advantage for reducing the fuel content [10]. The road networks and congestion of Delhi city has been discussed with the statistics of average number of cars, vehicles that run in Delhi city [11]. The system provides all the advantages using GPS based navigation system and also has additional SMS based alerts in order to provide transparency with both the rider and passengers. This system is user friendly [12]. A novel based heuristic method is proposed for carpooling [13]. The actual architecture and working of carpooling is discussed which is widely used in Smart phones [14].

### 3. Methods and Approaches

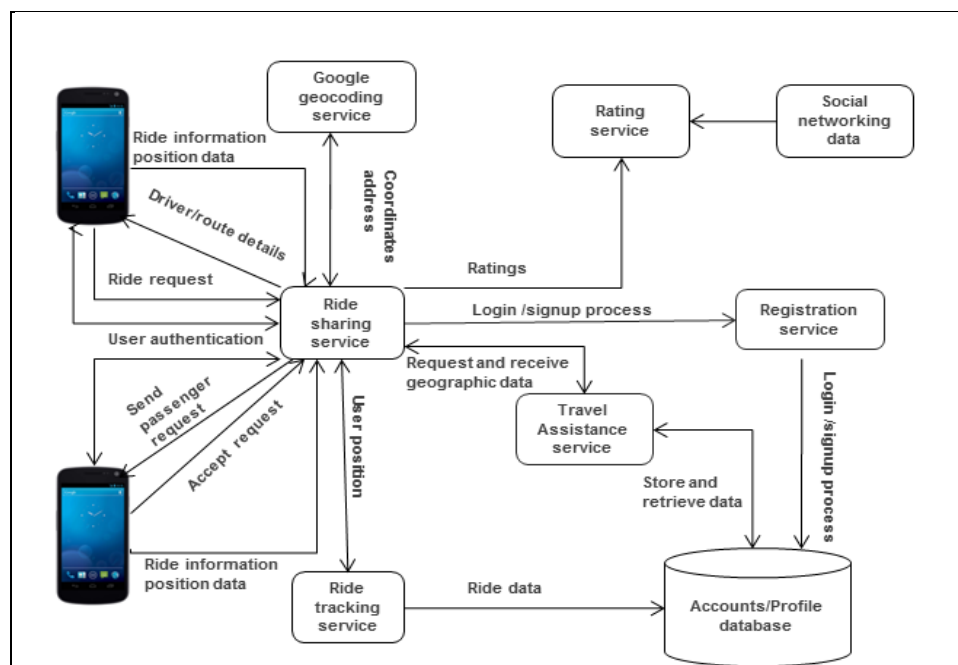
#### Architecture Diagram

Fig. 1 shows the architecture diagram of carpooling. The System consists of two participants - Driver and Rider. Both of them access the ride sharing system through the ride sharing application installed in their mobile device. To participate in the ride sharing, both of them have to register for the first time using their mobile application. This registration and login process is effected by the registration service and the user account data is stored in the Accounts profile database. Apart from the login data, the accounts profile database also comprises of other details such as the user address, the organization where he/she is working,

Facebook integration details such as friend list and the car type in case of a driver.

The process begins with the rider registering his ride through the mobile application. The ride registration data comprising of source, destination address and start time of the ride is then passed on to the Google geo coding service through the ride sharing service module. This module converts the physical address into Geo location coordinates and stores them in the Google fusion tables. The rider after login searches for the ride through his mobile application. The ride request is processed by the ride sharing service. The rating service sorts each ride based on the review of the ride's driver. Based on the rider's preference a filter is applied based on the social networking data to include only the drivers who are in the friend's circle of the rider. The filtered search result is presented to the rider along with the driver details. After the rider selects a driver, rider request is passed on to the driver's mobile application by the ride sharing service.

After the driver's approval, driver and rider are enabled to communicate through the ride sharing application. Once the ride starts, ride tracking service starts tracking the ride using the GPS data from the user's mobile device. This data is temporarily stored in the accounts profile database to provide assistance in case of an emergency. After the completion of the travel, rider provides the rating for the driver on a likert scale which is processed by the riding service and stored along with driver's profile data in the accounts profile database.



**Figure 1: Architecture diagram of carpooling [3]**

### 4. Modules

There are three main modules in the paper and they are as follows:

#### Module 1(Mobile Client)

An Android client will be the interface to the user. The user marks his source and destination and uploads it. Using this information the client displays his ridesharing options. The

client also provides facilities to communicate with other users who can be pooled.

