International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-2 Issue-3, February 2013

# Dynamic Carpooling Application Development on Android Platform

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***Abstract:** In today's world, there are lots of people commuting from place to place. Example: employees going back home. Students going home from university etc. And lot of times, people will be commuting via car or bike and there is place to take a fellow employee along with him to give a ride. But the problem is there is no easy way to know how many people a person can take and co-ordination is a huge issue that there is no effort by people to help each other by giving a lift and more over this saves the environment in reducing fuel usage, reduces traffic with fewer vehicles etc. The Carpool is an android application which will provide the advanced searching techniques and provide most relevant results for the carpooling in the city. This will be help full in easy way Carpooling reduces the costs involved in repetitive or long distance driving by sharing cars, sharing rental charges, or paying the main car owner. Some countries have introduced high-occupancy vehicle (HOV) lanes to encourage carpooling and use of public transport, to combat rising traffic congestion [1].*

***Index Terms:** Car Owner, Ride Seeker, Pickup and Drop-Off points, HOV [high-occupancy vehicle], OV [Origin & Destination]*

## I. INTRODUCTION

In recent years, the problems of global warming and the energy crisis have aroused widespread public concern. One recommended solution for reducing the harmful factors leading to such problems is carpooling. This type of transportation service could make a big difference if organized on a large scale by government or big companies, particularly large corporations with many branches or sub-companies. Carpooling schemes are designed to encourage commuters to share travel expenses and resources with colleagues. Carpooling (also known as car-sharing, ride-sharing, lift-sharing), is the shared use of a car by the driver and one or more passengers, usually for commuting. Carpooling arrangements and schemes involve varying degrees of formality and regularity.

**Manuscript published on 28 February 2013.**
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Formal carpool projects have been around in a structured form since the mid-1970s [1]. Long-term carpooling is defined as the sharing of a private vehicle by several individuals who follow a semi-common route between different points of origin and destination (OD) during a specific period. In practice, a participant can request to share the same trip with his/her friends, in which case they are treated as a participant group with the same OD and travel route/schedule. The results of such an action are the following:

1) Reduction in the number of vehicles on the route;
2) Reduction in expenses for gas;
3) Reduction in energy consumption (CO2 emissions) and Pollution;
4) Provision of social connections in an increasingly Disconnected society [2].

Fig.1 Carpooling

The Dynamic Carpooling is more complicated than long-term/daily many-to-one or one-to-many car pooling problems. An efficient plan for the Dynamic Carpooling may require matching participant groups to a car on a semi common route or assigning a participant group to different cars on different days. It is very difficult to simultaneously and optimally determine every participant group's role (driver group or passenger group), driver group schedules, and passenger group deliveries, as well as to suitably match several participant groups in a car while still keeping in mind fairness considerations. This process involves complicated movements of driver groups (or vehicles) and passenger groups in both time and space, with consideration of driver/passenger traveling costs.

## II. CURRENT STATUS OF DYNAMIC CARPOOLING

In recent years, the problems of global warming and the energy crisis have aroused widespread public concern. One recommended solution for reducing the harmful factors leading to such problems is carpooling [1]. This type of transportation service could make a big difference if organized on a large scale by government or big companies, particularly large corporations with many branches or sub-companies. Carpooling schemes are designed to encourage commuters to share travel expenses and resources with colleagues [1].

Dynamic carpooling is also known as casual carpooling and a variety of other names, is already widespread in a few metropolitan regions. In each case, public policies encouraging multiple-occupancy vehicles were the impetus. For example, on the Bay Bridge connecting San Francisco and Oakland, traffic moves very slowly in rush hour except in the High Occupancy Vehicle (HOV) lane, which can only be used by vehicles with 3 or more occupants (2 for pickup trucks) [10].


Fig.2 HOV Lanes Structure

In addition, HOVs do not pay tolls on the bridge. Just before the bridge, drivers pull off at a bus stop and pick up passengers in order to use the faster, cheaper lane. Similarly, in the DC area drivers (called “Car owners”) pick up passengers (called “Ride Seekers”) in order to use HOV lanes on highways and it can be implemented in other cities as well [9].To solve the coordination of routes problem, conventions have evolved among car owners and ride seekers for pickup and drop-off points. Often, pickup points are at or near public transportation stops, so that riders can fall back on public transport if there are not enough drivers that day. Commuter parking lots along highways, originally designed to support regular car-pooling, are also popular pickup points. But sometimes restaurant parking lots are used, or indeed any place with space for cars to pull over that is convenient to an HOV entrance [9]. There are a limited set of destinations and their meaning is well understood so that drivers or riders can hold up signs or call out destinations that frequent participants will understand. Nearby, there may be separate pickup lines for different destinations. Generally, there is not any symbol for that the regular Ride-Seekers know where to stand to get a ride. Conventions have also developed to address the problems of safety risks and social discomfort. Generally, riders or drivers line up and are matched in order of arrival, but by convention either party can refuse the first rider or driver in line if they feel uncomfortable for any reason. Normally rides are arranged that no female rider will be behind there waiting for a ride, allowing her to go ahead of the last male rider if necessary to alleviate social discomfort, the illusion of private spaces is generally maintained. Riders are expected not to initiate any conversation, and need not respond to conversational overtures from the driver [9].

