

# INTELLIGENT CARPOOLING SYSTEM USING DISTANCE AND TIME MEASURE

Anuj Tyagi<sup>1</sup>, Ashutosh Sharma<sup>1</sup>, Aryan Bansal<sup>1</sup>, Mukesh Rawat<sup>1</sup>

<sup>1</sup>Department of Computer Science and Engineering, Meerut Institute of Engineering and Technology.  
Email: [anuj.tyagi.cs.2019@miet.ac.in](mailto:anuj.tyagi.cs.2019@miet.ac.in) | [ashutosh.sharma.cs.2019@miet.ac.in](mailto:ashutosh.sharma.cs.2019@miet.ac.in) | [aryan.bansal.cs.2019@miet.ac.in](mailto:aryan.bansal.cs.2019@miet.ac.in) | [mukesh.rawat@miet.ac.in](mailto:mukesh.rawat@miet.ac.in)

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## Abstract

A web-based, fully automated car-sharing system is described in this article. Automobile spooling is another name for car sharing. It is talked about how difficult it is to develop such a system. Our project produced a system that has been built and optimised. The real-time carpooling programme includes an easy-to-use user interface. This system's route requests are straightforward yet well-organized. Full immersion in the journey is provided through the use of a digital map. As sharing trips decreases the need for parking spaces, carbon emissions, and road congestion, Carpooling is viewed as a more environmentally responsible and long-lasting form of transportation. Real-time ridesharing is an expansion of carpooling that uses information gathered from social networking to best fit each individual's interests. It allows users, in particular coworkers and classmates, to share a vehicle with other travellers going to the same or neighbouring destinations. The technology offers ridesharing in addition to real-time navigation on a map. The idea may be applied to taxis and rickshaws as well as any other public transportation systems. We've added a few fresh features to this programme that will make users' travels more convenient. Some features include giving the driver and passengers access to real-time photos of the vehicle so they can assess its condition and communicate effectively. Even if someone doesn't possess a car, they can still post the specifics of their journey, and anyone else who wants to join them can phone or talk with them.

## Introduction

India is a rapidly expanding country where the majority of people now struggle with transportation management. The amount of traffic on the roads today is a serious issue, and the problem is becoming worse since petrol costs are going up. Additionally, driving contributes to pollution, which harms the ecosystem. A potential low-cost solution to a variety of transportation issues, such as traffic congestion, energy use, air pollution, and climate change emissions, is to increase vehicle occupancy. Utilizing public transportation, carpooling, and vanpooling might increase vehicle occupancy. Carpooling is a kind of public transportation that involves sharing the use of private vehicles [1][2]. It is a group of people using a single vehicle to get to and from work. It enables the seating capacity of a car or complete vehicle to be utilised. It comes in two flavours: informal and service-organized. A big vehicle is needed for a casual carpool, and the participants are picked on the spot. In accordance with this, the passengers split the cost of the excursion. While in the case of pre-arranged carpooling, the user or customer has the option to accept or reject the trip at any time prior to the actual travel date [3][4].

During research, it was discovered that some of the previous systems had flaws, such as the car owner's sudden rejection, the lack of details regarding the car, such as images to show the condition of the vehicle in real time, and the lack of a calling feature to facilitate effective trip planning.

This app's goals are to normalise commutes, encourage group usage of private transportation, and protect the environment. This peer-to-peer (P2P) network organises trip sharing and carpooling so that numerous individuals

can travel in a car at a discounted rate. Additionally, it balances supply and demand so that private persons might provide open seats in their vehicles, which would enable them to establish relationships with both riders and passengers. Travelers group together to save money on gas and tolls as well as to lessen the stress of driving alone [5].

## Literature review

The largest long-distance ridesharing network in the world is called BlaBlaCar. Drivers and riders who wish to travel between cities can connect through a service called BlaBlaCar and split the cost of the journey. Frédéric Mazzella developed the idea in December 2003, and it was introduced in 2006. In 19 different countries, BlaBlaCar is used by more than 20 million individuals. Members must register for an account in order to develop a personal online profile with ratings and reviews from other users. Social users indicate their level of service experience; those with more are referred to as "ambassadors" and encourage greater ride sharing. Our service aims to overcome the primary flaw of this programme, which is that it only offers options for intra-city carpooling [6]

For individuals who are "on vacation" and wish to cut travel expenses to save money, the popular Cab Precise taxi rental software is available for Android users. It has only been implemented for a few specific routes, such as Chandigarh-Dallas and Mysore-Manali, but they want to soon make it available to everyone[7] .

