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Survey On-Demand Valet Service System using Mobile Application

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ABSTRACT: Valet parking system consists of thoughtfully crafted yet easily mastered software applications which are easy to use for technologically less oriented people to use ride on demand service. Our findings have made us understand the need of on demand valet service system in the metropolitan cities of India due to the increasing population and the subsequent increase in the vehicle traffic. This paper introduces a novel algorithm that provides a valet parking system and develops a architecture based on the Firebase Cloud Messaging (FCM) technology. This paper proposed a system that helps users find parking solutions at the least cost based on new performance metrics to calculate the user parking cost by considering the distance and time. This cost will be used to offer a solution of finding an available valet service provide upon a request by the user and a solution of suggesting a new valet service provider if the current valet service provider does not accept the request or nobody is available to serve at the moment. The simulation results show that the algorithm helps in providing on demand valet service to the users and minimizes the user's hassle is finding parking in the real time. We also successfully implemented the proposed system in the real world.

KEYWORDS: Mobile services, on-demand Services, performance metrics, FCM.

I. INTRODUCTION

A. Motivation

Influx of millions of vehicles in the present scenario has resulted in the over brimming of roads. Value of the real estate is shooting up. Unnecessary wastage of fuel is observed due to traffic congestion. As a consequence vehicular exhaust is contributing to the atmospheric pollution. Valet Parking system that has the ability to absorb the traffic, convenient for the vehicle owners, approved by the builders, compact, time saving is today a requirement.

B. Solution

This project will be leading the charge on a new industry of on demand services that address ubiquitous urban challenge: finding a parking spot. It is a mobile based application that helps to find secure parking spots in your city and provide valets on-demand who will assist in parking and attending to your vehicle. With the help of this project we will strive to make parking a vehicle both convenient and affordable. By removing cars from city centres, making better use of underutilized parking spots, and relieving the pain of parking for drivers, we can truly improve our customer's daily routines and relieve civic pain with an affordable, convenient, and fast service. Within our app, tell us where to meet you our Valet will be there when you arrive. When you're ready to get your car back, schedule the return, and your car will meet you at the time and place of your choosing. In this paper, we explore valet parking's role in On demand mobile services, particularly in comparison with ride sourcing like uber, ola, etc, through a systematic on demand service model which will provide the best possible experience to the user.

Some interesting features about Parking:

- Typically, car owners spend an average of 10-15 min looking for parking spot.



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- While parking is free or cheap in most places (at least in India), there is a cost in terms of lost time and uncertainty of finding a suitable parking space.

As in most informal fragmented markets, 'Jugaad' (workaround) solutions exist at the local level – e.g many offices lease space from empty or unused properties OR buildings with offices and commercial spaces use the available parking at complementary timing etc.

II. RELATED WORK

There are expanding number of outing arranging administrations that propose open transport courses to clients with timetables and other data. A considerable lot of them are coordinated with continuous information about travel times, which can be consolidated with data stages in light of group sourced data [1], including movement blockage, prepare flag disappointments, and so forth. As of late, auto sharing of cabs or private vehicles has turned out to be progressively well known. Portable administrations are created to allot a reasonable taxi or shared auto to each excursion in separation. Such versatile administrations can be considered as an augmentation of existing taxi calling administrations. They use methods for blurring a reasonable ride among an arrangement of applicant vehicles in view of specific criteria. Various worldwide arranging systems have been explored, for example, heuristic systems for the heap adjusting of accessible taxicabs to serve anticipated future request with bring down inertness.

Uber [4] is a versatile application like the taxi calling framework which empowers clients to ask for drivers keeping in mind the end goal to be transported. Customarily, one who needs to call a taxi normally needs to influence demand to a call to focus. With the Uber portable application, everything winds up noticeably less demanding and quicker. One can ask for an auto on the web, then monitor the auto's GPS area on a guide until the point that the auto comes to pick one up. The application gives a toll estimation for the ride, with the goal that the client knows the cost ahead of time. At last, the client can pay effortlessly through the application so the requirement for money is disposed of. Uber likewise gives clients the chance to give input after a ride. Kutsuplus [5] is another transport benefit transport framework conveyed at Helsinki in Finland. The idea has been produced by Ajelo and is very like Uber however as opposed to getting a taxicab on-request you get a transport on-request. A us demands a transport on a versatile application picking the beginning stage, the goal, the takeoff time and the quantity of seats you need to book. Kutsuplus will at that point search for other individuals requesting a transport to a similar goal and will propose conceivable courses. Once the excursion is confirmed, the client can pay straightforwardly through the versatile application with a virtual wallet. The cost is not fixed as in standard transport travel. For each excursion recommendation after a request, the toll is shown. The toll can be part and ends up noticeably less expensive in the event that one books a transport for a gathering. Ajelo was a start-up organization that built up the calculation and was procured in November 2014 by Split [8] to send a common ride benefit in the United States.

