Design of a Carpooling Android Application with Socialization for Pakistan

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Summary
Transportation is an issue of interest in huge urban communities of many evolving nations today. Because of the enormous population in these urban areas, there is steady traffic clog and contamination. Subsequently taxi administrations are normal. Given the wide spread appropriation of advanced mobile phones far and wide, we propose an Android-based carpooling application for taxi service for Pakistan. By carpooling we mean sharing of taxi service by multiple users going to the same location with shared rent making it economically efficient. The proposed added feature of the mobile application is that besides going to the same drop off point or moving from the nearby location, other areas of common interests including similar employment status, hobbies etc would play a key role in selecting the fellow passenger in the taxi. This would provide a socialization platform for sharing knowledge and future collaborations with mutual agreement. In future, an algorithm with this feature would be designed and results of empirical study would be shared.

Key words:
Transport, Ride Sharing, Mobile Application, Android, Socialization

1. Introduction

Public transport is an arrangement of transport for travelers by gathering travel frameworks accessible for use by the overall population, typically managed on a schedule, operated on established routes, and that charge a posted expense for each outing. An important necessity is that public transport including different methods of transport ought to be consistent. It should feel like a single ride, regardless of whether you need to walk, take a bus, take a metro, take a bus again and stroll till your goal, there shouldn't be a break in any leg of the framework. The expansion in individual vehicle transport brings numerous issues, including clog, air contamination, vitality utilization, and other negative impacts to condition. Air terminals, ports, railroad, metro, and transport stations ought to progressively be connected and changed into multimodal association stages for travelers to build the utilization of open vehicle [1][2].People search for the most part three variables with regards to public transportation: effectiveness, availability, and reasonableness. Nowadays, the taxi market is a high-competitive niche. In any case, given the wide spread selection of cell phones especially advanced mobile phones, Taxi hiring applications provide facility to connect with more clients quickly. After the private taxi revolution, many businesses have started to invest in ride-hailing applications development and adopt the same business strategy to receive a profitable revenue [1], [2].

In an empirical analysis done on Taxi services in Karachi city of Pakistan, it was suggested that Taxi services should pay attention to higher fares and find means to make fares attractive [3]. In modern times, concept of Carpooling is also getting popularity. Carpooling is a service where multiple passengers with similar schedules and itineraries travel through a combined ride by sharing.

The aim of this research paper is to explain design procedure of the Taxi Booking Android Application of community transport with carpooling. The emphasis of the application besides sharing common transport facility is integrating people of common interest in one place leading to socialization in Pakistan. This would work as add on in addition to split fare. The paper is designed in such a way that Section 2 describes the review of existing systems. It is followed by Section 3 explaining the design of proposed Android mobile application. Section 4 is module wise explanation of design whereas Section 5 discusses the application functionality principle. Finally Section 6 provides conclusion and future directions.

2. Review of Existing Systems

A worldwide brand, Uber is among popular services in taxi operation throughout the world. It is one of the principal taxi administrations to dispatch in Pakistan that worked precisely. The service fluctuates from driver to driver. The Uber cell phone application is accessible on many platforms and associates' traveler to drivers in a region. All travelers need to do is to download the Uber application on their cell phone. At the point when a ride request is made, a GPS based dispatcher include essentially sends the area of the mentioning user as pinpointed on a Google map. The client at that point chooses the sort of vehicle one needs to utilize. At the point when a traveler is in the vehicle, one can send

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a connection of an online map to a friend, who can follow their whole trip through GPS. Driver rating is additionally an element of the application [4].

Careem is another well-known taxi administration which works in Pakistan. Careem propelled in Pakistan after effective help in the Middle East. Before the Careem application was created, clients would utilize program to do appointments. There is wide assortment of vehicles accessible with various classes – economy, business, and go with their very own different rates. Drivers can be representatives or vehicle proprietors; the idea is same as Uber [5].

