



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 3, March 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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Optimizing Transportation: Carpooling

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ABSTRACT: The carpooling which is also know by the term car sharing or ride sharing is the modern day approach to tackle the problem of transportation, so that more than one person can travel in a car from one place to another. Due to the enormous increase in the number of vehicles running on the road people have started facing problems in transportation due to heavy traffic on roads. Apart from that the increase in number of private vehicles have also done a major impact on our environment. It also adds to the fact that if carpooling is done by people rather than using private vehicles to travel alone, it can also contribute towards a better environmental condition. Carpooling is a more efficient and environment friendly way to travel because it reduces air pollution problem, traffic congestion problems on road and it also reduces need for parking spaces. Apart from that, it is also economical because the cost to travel for one person would reduce to a really low level because of sharing. This paper will describe about a Carpooling system which is a collective transport system based on sharing of private cars to travel, whose objective is to reduce number of cars on road by making use of the seats that would otherwise be empty. Apart from that carpooling is also a great way of making new friends.

KEYWORDS: Carpooling, Car sharing, Web

I. INTRODUCTION

Transportation is a major issue these days due to the increasing population and their transportation needs. One of the most used means of transport communication is roadways, especially in India. One of the major forms of road transport consists of the Private Vehicles, which are not generally used with its full seating capacity to travel. Because of this, there is a significant rise in pollution, traffic congestion, increasing parking space, wastage of one's time, higher travel cost and many more. Today it is very important to promote initiative to reduce car dependency and improve environmental quality. One such initiative is called shared path or carpooling. This term is applied to travel and work where public transport is limited. The Government should encourage the carpooling method among the people in the country through advertisements, by programs through which it can reach the community easily. The biggest advantage is that carpooling can supports areas not covered by the public transport system. 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. A 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. The implications for environment sustainability are sufficiently high. The system elaborates about the usage of carpooling and also discusses about the major advantages of carpooling. This type of ridesharing attempts to provide added flexibility to rideshare arrangements by allowing drivers and passengers to arrange occasionally shared rides.

MOTIVATION

Carpooling is a ride-sharing platform that aims to connect riders who are traveling from one destination to another with poolers who are looking for a ride in the same direction. The platform allows users to create a profile, search for rides, and book a seat with a driver who is heading in the same direction as them.

Carpooling aims to solve several problems for road travelers, such as reducing travel costs, reducing traffic congestion, and lowering carbon emissions. By sharing a ride with others, users can split the cost of fuel and tolls, reducing the overall cost of travel. Additionally, by reducing the number of cars on the road, Carpooling aims to reduce traffic congestion, making travel faster and more efficient.

II. LITERATURE REVIEW

Mayur K. Thorat and Rahul M. Lahakare have given an overview of Carpooling system With SMS alerts emphasizing more on overcoming issues encountered before and how to make it more secure. They gave the idea of using it for both inter-city and intra-city travels. They tried to expand their user base to blind people also who can use speech recognition technique to precisely know the location at any time.[1]

R. Manzini and A. Pareschi have given a decision support system for the application of carpooling system. This will be used to support passengers to in determining which cars to us.[2]

Swati. R. Tare, Neha B. Khalate and Ajita A. Mahapadi have contributed by suggesting ideas on how make this application more user-friendly for passengers and not only for drivers. They especially worked on reliability of Real time System and security of woman travellers. [3]

BlaBlaCar is the world's largest long-distance ridesharing community .Conceived in December 2003 by FrédéricMazzella, and founded in 2006, BlaBlaCar connects drivers and passengers willing to travel together between cities and share the cost of the journey. BlaBlaCar has more than 20 million members across 19 countries. Members must register and create a personal online profile, which includes ratings and reviews by other members, social members show how much experience they have of the service, meaning those with more-known as “ambassadors” - attract more ride shares. One major shortcoming of this application is that it only offers inter-city carpooling options which our application aims to rectify and add intracity commuting options too. [4]

System to pay for the ride. The famous taxi-hire application “taxi for sure” on android platform is the first car sharing application who took the initiative and introduced Carpooling for “Vacationers” .i.e. for those who are on vacations and want to spend less on travelling to save their pocket. They started it for some particular routes only like “Chandigarh-Delhi”, “MysoreManali” etc. and they are looking forward to reach out the masses in coming future [5]

Scholars like Jaller et al. (2015) highlight the potential synergies between carpooling and public transit systems. Integrated solutions that seamlessly connect carpooling with public transportation can offer commuters more sustainable and convenient mobility options.[6]