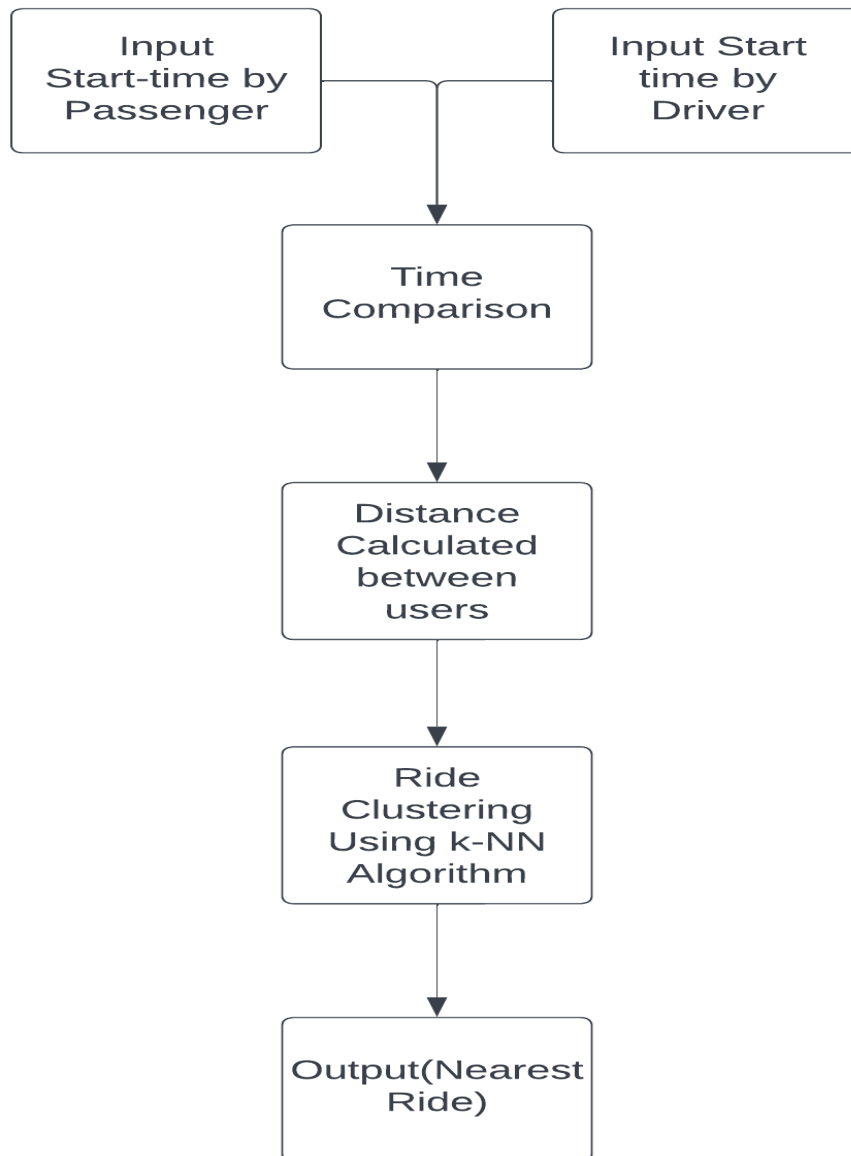
The most crucial aspect of M. Mehedi Hasan Sonet's work, "SharY: an effective ridesharing and carpooling system using advanced optimised algorithm," was that they did not accept every request in order to optimally satisfy every user. Instead, it was recommended as a solution that a host would choose the client(s) that would satisfy in terms of fare criteria and route selection, meaning that given the road that the host has selected, they will not have to travel very far. Based on needs of both parties, the host will be given recommendations for the best possible clients, resulting in pairings that are advantageous to both. As a result, they came up with a solution, In a research, the system would select a passenger if it matched one to a location that was close to or the same as the driver's destination, so the driver or owner wouldn't have to wait for the passenger.