Propelled in April 2017, Swvl planned to reform the mass transportation scene by substituting open transportation with a moderate, shrewd, innovation based option in contrast to driving through clogged, developing markets. Since the news came out, there've been a few Swvl transports out and about with the nearby network anxious to utilize the stage to drive at a value point that is altogether lower than other equivalent alternatives in the market [6]. Another ride-sharing activity called Airlift has increased critical consideration incorporating carpooling concept. Service presently works in Lahore and Karachi. This exceptional framework enables clients to "pool" together on a solitary vehicle, to and from regular get and drop-off focuses, for example, tourist spots, shopping centers, workplaces, and bus stations [7]. Uber and Careem have also launched carpooling services. Uber calls it Uber Pool where as Careem uses the terminology Careem Sawa.

H. Qadir et al., have investigated that there are no existing standardized systems to deal with satisfaction of drivers and passengers in carpooling systems in Pakistan. They proposed highest aggregated score vehicular recommendation framework (HASVR). This framework is based on five parameters namely average time delay, vehicle capacity, fare reduction, driving distance, and profit increment. A dataset consisting of 61,136 taxicabs with GPS was used for the study. The results indicated that HASVR was able to provide passenger satisfaction with reduce fare [8]. There is need to include other aspects including socialization factor in carpooling services which may provide a channel for knowledge sharing in addition to having a satisfactory ride with likeminded persons. Previous researches have shown that characteristics of a person have strong match with the environment around and may become a key factor in person's satisfaction [9]. It is a fact that meeting with persons having common interest's helps in building relationships, increased creativity and growth in the profile helping in finding more opportunities [10].

3. Design of the Mobile Application

We are proposing an Android based community transport mobile carpooling application with additional feature of shared interest among passengers. The selection of Android has been made because of its openness and ease of use, a number of researchers around the globe are working various Android applications. However, the design would have all basic features of any Android application developed for this purpose [11]. These basic features are listed below:

- A module for enrolling/registration on the application
- A module that enables a user to maintain one's profile
- A module to check the routes already scheduled
- A module for putting request for a seat in the desired route
- A module for calling & finding the Taxi driver
- A module for review & rate the ride

A use case model can be utilized to note these essential

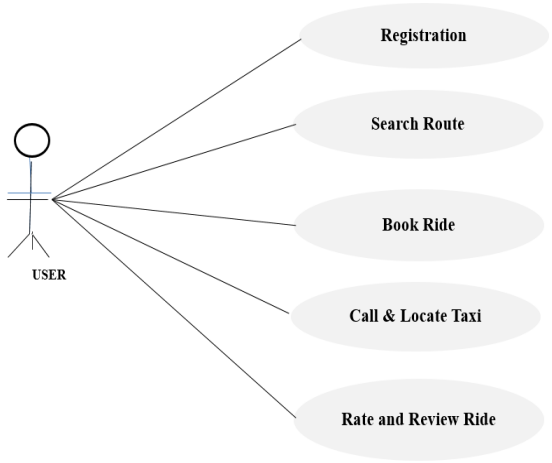

Fig. 1 Use Case Diagram

capacities as shown in Fig. 1. Table 1 is use case narrative depicting the progression of movement in the application. It can be seen from Table 1 that basic information regarding user profile known as Actor is the same as in case of Uber, Careem or any other service. However, in this case additional information regarding employment status, hobbies, and other interests would also be included. The concept is that when finding persons travelling to the same place in the same ride, preference would be given to persons sharing common interests which might be similar occupation, hobbies and interests besides travelling to same nearby destination. This would provide an opportunity to

the persons travelling together to share knowledge during the travel and socialize.

4. Implementation of the Mobile Application

The portable application can be executed utilizing JAVA for the Android stage with the assistance of Fire Base Database and can be deployed to the Google Play Store first. Android is the most broadly utilized portable working framework around the globe. Later on, an IOS application can also be designed [12]. There will be two panels in the Android application, one for the Customer and one for the Driver.