Recent developments in dynamic ridesharing, as discussed by Agatz et al. (2012) and Amini and Zheng (2014), introduce flexible and real-time matching of riders based on their routes, preferences, and schedules. This approach enhances the efficiency of carpooling systems.Examine literature that discusses gender differences in carpooling participation. Research by Givoni and Rietveld (2011) suggests that women may have different motivations and constraints when it comes to carpooling compared to men.[7]

The transportation sector plays a key role in the economy, but relies heavily on fossil fuels as sources of energy. Oil-derived fuels account for 95% of transport energy consumption in the European Union, and oil consumption associated with the transport sector has been 4 increasing since 2014 at an average rate of 2.2 % each year. Within the sector, road transport accounts for the largest share of total oil-derived fuel consumption (71 % of total EU consumption). Even though the share of renewable energy for transport in the EU rose from 7.4 % in 2017 to 8.1 % in 2018, it is still below the EU target of 10 % set for 2020 (EEA, 2020). In the case of the US, transportation accounts for 26% of total energy use, and around 90% of the energy use in the sector is derived from petroleum. Light-duty vehicles (e.g., cars, small trucks, vans, sport utility vehicles, and motorcycles) account for 55.5% of total U.S. transportation energy use, while trains and buses account for only 2.4%. Further, total motor gasoline consumption for transportation has increased because of increases in the number of vehicles in use and in the number of miles traveled per vehicle (EIA, 2021).[8]

Another strategy focuses on the use of electric vehicles and plug-in hybrids. For example, Jenn, Springel and Gopal (2018) study the incentives for the adoption of electric vehicles in the US and find that every \$1,000 offered as a rebate or tax credit increases average sales of electric vehicles by 2.6%, while high-occupancy vehicle lane access is a significant contributor to adoption. Further, the authors indicate that raising consumer awareness is critical to the success of electric vehicle incentive programs. However, and despite efforts 5 from automakers and governments to foster the use of electric vehicles, adoption rates remain low because of relatively high prices, technical limitations, and the sparse availability of charging infrastructure (Jang and Choi, 2021).[9]



Researchers and policy makers have also paid special attention to the promotion of alternative modes of personal transportation as a promising approach to decarbonize mobility. These include public (Stanley and Watkiss, 2003) and active mobility (e.g., walking or cycling), which is, ultimately, 'zero carbon' and environmentally friendly (Chapman, 2007; Gössling and Choy, 2015). Other more recent modes involve electric bikes, scooters, and bike/scooter sharing services, where users can access those vehicles for short trips. In China, Cherry, Weinert and Xinmiao (2009) find that electric two-wheelers emit several times lower pollution per kilometer than do motorcycles and cars, and have comparable emission rates to buses but higher emission rates than bicycles.[10]

III. PROPOSED SYSTEM

The online carpooling system connects car owner to people in their vicinity who need a vehicle to travel. It acts as a platform which links the supply and demand creating a new mobility service. The ride fare is fixed by the car owner within the range of kilometers travelled and will even take care of all administrative issues.

Modules

Vehicle owner:

To connect with the server owner must give their username and password then only they will be able to connect to the server.

- └ Start
- └ Owner login
- └ Searching for the server
- └ Connect to the server
- └ Viewing the admin details
- └ Confirmed the ride
- └ Stop

Admin:

