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INTELLIGENT TRANSPORT SYSTEM FOR IMPROVING USER EXPERIENCES AND TO ENHANCE VEHICLE POOLING

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***Abstract*— Due to tremendous rise in world population today and everyone is greedy to have a vehicle, it has become a basic need of human's life which is coping with other important needs. We are addicted by it. This leads to problems like increase in number of vehicles, traffic, parking problems, fuel consumption etc.**

To overcome this problem Smart Vehicle Pooling System can be used, in which people shares a vehicle toward a common destination. After performing matching operation among Driver's and Passenger's preferences, they will make sure about sharing of ride. The key concept which we will be going to introduce is profile matching before showing available rides on searching. It is an effective means of reducing traffic congestion, waiting time, wastage of resources and fuel consumption, improving social life, reducing the number of accidents and environmental pollution which in turn results in green environment.

Keywords— **Vehicle pooling system, Green environment**

I. INTRODUCTION

The system studied is a new transportation means, that is complementary to existing public transportation systems and should be an attractive alternative to the use of private cars, in order to remedy some important problems such as traffic jams, parking congestion, and pollution in city centers. This paper provides the carpooling technique to reduce the environmental problems. Carpooling involves two or more users, heading in the same direction, who travel together by means of a private vehicle along a semi common route. Although the idea of carpooling is not new, it has not often been applied systematically. There are many reasons for this, the major one being that it is difficult to group people together and find a plan that is mutually satisfactory.

Some carpooling organizations have set up websites for consulting or exchanging information about participants' travel routes, departure/arrival times, departure/arrival locations, or requests. The problem is that users can only find matches by exchanging data or by the application of a simple logic program. Consequently, the matching results obtained are not only ineffective but also possibly inferior.

In order to make sure that the new transportation system will run correctly, we have to meet the customers' requirements, the major ones being the following: as clients do not like to wait (or at most, five minutes), they want a well-kept car ready for a journey as soon as they arrive at a car station.

This system will be applicable for educational organizations such as Amrutvahini College of Engineering. The pooling can be done within three possible groups as:

- Faculty-Faculty
- Student-Faculty
- Student-Student

The students and faculty get connected to this system after verification only.

II. RELATED WORK

Carpool is sharing of journey among commuters travelling for the same destination or in route for same destination. It is refer to carpool, car share, ride share etc. but the main ideology is the same. Most of the applications are available

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using mobile and online systems. The systems like bla bla cars, Uber, Sidecar, Ola, etc. have similarities among them. The work that is related to this is being successfully implemented Monash University as *"Carpooling – Rideshare"*; it is a way to interact with people, care for environment and parking for less. Main findings of these systems are:

- Location based stations covering a specific area.
- Same pickup and drop off stations.
- Charges based on time and mileage.
- Information provided without explicit matching.
- Communication and hardware based approaches.
- No matching between drivers and riders.

III. SYSTEM CONCEPTS

In this system, there are two types of user:

1. Driver(Faculty or Student)
2. Passenger(Faculty or Student)

The key features of this system according to user requirements are:

- Driver and Passenger profile matching
- Online Payment
- Preference to optimized route
- Verification
- Feedback
- Rating

System main modules are illustrated in Figure 1. Driver profile and passenger profile is given in Figure 2. Data flow diagram is illustrated in Figure 3. Figure 4 illustrates the system architecture using internet access.
The user will get connected to the system after verification(online and offline). Before Login, the user can check whether rides are available or not just by giving his source and destination. The available rides with optimized route will be shown to the user after profile matching. Now the user will select the ride according to his choice among them. Best routing path, will be based on graph optimization like *Dijkstra shortest path algorithm.*Using *Global Positioning System(GPS),* the route followed by the driver will be visible to the user. Users with mobile phone will able to communicate and exchange information. If a user has a communication device supporting *GPS and GPRS*, the system will be able to exchange information during the user ride.

