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Vehicle Parking System

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Abstract: ***Vehicle Parking is a major challenge in any city. People struggle to park their vehicles in proper place. In some parking place there is no safety for the vehicle. There is a chance of theft or vehicles may get damaged. People waste their time to search vehicle parking place. To solve these problems 'Vehicle Parking System' is used. It is efficient software to customers to search parking place. It provides frequent information about the availability of parking slots and it includes online payment for parking. Cryptographic techniques are used in this vehicle parking system. So, it provides confidentiality between the vehicle parking system and the customer. This software is easy to use by anyone with Internet facility and also provides security. Administrator handles customer queries and also he tracks customer status. Customer get the information through Email or sms(Short Message Service).***

Keywords: Cryptography, Email, sms, Online Payment

1. Introduction

Parking is a key component in all the cities. Almost all cities have addressed parking problems associated with educational institutions, entertainment uses, religious institutions, commercial activities, special events, etc. For example in theatres, vehicle may get damaged due to large parking. Since no online payment facility everyone need to pay cash. Some people park their vehicles outside the theatres which create traffic.

People don't aware of parking vehicle facility, searching parking place is waste of time. Through some guidance parking places may be searched. Sometimes Emails and sms(Short Message Service) about the parking system may be fake which creates bad impression on the system.

Excessive automobile increases accidents. Improper traffic management leads to traffic jams and waste of time waiting in signals. This ultimately results employee late entry to office. By proposed parking system, unnecessary traffic can be avoided.

In Vehicle Parking System when the customer registered successfully, they will get pin number. Using pin number customer can park their vehicle. Suppose, if hacker get this number, real customer will lose his facility and also he/she loose their money. This pin number has expiry date and it is encrypted. Cryptography techniques are used to prevent this problem. Management is also a critical task to monitor staff and customer. This system easily monitors all branches, and he handles customer queries and assigns works to staff. Admin can see the available parking slots of each branch by using charts. Using this, an administrator send parking availabilities to the registered customer frequently. It helps the customer to reduce time to search parking facility of all the branches. Customer may also use online payment than solid cash.

Vehicle parking system manages the staff and customer efficiently and helps to search parking place. Cryptography techniques are used for confidentiality and authentication. This software is user friendly. This system is based on data-centralization.

2. Related Work

M.F Ismail [1] proposed an Andvanced Vehicle Parking System. This paper improves multilevel parking facilities by a new smart parking system. It includes new circular underground basement of the parking system, so it reduces the space. The simple rack pinion mechanism is used to lift the vehicle.

Denis M. Filatov, Elena V. Serykh [4] proposd an Intelligence Autonomous Parking Control System of Four-Wheeled Vehicle. This paper shows the mathematical formulation of the vehicle. So it provides the minimum length parking route and minimum parking operation. This is based on the fuzzy logic.

SarangDeshpande [5] proposed a Vehicle Parking Guidance System using Hierarchical Wireless Sensor Networks. A three sensors per parking slot is used. It distinguishes the type of parked vehicles and find the free parking slots. Free, occupied and partially occupied status information is stored in the Parking Server. Parking information available to the user by the web and mobile applications.

3. Existing System

With an expeditious increase in the vehicle transport in the major cities, it has become more difficult to find the free parking place to park the vehicles. Unwanted traffic, drivers frustration, delay in the transportation and increase in the noise and air pollution are caused by constant rise in the number of vehicles on the roads. Due to lack of proper knowledge of parking space, it has become ineffectual to utilize most of the nearby parkingspace. When the messages exchange between the system and the customer there is a chance to hack that message by a third party. That is, there is a lack of confidentiality.

4. Proposed System

Vehicle Parking System concentrates on customer problem about the parking. This software manages the customer and staff in the system. This software is easy to use by anyone with Internet facility and also provides security. Administrator gives information about the parking place

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through Email and sms(Short Message Service). Cryptography techniques are used to ensure confidentiality which prevents third party to hack the information and it also includes online payment.

In this Vehicle Parking System mainly three modules has been provided. They are, Administrator Module, Staff Module and Customer Module.Fig 1.