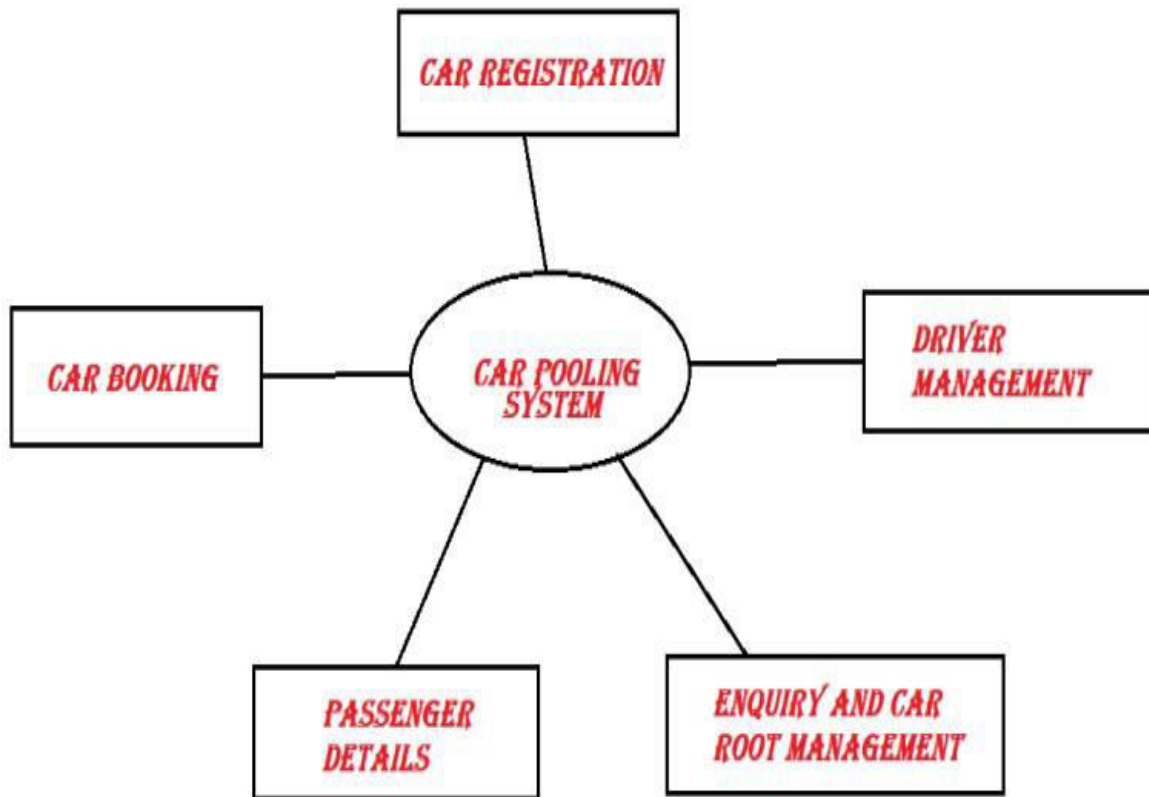
Owner accepting nearby user is going to get the request from the user considering his starting point.

- └ Start
- └ Admin login
- └ We need to register by giving all the details
- └ Start the ride
- └ User searches for the ride related post
- └ Selecting the ride
- └ Viewing user detail and ride detail
- └ Stop

User:

After getting the registration request to the admin, he personally verifies whether the user is genuine or not. If genuine, then there request is accepted.

- └ Start
- └ Admin will make a post of his ride
- └ User login
- └ User needs to register the details
- └ Admin accepts the user details
- └ Viewing user details
- └ If the admin does not accept the request user needs to choose another driver
- └ Stop