4.1 Customer Panel

In Customer panel, users demand the ride and drivers acknowledge the ride. Travelers meanwhile can check traffic details, track driver's direction, and get the information about assessed appearance time. Customer panel is proposed to have following sections.

a. Registration

This is the main intuitive screen that is shown after the welcome screen if the user is downloading the application in the first go. It gives handle that catch the name (surname), the cell phone number, the email, and secret key for login to the application. As soon as the cell phone number is entered the application processes the verified mobile number via code sent to the user's number via message. All this is done to avoid any fraudulent activity or fake number of users registering on the application. During the registration process, user would be asked to enter his employment status, hobbies and other areas of interests as well.

b. Pick a Route

This module comes into working where clients are presented to accessibility rides (already scheduled) from the area near to user's location. When this module is opened, the GPS gets enacted to follow client's pin point location and asks him to put his pickup and drop off location.

c. Book a Ride

User creates an appeal to confirm the ride. When the user taps on 'book a ride', this activity prompts closest taxi driver with a ride notification on his cell phone. The taxi driver accepts or denies the request.

Table 1: Use Case Narrative of Android Application

Brief Description	The application mainly focuses on providing a comfortable service to its users by reducing the ride cost as well as socializing. The ride can be shared by a multiple number of users going to the same destination at one time. A use case demonstrates how the user go through the expected routes.
Actor	The mobile application user.
Flow of events	The actor updates the initial registration details and moves on to the second portion. Initial details would also include occupation, hobbies, general interests The actor chooses current location and the desired location The actor selects a suitable route and taps on Book A Ride button ride request to that specific bus (route) driver. Upon ride confirmation by the car driver a notification is popped up in actor cell phone showing booking confirm. After the actor reaches to its destination the actor can rate and as a feedback to it. Feedback would have an option to connect in future with persons actor travelled with
Pre-conditions	The actor should carefully fill all the requirements to book a ride i.e. select desired route and request for a ride
Post conditions	A message or a notification shall be popped up on the user cell phone letting him know his seat confirmation. Message would be updated regarding fellow passengers in the ride and their common interest with the actor with an option to collaborate in the future with mutual consent

d. Taxi Locator

This module is coordinated with Google Maps demonstrating the area of the responsible taxi driver on the map.

This module specifically allows the user to make a phone call to the taxi driver who accepted the ride request in order to inquire for how much time will it take for the ride to reach users location.

e. Ride Arrival Notification

When the driver acknowledges booking, clients are notified about their ride. Likewise, when the ride arrives at the pickup point, clients are again informed about the location of their vehicle.

4.2 Driver Panel

Drivers have a particular User Interface (UI) that is straightforwardly connected with the administrator dashboard where their every single movement can be followed by the administrators. When the driver applies to get enlisted with the organization to drive a taxi under that brand name, they should pursue the standards. Proposed sections of Driver panel are:

a. Registration

Drivers are certified, and chose to responsibly drive one's vehicle as a taxi on income sharing base in this whole venture. The course of action is with the end goal that driver acquires a share of each ride he/she gets and parts the income according to the organization's standards. The registration process of driver includes all paper work details, contract details, in fact the driver has to prove his driving skills by submitting the official license copy along with the registration details of the car.

b. Driver Dashboard

Drivers are given a slightly different portal than that of users through which they can tap their completed rides, total income, and benefits. A common driver's dashboard contains insights about complete rides attempted, cash earned, alongside the time span spent with the ride booking application itself.

c. Receiving Payments

Drivers are qualified to get installment upon ride fulfillment. This installment comes either in type of money, in-application e-wallet installment from application clients, or by web banking which includes charge and Visa installment, net banking, or other e-wallets.