## III. PROPOSED SYSTEM


Fig.3 Proposed system

### *A. Detecting location of the devices*

Dynamic carpooling today is limited to a few standardized pickup and drop-off locations, as that is the only mechanism available for route coordination. But that severely limits the geographic areas and the set of people who will find it convenient to ride with others. A basic piece of infrastructure for more flexible pickup is for riders and drivers to have devices that can transmit their current location. Cell phone companies may be building this service, though triangulation among cell towers, in order to provide emergency response, or it may be provided through Global Positioning Systems. In order to be useful, the location information would have to be fairly precise, at least identifying a single city block, for example.

### *B. Registration and operation*

We will be developing application for ANDROID OS for which we will use the Android SDK software and we'll configure server using ASP/JSP. The employees will register using the developed application. Vehicle owner will give source and destination (including the actual path), number of seats, vehicle no. and starting time as input to application. The intermediate location from source to destination which will be available in the server will be available to vehicle owner for selection. The owner will select one of the paths. The server will be configured either in JSP or ASP. Time is a very important constraint in our project. All the updations should happen instantly without fail. Now the other side of application, fellow who want ride will subscribe to the application. During subscription a fellow will enter source and destination. This request will be sent to the server. The server will respond with vehicle available on that route. Vehicle number, owners name, seats available etc. will be visible to the fellow. Now this fellow will send request to the vehicle owner through the server. The vehicle owner on the other side will approve the request. Then we can track the vehicle owner’s mobile (using getlat, getlog methods) location and provide it to the fellow. The fellow can see the car location on GMAP.


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An application signature is required for GMAP for which we will have to register. Once all the vacant seats get full then the vehicle owner can ignore the upcoming requests. For the security and privacy reasons the vehicle owner can decide that whether to accept the request or not.

### *C. Interface design*

Drivers will need a very convenient interface for specifying their destination and their route options. Riders will need a convenient interface for specifying their starting and ending points, and how much flexibility they have in either (for example, they can walk n blocks from current location in order to be picked up) [5] They will need clear indications of when and where pickups should happen and how to recognize each other. Both drivers and riders will need convenient ways to specify their preferences about what information from their personal profile to reveal to the other party under what conditions [9]. All of this will be especially challenging for drivers, who will have limited attention and limited ability to provide anything other than oral input while driving. A lot of research in user interface design will be needed in order to solve these problems.

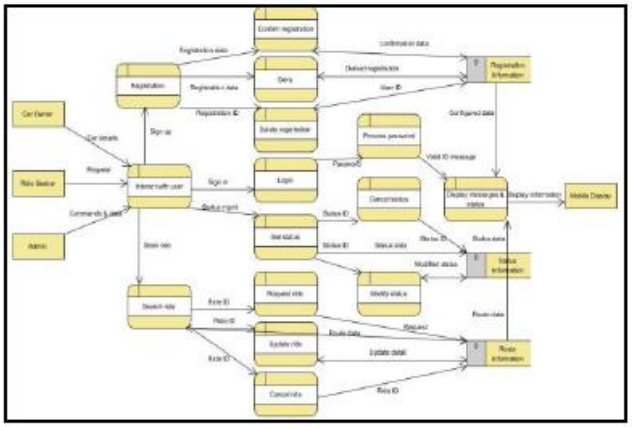

Fig.4 Level 2 DFD of Dynamic Carpooling

### *D. Dynamic route matching algorithms*

Another research challenge will be to match drivers and riders in real time. Drivers may have some flexibility about routes to take, so that calculating whether a driver and rider can be matched may involve quite complicated algorithms [9].The window of opportunity for making a match will typically be quite short, on the order of seconds, before a driver will pass the passenger pickup spot.

### *E. Safety and Reputation System designs*

The basic idea of the safety system will be to authenticate the rider and driver before making the match, so as to provide accountability after the fact, and to monitor arrival at the destination in order to detect abduction if it occurs. Authentication based on device possession and knowledge of a password or PIN is a standard design. The details of destination monitoring would have to be worked out. One idea would be a protocol where the rider and driver are required to check in at the completion of the ride. If no check in is received, the system would automatically generate a call and, if the correct response were not received, it would notify police. Such a system might generate too many spurious calls to police, however, if device batteries ran down, for example. Further efforts will be needed to design a system that appropriately balances the risks of false alarms and missed incidents [9].