This method was created as a recommendation framework by Hajra Qadir (An Optimal Ride Sharing Recommendation Framework for Carpooling Services) that takes into account a number of factors relating to both drivers and passengers when making suggestions. The following three factors influence passengers: vehicle capacity, fare reduction, and average delay are the three factors Profit growth and driving distance are the requirements for the driver. The vehicle recommended by their framework is a universally favoured vehicle that takes into account the objectives of all parties participating in dynamic carpooling, namely three different passenger types: passengers, elderly passengers, and owner [8][9].

This app not only provides the carpooling outside the city but it also removes the shortcoming like it only shows the result which are near to passenger, it does not shows the all the available trips but it shows only those result which are perfectly with distance and time.

## Proposed methodology

Fig .1 Flow Chart



In this part, the suggested system is given as Section-A(Architecture) and Section B(k-NN Algorithm) [10][11].

### A. Architecture.

The following elements will be included in the architecture of the proposed system:

**1. Users-** The system will have three types of users driver, passenger, and administrator.

Driver- Person providing his car for carpooling.

Passenger- Person using carpooling System.

## 2. Proposed System

The proposed carpooling system which assists and commands all admin operations. It is the most crucial component and is regarded as the system's core. Its components are,

1. **System admin** – A person in charge of system management and control. The key administrative duties include accepting new driver and passenger requests, providing users with account information so they can begin making use of the system and producing reports on drivers and any relevant data about their vehicles, such as brand, model, number, and number of seats available.
2. **Database** – Includes all accurate data about drivers and passengers.
3. **Server** - Server contains actual database about the Users . It contains registered users and activated user. Active users are those who are prepared to start the trip, while registered users are those who are eligible to drive.

Below is an illustration of the steps in the suggested system:

1. Initially , active users requests for carpooling are sent by (drivers and passengers)..
2. Now, admin will check the eligibility of drivers and create the account of driver and send it to passenger.
3. Now driver will determine the start-up time and seat availability.
4. Passenger will send the request , that will determine the pickup location and time.
5. The k-NN algorithm is then used on the available drivers to match the passenger with the "best" drivers once the passenger request has been received by the carpooling system. The available active drivers are reflected in the k value of the k-NN algorithm. Usually, the system administrator sets the value. The collection of best-matched drivers that the k-NN has found is used to notify the passenger.
6. Passenger confirmation will be sent via the system.
7. System will provide the best match to passenger for startup time, pickup location, seat availability and journey time.
8. For each accepted request , the number of seat will be decreased automatically and when there will be no seat available , the request will not be forwarded.

### B. k-NN Algorithm.

One of the most well-liked machine learning algorithms is the k-NN, which is regarded as an appealing classification method because to its simplicity, adaptability, and high efficiency. A non-parametric learning algorithm is the k-NN. As it scans all users, calculates the distance between each Driver D and Passenger P, analyses the findings, and creates clusters to choose the Driver D that is closest to or best matches Passenger P, the k-NN generates encouraging results[12][13].

### k-NN Algorithm

#### Input:

**P:** Details of the passenger request, including the start-up location and the pickup time.

**D:** Active drivers in a set, with each driver containing  $d_i$ (pickup time) and  $d_j$ (start-up location).

#### Output

**S:** Matching drivers in a set.

1.  $S=0, Res=0.$
2. For  $d_i \in DR.$

3. If  $D(d_i) = P(p_i)$ .
4. Determine the separation between D and P. i.e.  $\text{dist}(d_i, p_i)$ .
5.  $\text{Res} = \text{ADD}(d_i, \text{dist})$ .
6. Endif.
7. Endfor.

**S** : Sort the Res according to the  $d_i$  in descending order.

Return S.

The Euclidean distance formula will be used to calculate the separation between P and D which will be : [14][15].

$$\text{Dist}(x,y) = \sqrt{\sum (x_i - y_i)^2}$$

## Result

This section describes the implementation of the proposed system. The result sets are computed using the proposed methodology and results are analysed.