5. Application Functionality Principle

This Application based on Community Transport is expected to help consumer to book an instant ride and share the ride with another passenger with common areas of interest. Once application has been installed, it becomes activated on mobile phones. Customer opens the application and with the help of associated Google map and begins to book a ride by selecting a pickup and drop off location. At the constant time, the figure of wave kind is created on the screen. Once the driver confirms a ride, the user gets the notification. The driver should also add multiple passengers at a same time, if all riders wants to go at a same place or nearby location. As multiple passengers can share their rides, by this act the cost will be divided among number of passengers. The algorithm of selection of passenger sharing the ride would be made based on shared interests. It would be an automated system and there would be no intervention of either driver or the passenger to eliminate any bias. Once passengers have been picked, they would be able to socialize during the ride time. As all passengers would already know that they are travelling with likeminded persons so the interest to communicate and socialize would be high. Once the ride is finished and the rent is shared, each passenger would be able to provide feedback as in case of any normal taxi service. In addition to that, passenger would have an option to link up with fellow passengers in the future. This would require a mutual consent. Once it is done passengers would be able to share their contact details and then share knowledge in future. Fig.2 shows a schematic view of client or customer hierarchy in terms of events faced by the Driver. It can be seen that after login, driver finds multiple passengers through the Android application using a dedicated algorithm, interacts with the customers and then deal is done and ride executed.

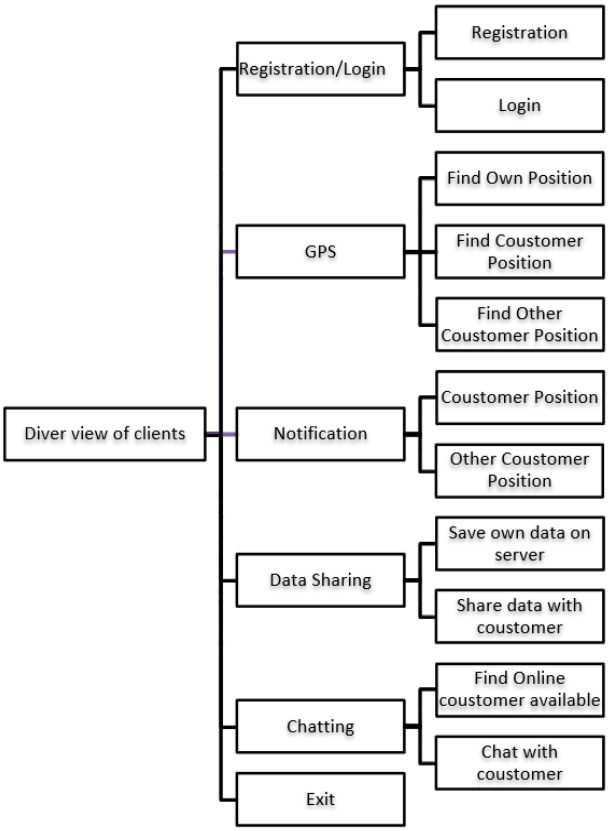

Fig. 2 An example of Client hierarchy viewed by Driver

6. Conclusion and Future Work

In this work, we have looked at the community transport with the case study of sharing taxi rides. Carpooling services by leading taxi services of Pakistan have been identified. A skeletal of android based application used for

sharing rides for passengers with common destination in nearby vicinity has been proposed. The additional feature of the application is that during registration phase, additional information e. g employment status, hobbies and others would be shared by passengers. Besides travelling to the same destination, passengers with common interest or employability would be considered a factor and would have preference. This would make taxi ride a social networking place as well. It is envisaged that in this way knowledge sharing of likeminded persons would increase resulting in providing ventures and opportunities for future collaborations in various areas of mutual interest. Limitation of this work is that no specific parameters defining the common interest have been identified as no empirical data was available. In future, we shall be developing an algorithm for the said purpose and in collaboration with leading taxi service providers of Pakistan, an empirical study will be done and results will be evaluated based on advanced computational methods including fuzzy logic to deal with the complexities if found in the results. Ultimate goal of the work is design of a mobile application initially based on Android with feature of Socialization for knowledge sharing in multidisciplinary areas for Pakistan.

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