Far more likely than actual violence is the unpleasant ride. A passenger or driver is rude or hasn't showered recently. The driver doesn't take the rider to the agreed destination. The car makes the passenger dirty or vice versa. In online commerce systems involving strangers, such as eBay's auction system, feedback or reputation systems have proven to be useful, providing information about who to trust, incentives to act in a trustworthy manner. In this case, the system could automatically track some information about participants (e.g., are agreed ride matches carried out or the Driver may have right to refuse the passenger if he is not feeling comfortable). In addition, riders and drivers could leave feedback about each other after a ride, perhaps as simple as would ride/drive again with this partner, or not. Such feedback can influence not only whether the particular rider and driver are paired again, but also whether others are paired with them. There are many interesting design choices to be explored for a reputation system in this context. For example, reputations may be incorporated into rider matching algorithms in personalized ways: one driver may be willing to go two blocks out of his way to pick up a high reputation rider, but another driver may not [9].

## IV. REQUIREMENTS

Dynamic carpooling is a service that arranges one-time shared rides on very short notice. This type of carpooling generally makes use of three recent technological advances [1].

Fig.5 Carpooling Requirements

- **GPS navigation devices** to determine a driver's route and arrange the shared ride
- **Smart phones** for a traveler to request a ride from wherever they happen to be
- **Social networks** to establish trust and accountability between drivers and passengers

These elements are coordinated through a network service, which can instantaneously handle the driver payments and match rides using an optimization algorithm. Real-time ridesharing is promoted as a way to better utilize the empty seats in most passenger cars, thus lowering fuel usage and transport costs. It can serve areas not covered by a public transit system and act as a transit feeder service [2]. It is also capable of serving one-time trips, not only recurrent commute trips. Furthermore, it can serve to limit the volume of car traffic, thereby reducing congestion and mitigating traffic's environmental impact.


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One potential drawback may be economic harm to the auto industry due to sharing; however, some auto companies such as Daimler are quite supportive of real-time ridesharing research Opposition may also come from taxi companies and public transit operators [1].

## V. BENEFITS AND CONSTRAINTS

### *A. Benefits*

- **Financial Benefits** - Carpool participants save money by sharing the cost of driving one car. Driving one car saves on gasoline, tolls, parking and vehicle maintenance.
- **Quality of Life Benefits** -. Carpooling helps reduce stress levels, as you can escape from driving in high-traffic situations. A drive back home can prove to be quite relaxing as you can take a nap out in the car. Carpools may provide social connections in an increasingly disconnected society.
- **Environmental Benefits** - Carpools decongest roads. Carpools reduce pollution and carbon dioxide emissions thereby reducing global warming.
- **Traffic Benefits** - Some larger carpools offer "sweeper services" of late pick-up options for people having to stay longer at work. One form of backup is a "guaranteed ride home" arrangement with a local taxi company.

### *B. Inter-personal constraints*

- **Smoking - non-smoking** - It might be difficult to adjust with people in the car, in case they have peculiar habits such as smoking or latecomers, etc.
- **Female - male**
- **Friends – strangers** -In the "dynamic ridesharing" concept the system does one-to-one matching automatically, and all that both, the driver and passenger have to do is accept the match done by the system.
- **Unable to divert your ro**ute -You cannot do any errands on your way to and from work, as you will have to leave for work immediately when the person picks you up. Also, you will be unable to divert your route, since you are totally dependent on that person.
- **Punctuality** - Any participant running late can effectively make all the other members behind time we well, since the carpool has to wait for the participant.

## VI. CONCLUSION

Enable Dynamic Carpooling (EDCP) application is used for efficient communication between car owner and ride seeker. It leads to the establishment of a well organized transport facility. It is an application aimed at reducing fuel consumption and carbon emission. Thus it is an environment friendly application. Future implementations may include,

- **Notifications From Company** -The software can be further expanded in scope to include this additional facility. Notifications to the company employees can be sent using the application instantly.
- **Messages to employees** - Messages which are specific to an employee can be sent using this application. These messages may be in any context which would require confidentiality.
- **Advertisement** - The application can also be used for the advertising purpose.

## VII. ACKNOWLEDGMENT

This work is supported by S.T.E.S.'s Sinhgad Academy of Engineering. We are thankful to Dr. A. G. Kharat, Principal, Col. Prof. O. P. Misra & Dr. C. B. Bangal, Vice Principal, Prof. A. N. Adapanawar, HOD-IT, Prof.S.L Bangare, Prof.P.S Bangare for their support and guidance. We wish to express our sincere thanks to Mr. Kalyan Gunda Kalyan C Gunda, STSM, GPFS & SONAS Development IBM STG, Bangalore, India for his support and guidance.

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