### Result Set-1.

Time	Requests by Customer	Destination	Time to Reach	1.Clusters Formed	2.Time Taken	3.Result
9:00	R1	MIET	9:30	R1, R2 ,R3	2MS	Correct
9:30	R2	MODIPURAM	10:00	R2, R3	2MS	Correct
10:00	R3	KHATAULI	10:00	R3, R4, R5	2MS	Correct
10:30	R4	MUZAFFARNAGAR	12:00	R4, R5	2MS	Correct
11:00	R5	ROORKEE	1:30	R5	2MS	Correct

### Result Set-2.

Time	Requests by Customer	Destination	Time to Reach	1.Clusters Formed	2.Time Taken	3.Result
9:00	R1	MODINAGAR	9:30	R1, R2	2MS	Correct
9:30	R2	PARTAPUR	10:00	R2,R3	2MS	Incorrect
10:45	R3	MIET	11:00	R3,R4	2MS	Correct
11:00	R4	MODIPURAM	11:30	R4, R5	2MS	Correct
11:30	R5	MANSURPUR	12:30	R4, R5	2MS	Correct

**Result Set-3.**

Time	Requests by Customer	Destination	Time to Reach	1.Clusters Formed	2.Time Taken	3.Result
9:00	R1	DELHI	9:30	R1, R2	2MS	Correct
9:30	R2	GHAZIABAD	11:00	R2, R3	2MS	Correct
10:00	R3	MOHANNAGAR	10:30	R3, R4	2MS	Correct
10:30	R4	DUHAI	11:00	R4, R5	2MS	Correct
11:00	R5	MODINAGAR	12:00	R4, R5	2MS	Correct

**Result Set-4.**

Time	Requests by Customer	Destination	Time to Reach	1.Clusters Formed	2.Time Taken	3.Result
9:00	R1	ROORKEE	10:00	R1	2MS	Correct
9:30	R2	PURKAZI	10:30	R2, R3	2MS	Incorrect
10:00	R3	MUZAFFARNAGAR	11:30	R3, R4	2MS	Correct
11:30	R4	MEERUT	12:00	R4, R5	2MS	Correct
11:00	R5	DELHI	1:30	R4, R5	2MS	Correct

1. Clusters formed according to the nearest pickup location of Customer.

2. Time taken to generate Clusters.

3. Clusters Generated Correctly.

Calculation of error factor in cluster generation according to the nearest pickup point .

Total Clusters formed	Correct	Incorrect	Error
5	4	1	1
5	5	0	0
5	5	0	0
5	4	1	1

$$\text{Percentage Error of system} = \frac{\text{Number of errors}}{\text{Total clusters formed}} * 100$$

$$= \frac{2}{20} * 100 = 10\%$$

## Conclusion

Carpooling enables you to share your vehicle with others rather than travelling alone. Carpooling has grown significantly in popularity over the past ten years as a result of an increased awareness of the issue of climate change and a desire to help fight it.

These efforts The Car Pooling System seeks to reduce traffic congestion on roads while minimising the usage of petroleum, our most major non-renewable resource. Therefore, it is a social application that is favourable to the environment and aids in reducing travel time. This project will be accessible to everyone who develops software, and because of its capabilities, developers may focus on creating the database schema while the application server creates tables based on the fields in JSP and their associations.

Utilizing "test cases," this application software has undergone successful computation and testing. It is simple to use and provides the necessary options to carry out your objectives. Oracle served as the server and Java served as the interface while the programme was created on a Windows environment. Instant access is what the programme accomplishes. This research discusses the psychological aspects that motivate both drivers and passengers to carpool. You will have a better and more comprehensive grasp of how to make travel decisions thanks to the suggested framework. To stimulate the interchange of travel, the advantages of travel should be highlighted. There are several benefits to travelling as a group.

The most obvious benefit of carpooling is that it is far less expensive than travelling independently. This not only keeps us company while we're on the road but also introduces us to our destination or other travellers. We offer one-way fixes for all issues so you may travel pleasantly without wasting a lot of time stuck in traffic.

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