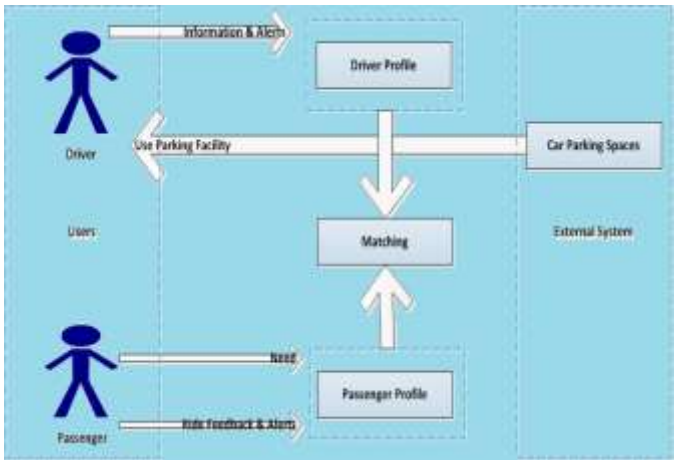

Fig. 1. Main Module

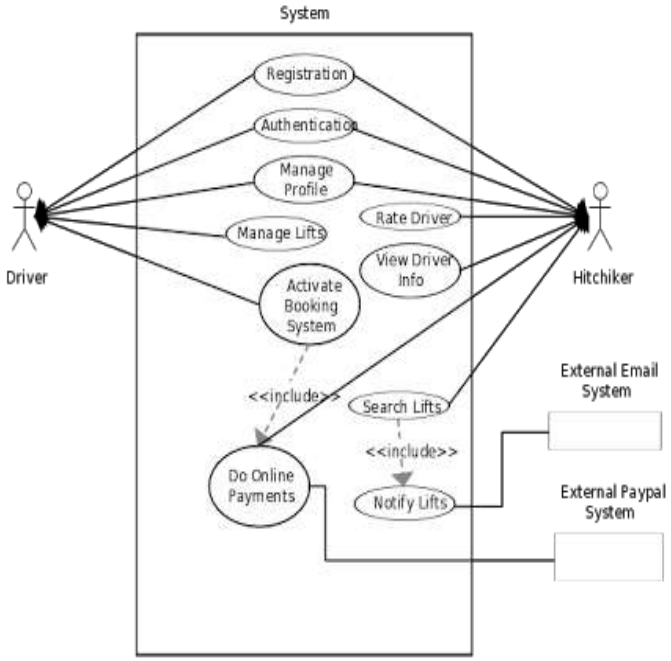

Fig. 2. Use Case for Driver and Passenger

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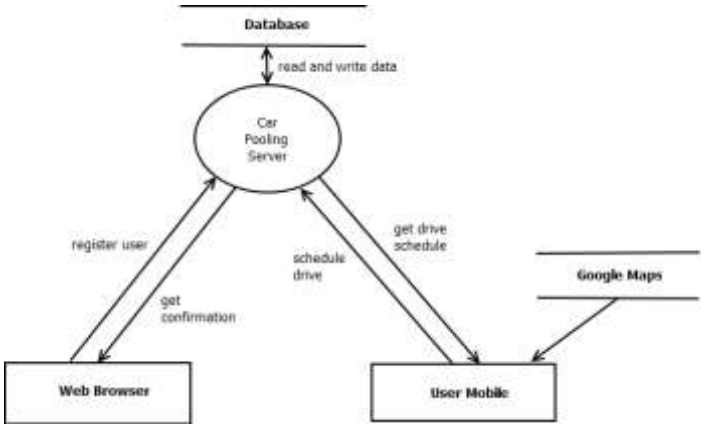

Fig. 3. Data Flow Diagram

Fig. 4. System Architecture with Internet Access

IV. ALGORITHM

- Registration:

Registration module is useful for entering the user information into database. This module used to create user account. It takes different input parameters from user such as Full name, Address, Date of Birth, Adhaar number, Vehicle number, prohibition,etc.

- Verification:

Verification module is used to verify user identity. It consists of two forms of verification:

1. Online Verification:
   This phase authenticate user Adhaar number.
2. Offline Verification:
   In this phase, inquiry is done by an employee by doing investigation about user in his/her institute or workplace.

- Profile Matching:

Using the field 'Things to be prohibited', we are matching the user profiles using profile matching algorithm.

- Destination Route:

After gaining Source and Destination from user, we are displaying available routes using Dijkstra algorithm. Ride vacancy, rating are displayed along with the route. Wait time is also provided by car owner to avoid delay.

```
function Dijkstra(Graph, source):

    create vertex set Q

    for each vertex v in Graph:           // Initialization
        dist[v] ← INFINITY                // Unknown distance
from source to v
        prev[v] ← UNDEFINED               // Previous node in
optimal path from source
        add v to Q                        // All nodes initially in Q
(unvisited nodes)

    dist[source] ← 0                      // Distance from source to
source

    while Q is not empty:
        u ← vertex in Q with min dist[u]  // Node with the
least distance will be selected first
        remove u from Q

        for each neighbor v of u:         // where v is still in Q.
            alt ← dist[u] + length(u, v)
            if alt < dist[v]:             // A shorter path to v has been
found
                dist[v] ← alt
                prev[v] ← u
    return dist[], prev[]
```

- Selection Process:

In this module, we are selecting suitable ride among all available rides.

- Route Finalization:

In this module, confirmation of ride is done through message-passing. After confirmation, vacancy count will vary accordingly. Route is finalized after money transaction from passenger account to owners account.

V. MATHEMATICAL MODEL

Input:
Source, Destination, Arrival and Departure Time
Output:
Optimized Carpool Route, Best Route with Current Passenger Pool
C (number of cars)
S *(generating more parking slots and increasing the number of students)*

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$$Minimize\ Z = \sum_{i=1}^{m}\sum_{j=1}^{n} s_{ij}c_{ij}$$

Minimizing the number of cars and maximizing the number of parking slots availability

Success Condition:
Enable to find shortest path, Successfully find route along with minimum cost,
Successfully profile matching is done.
Failure Condition:
Unable to find shortest path, optimization of shortest path is not done properly,
profile matching is not done.

VI. CONCLUSION

The purpose of this vehicle pooling system is to share the ride with people. Dijkstra's algorithm works efficiently to find shortest path. On-line and off-line verification is present in system which provides more secure journey for users. In off-line verification, enquiry is done by an employee by investing about him in his institute or workplace. This system will be useful for rural regions as much as metropolitan cities. Profile matching is used to match profiles of drivers and passengers by considering attributes like things to be prohibited(such as music, smoking, pet animals, flowers, etc.). This will result in comfortable and safe sharing of rides.

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