III. PROPOSED SYSTEM

1) SYSTEM OPERATIONS

When a user wants to book a valet to find parking at the desired location and time, he must login to our system. After successful login, a request message is sent to search for the available valet. Then, the system will send back a response message containing the information, including the valet name, contact details and the directions to reach him. The choice of the valet is based on the function $F(\alpha, \beta)$, which is calculated based on the current location of the user and the location of the valet. The system will forward the user to a valet with a minimum $F(\alpha, \beta)$ value if there are more than one valet present at the location. When the user arrives at the location, he must identify the valet using his given details and drop the car to him and specify the location of drop off and time of the same. After the time is up the valet will go to drop the vehicle and notify on the app that the trip is completed and the money will be deducted from the wallet of the user. If there is no valet available to serve at that moment then, the system will send a suggestion message that includes information on a new valet details, including the address and new directions, with a minimum cost. The new

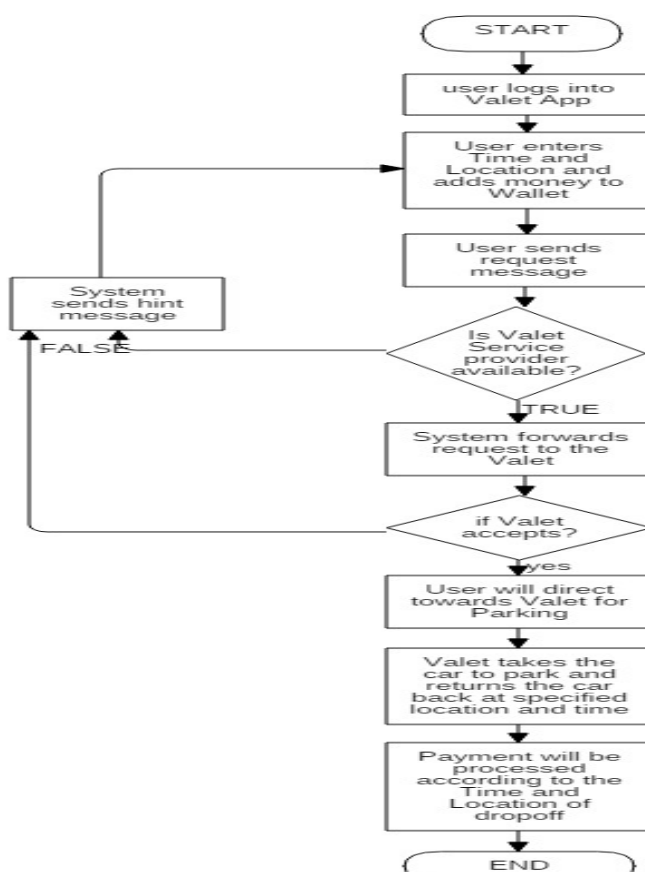
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valet will be selected based on the neighbour table of the current car park (the first node in the neighbour table), as shown in Fig. 7.



Each node has a neighbour table to maintain information on the current status of the network and a queue with preened length. The neighbour table for each node contains information on the neighbouring nodes directly linked to it. On the other hand, the queue is used to control the number of vehicles forwarded to the node, which aims to prevent overloading in the number of vehicles beyond the capacity of the node. In our proposed system, each node will broadcast a message to its neighbouring nodes after a new node joins or leaves it. This message includes information on its total free resources. The neighbouring node that receives this message will update its neighbour tables. We have assumed that, in our network, where α is a coefficient that depends on the length of the path between two nodes and β is a coefficient that depends on the number of free slots in the destination node.

IV. SYSTEM ARCHITECTURE

Our project is an on-demand valet parking service that aims to optimise the process of parking cars. Through the app, a user can request a valet to come to a designated spot (within their service location), take their vehicle, and park it in an enclosed space till the patron needs it again. In the following figure we can understand the flow of events, such as customer using its application for booking the valet, setting the time and location based on which they will be charged. They may also opt for value added services at this time. After this they will be sent to the payment page from where the

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payment will be processed through the admin and sent to the valet service provider. Meanwhile the valet service provider will receive the request with time and location and act accordingly to assist the user to park their vehicle. Once the vehicle is handed over to the valet they will park the car in the nearest safe parking spot available and once the user demands its car back or as requested it will be dropped off to the user's desired location. Thus making this service fast convenient and affordable

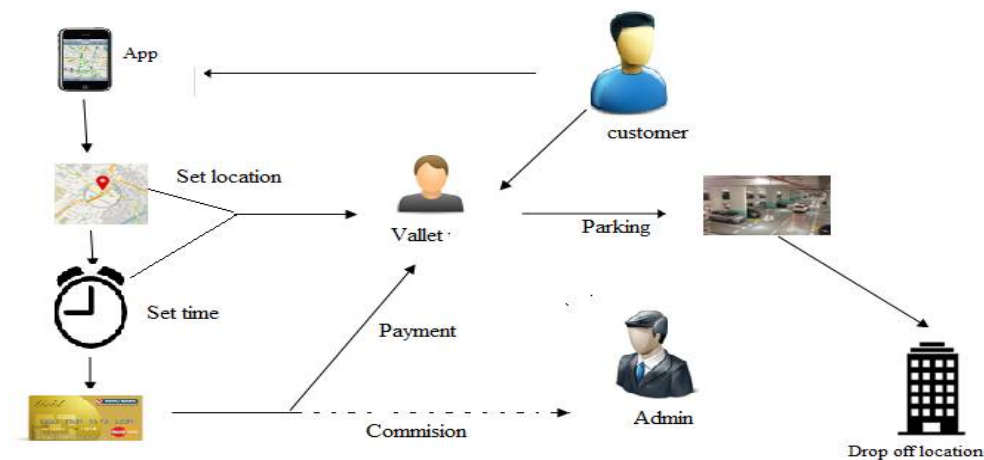


Fig. System Architecture

V. CONCLUSION

This study has proposed a On Demand Valet parking system that provides an easy to use android application and minimizes the costs of finding the parking. Our proposed architecture and system has been successfully simulated and implemented in a real situation. The results show that our algorithm significantly reduces the average waiting time of users for parking. The simulation of our system achieved the optimal solution when most of the users successfully found a valet. In our future study, we will consider the security aspects of our system as well as implement our proposed system in large scales in the real world.

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