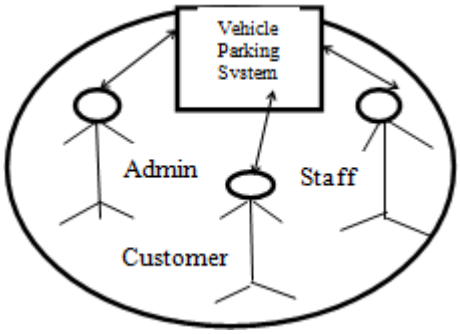


Figure 1: Vehicle Parking system Modules

Administrator can add or update staffs,branches and parking slots.He can receive and give response to the customer. He has the option to change his password and track the status of the customer. Admin can also check the status of each branch using pie chart which shows the percentage of parking space allocated in each branch Fig.2. Staff module checks for assigned work and status of the accepted works with details of accepted dated and cleared date. He can also checks for the status of the rejected work details. In Customer module, customer needs to register first before using the parking facility. After registration, they can send parking requests to the Vehicle Parking System. For each requests unique requests id will be generated. If the requested parking slot is available it is allocated to customer after completing the online payment process.

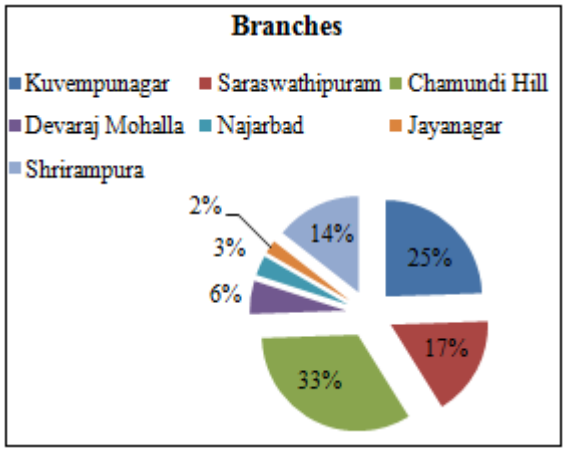


Figure 2: Branches Pie Chart

PROPOSED SYSTEM ALGORITHM

Procedure GetParkingSlotStatus
If S1=SlotOccupied AND S2=SlotOccupied AND S3=SlotOccupied Then
Return Occupied
END If
If(S1=SlotCccupied AND S3=SlotOccupied)
OR(S2=SlotOccupied AND S3=SlotOccupied) Then
Return Partially_Occupied
End If
If S1=free AND S2=free AND S3=free Then
Return Free
End If
End Procedure

Free parking slots information in various parking branch is updated at regular interval. Percentage of vehicle in each branchoccupied and the time period in which vehicles enters and exit is considered.

Vehicle Parking System include Dijkstra's Algorithm to find the shortest path between the requested place and the branch and also finds shortest path among branches. Dijkstra's algorithm is an algorithm to finding shortest paths between nodes in a graph. In road networks it is very useful.This runs in time $O(|V^2|)$, Where $|V|$ is the number of branches. This algorithm is implemented by a Fibonacci heap and running in $O(|E|+|V|\log|V|)$, Where $|E|$ is the number of edges. Parking System utilizes this algorithm and helps the customer to find shortest path among vehicle parking branches. It reduces time to search best path to go.

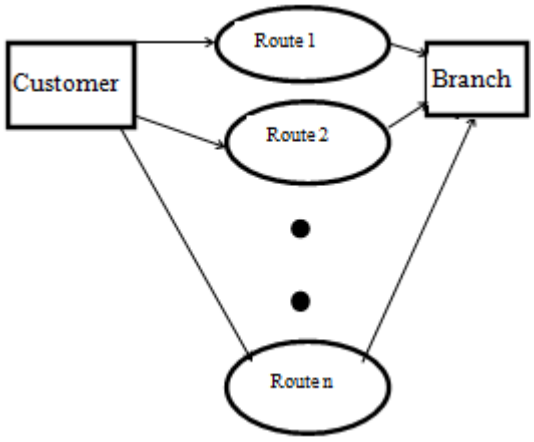


Figure 3: Routes between customer and branch

In Fig 3, there are four routes from customer to branch. Finding shortest path between them which reduces time, cost, distance.