### Module 2(Web service)

The web service serves as the processing unit of our application. The mobile client transmits the user data to the web service. The web service stores this data in the database. When the user requests his ridesharing options the web service queries the database for other users, filters the users who do not fit and sends only the appropriate users to the mobile client.

### Purpose File

Only the riders are considered for drivers and only the drivers are considered for riders.

### Time filtering

Only the users who have uploaded data in the past hour are considered.

### Bounds Filtering

A virtual box is drawn around the paths of the users and if the boxes don't overlap those users are not considered.

### Route filtering:

The routes of the users are compared and if there are sufficient matching points on the route they are considered. The above filters give the number of users who can be pooled with the requesting user in the path he/she has chosen.

The web service then checks for ridesharing in alternate paths. It then determines the most efficient path by using the formula  $p = n/dt$

Where,

P is the points to the route

n is the number of users who can be pooled in the route

d is the distance of the route

t is the time to travel through the route

The route with the highest point p is chosen as the most efficient route and is sent to the mobile client along with the users who can be pooled in that route.

### Module 3(Google Fusion Tables)

Google fusion table serves as the database to our project. This is a free service provided by Google to efficiently store Geopoints online.

## 5. Results and Discussions

### 5.1 Login Activity

The xml file of the loginActivity has a linear layout with an input box for email id, another input box for password. It also has a register button for new users to register. On clicking the login button, the CheckUser() method is called, this method queries the Account\_Info table in the Fusion Tables and verifies if the given email id and password matches with any of the records in that table. If a match is found the user gets logged in and the "Travel with me" is called or else a message saying "Invalid username/password"

is displayed. Clicking the forget password, the onetime password is sent to the mail and the password can be further changed. The Loginactivity is given in the figure as shown below

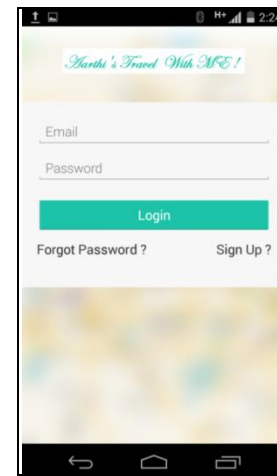


Figure 2: Login Activity

### 5.2 Register Activity

When the user clicks the Register button in the LoginActivity, the RegisterActivity pops up. The xml file of the Register Activity has input boxes for name, email id, password and also the corresponding gender. When the user enters these data and clicks the register button, the register () method is called. This method uploads these data to the Account\_Info table in the Fusion Table. This data is later used to authenticate the users. The Register activity is shown below

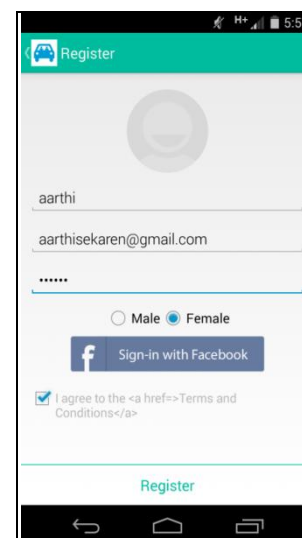
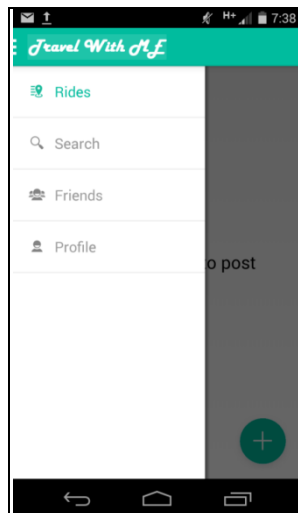


Figure 3: Register Activity

### 5.3 Travel with me Activity

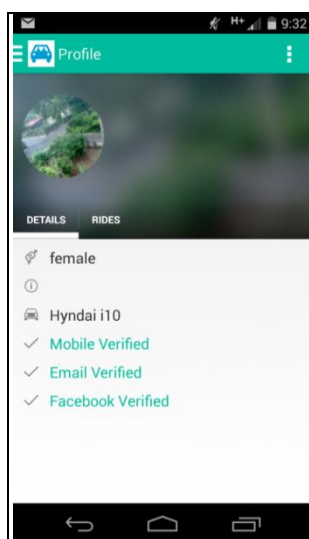
This is the most important activity in our application. Once the user is authenticated the Travel with me activity is brought up. The xml file of this activity contains a vertical linear layout. The horizontal layout is predominantly occupied by the search, rides, and profile.