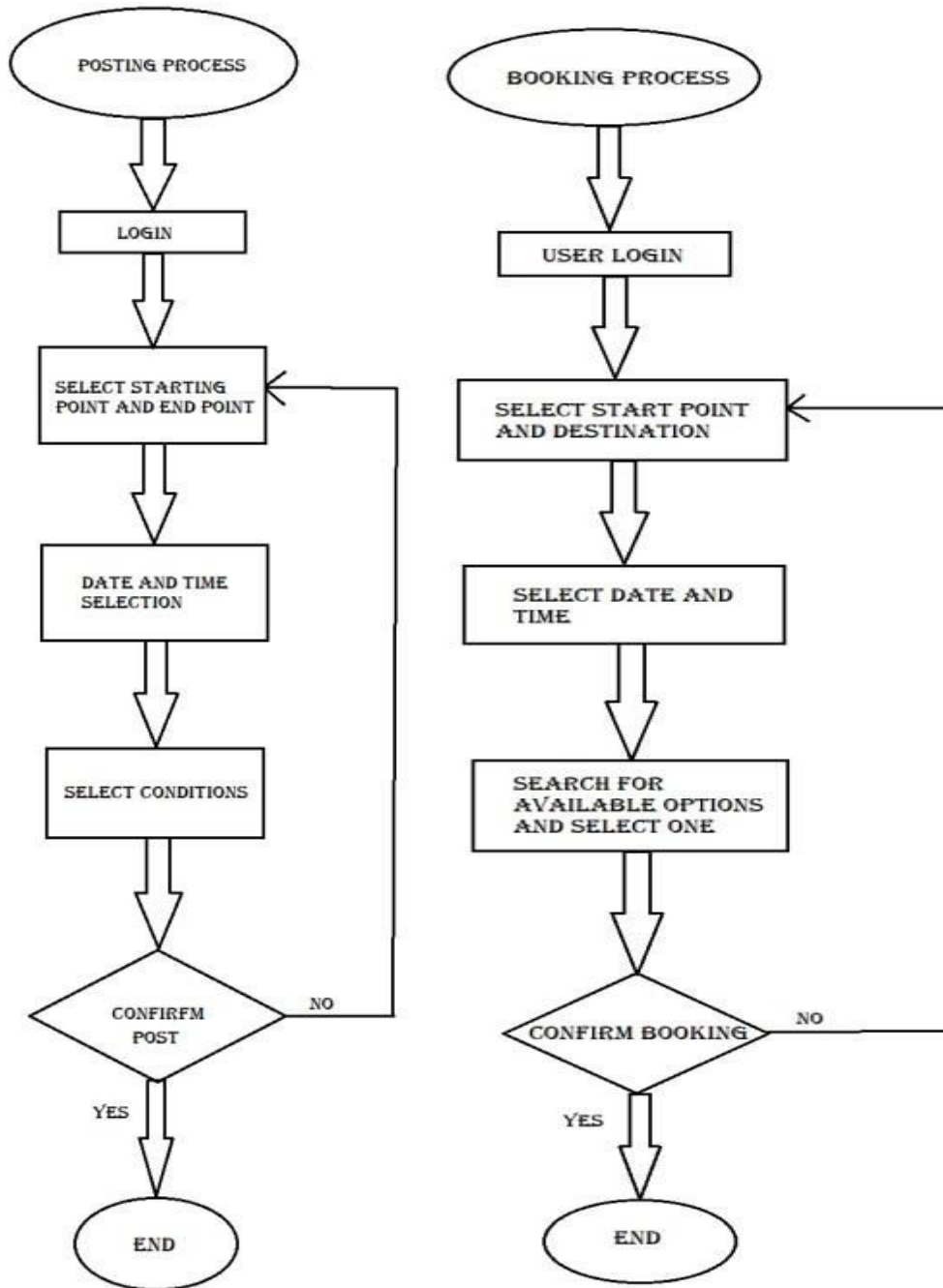
Proposed system data flow diagram

System Architecture

Carpooling system basically depends on two things:

1. The driver who is going to make his vehicle available to get pooled as well as his route
2. Second is the passenger who is willing to get a ride from the available cars.

In carpooling system, the user has to be logged in to use the services provided by us. The user can either create a pool or can get a ride or both according to his needs. The passenger also has to fill the information asked by the tool like his route information. The driver has to create a post first and fill all the necessary details. Every detail these users mention will be stored in our database. The user will use GUI provided by the system to fill in the details which is connected to our database. All the entries will be saved in particular columns. Now, after getting details from both the users, whenever a user (passenger) will click on find a ride option, the user will be diverted to the Activity page of the application where user will be shown drivers according to his source and destination details.



A. Posting Process

B. Searching and booking process

System Architecture Diagram



IV. RESULTS AND DISCUSSIONS



FIG 1:Main Page

Registration

Name:

Email:

Password:

Role:

[login](#)

Fig2.CREATING A REGISTRATION USER AND DRIVER

Login

Email:

Password:

[register](#)

Fig3.LOGIN FORM FOR USER AND DRIVER

Carpooling system is an effort to reduce consumption of fuel, our most important non-renewable resource and traffic congestion on roads by encouraging people to use car sharing. So it is environment-friendly and also helps people to reduce their journey time. This can also solve the problem of transportation in less developed areas of the country where possession of a car is not very common. The benefits of the system are enormous with reduction in traffic, fuel economy, reduction in pollution etc. By using such an efficient carpooling system user can saves money on gas, car care, parking permit fee. By sharing the commuter expense, everyone in car pool saves money. User can book and share the ride anywhere with anyone and certain amount of capacity and with fare price. To further promote pooling, payment system or redeemable points system can be implemented in the future. There are many advantages of using Carpooling. Carpooling is user friendly and reliable. It also has a great advantage to our environment as by carpooling the emission of gases and pollution is reduced thereby creating a better environment. Carpooling can be done by Website, Mobile Phone, call /SMS. There will be a 24*7 support for the users to resolve any kind of issues faced by them. Decreasing the fuel emission will also lead to reduction in global warming.



V. FUTURE SCOPE

Feature 1:

Along with location start and end destination, we will also ask user to enter time for reaching the location and destination. Now we can suggest optimal time for the user to reach on the start location so that him and other people he is carpooling with reach their destinations on time.

The frontend of this feature has been implemented and work on the backend is left

Feature 2:

For users having different vehicles, along with start and end location we will also ask user for the type of vehicle and number of seats in the vehicle. Now we can suggest them to ride their vehicle or carpool for users travelling on same route. This can be implemented by generating a graph algorithm using dfs.

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