In Fig 4, branches are connected in the fashion of mesh network. This technique can be applied to both wired and wireless networks. This work applies full mesh topology. That is, every branch in the city has a connection to each of the other branches in the network. In which number of connections among the branches can be calculated using the following formula:n(n-1)/2, where n is the number of branches. It can handle high amounts of traffic, because multiple branches can transmit data simultaneously. It can also handle failed branches. If any one or more branches failed, it does not cause a break in the network. Redundancy data will be available on the other branches. Adding additional branches does not disrupt data transmission between other devices.

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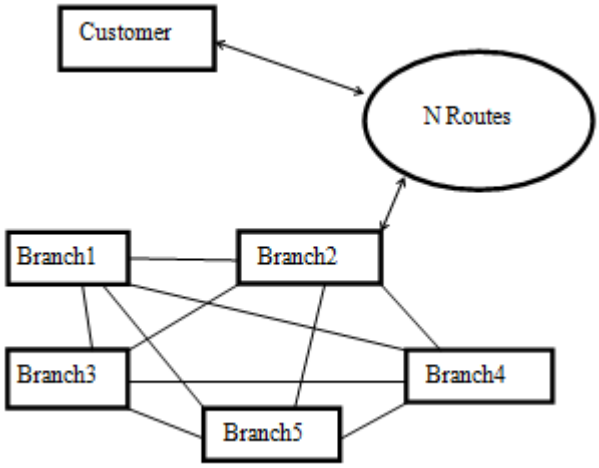


Figure 4: Mesh topology applied to number of branches

DIJKSTRA'S ALGORITHM

Function Djk(G, S)
Create vertex set Q
For each vertex V in Graph:
Distance[v]<-INFINITY
Previous[v]<-UNDEFINED
Add v to Q
Distance[source]<-0

While Q is not empty:
U<-vertex in Q with min distance[u]
Remove u from Q

For each neighbour v of u:
Alt<-distance[u]+length(u,v)
If alt<-distance[v]:
Distance[v]<-alt
Previous[v]<-u
Return distance[], previous[]

Dijkstras Algorithm find the shortest path between two intersection on a city map. This algorithm initially marks the distance to every other intersection with infinity. Select the current intersectionat each iteration. The current intersection will be the starting point at the first iteration and the distance to it will be zero. For subsequent iteration, the current intersection will be the closest unvisited intersection to the starting point. Update the distance to every unvisited intersection from the current intersection that is directly connected to it. Determinine the sum of the distance between an unvisited intersection and the value of the current intersection.If the value of unvisited intersection is less than its current value, relabeling it with this value. Continue this process of updating with the shortest distance of neighbouring intersections. Then mark the current intersection as visited and move to the closest unvisited intersection until the destination as visited.

Rack and Pinion Mechanism:

Rack Pinion mechanism is used to lift the vehicle. So, it reduces the cost compared to other machinery. This mechanism needs brute force to move the vehicle up and down. This is very difficult and requires some strength. The rack and pinion reduces the force needed to move the vehicle and most importantly protects the machine operator and saves from excessive strain. Finally this mechanism saves effort and time.

Circular Underground Parking System:

There may be a solution to the space issue in crowded cities. By using circular parking system, we can soon park our vehicles. The circular parking system is designed in a circular building to park an unlimited number of vehicles. This system significantly reduces the amount of space required to park each vehicles. It has an average retrieval time of two minutes. It operates with the driver parking and the vehicle leaving in the parking bay at the entrance level. The movement of the vehicles are achieved by use of a rack and pinion mechanism to bring the vehicle to the required floor level and thereafter by a cart to its parking bay. This system is controlled by an integrated computer system, the overall activities/operation can be viewed with one screen and its operation is very user friendly.

5. Conclusions

Through Vehicle Parking System unnecessary traffic on road can be avoided. Using cryptographic techniques data confidentiality and authentication is maintained. Online payment helps user friendly way of payment than cash system. Data centralization helps in controlling the operations and activities of all branch offices located in and around the state. Customer can interact with the Administrator for any query. Dijkstra's Algorithms helps to find shortest path so it reduces time and cost. Circular underground parking solves the space issues. Rack pinion mechanism helps to lift the vehicles. This software is user friendly.

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