**Figure 4:** Travel with me activity

#### 5.4 Profile Verification

After travel with me activity, profile verification is done. Profile verification comprises of mobile, email, Facebook verification. Verification is done by sending verification code to the respective Email, Facebook and Mobiles. The verification code is for security purposes and to keep the accounts secured from malpractices such as hacking. This may also include the type, name of vehicles used. The ride is initiated only after profile verification. The profile verification is shown below

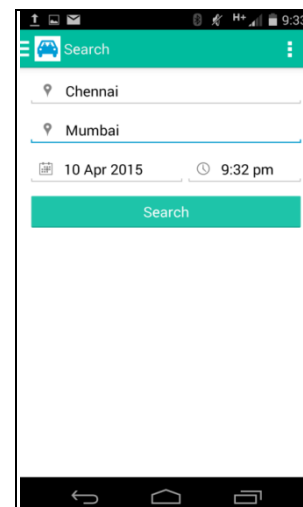


**Figure 5:** Profile verification

#### 5.5 Search request

The search request consists of three horizontal layouts. The source and destination are typed in the respective source and destination layout. The source and destination boxes are designed to predict the location as the user types in his location. By making the user select one of the predicted addresses, we can directly use the geo co-ordinates of the corresponding source and destination addresses. The date and the time are given and the search request is initiated. Search algorithm is designed to include the rides with a tolerance of one hour on the time parameter. This approach increases the

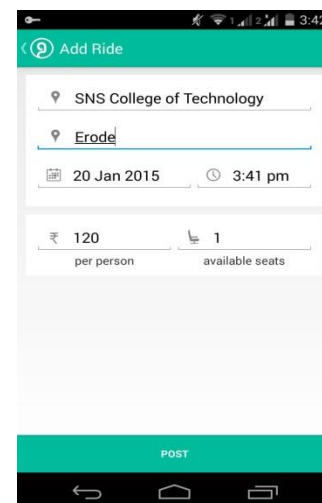
number of ride options available for the user. The search request is shown below



**Figure 6:** Ride Confirmation

#### 5.6 New Ride

The user can create a new ride by uploading both the source and the destination. The pop up for the source and destination will be listed. After uploading the source and the destination, the date and the time will be chosen as per our convenience. The total cost for a ride should be provided, the number of available seats should be given and the ride is posted. If the ride posted by a rider, suits a passenger, he/she can contact with the rider and can proceed with the ride as shown below



**Figure 7:** New ride

#### 5.7 View of all rides

The user, who wants to take a ride, can see all the rides listed in the search request. If the destination matches with the user's destination, the user can request for a ride from the rides listed. The user will be able to see the phone number of the rider and can contact them easily to proceed with the ride. The personal expenses are divided among the various requestors. Multiple requestors can request for a ride. The



user can also filter the rides to display those created by his friends. Facebook integration is used to identify friends of a user. This feature is created keeping in view of the riders who do not wish to travel in a stranger's car. The user can also see all the nearby rides. This feature enables user to see all the rides which are nearby to his physical location, which is obtained from the GPS of the user's mobile device. The figure 7 shows all rides



**Figure 8: All rides**

## 6. Conclusion

The model effectively outlines the purpose and effectiveness of carpooling and also makes it more appealing by enabling users to share their ride with their friends and relatives and restricts others. This feature encourages carpooling in less developed areas of the world where possession of a car is not very common. The system benefits from the social networking contacts derived from the user's Gmail account, this can be further improvised to include other mail accounts like yahoo, Hotmail etc. Also social networking sites like Facebook, twitter, LinkedIn provide ample amount of data which can be used to identify college mates, colleagues, or even ex co-workers, or school friends. The system in future can also be configured to identify friends of friends who can be pooled and in turn leads to new friend suggestions. The benefits of the system are enormous with reduction in traffic, fuel economy, reduction in pollution etc. to further promote pooling payment system or redeemable points system can be implemented in the future.

## 7. Future scope

Carpooling application is user friendly and reliable. Carpooling has a greater advantage to the community by reducing emissions and pollution thereby creating a better environment. Carpooling could be done by website, mobile app, call/SMS. If the user face any issues, the support team will resolve the issue. There will be 24\*7 support for mobile application for help assistance to the users. Decreasing the fuel emissions will reduce global warming to a larger extent.

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