ISSN:2320-0790

An International Journal of Advanced Computer Technology

GPS BASED PARKING SYSTEM

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Abstract – This paper describes the approach to manage the parking by using the GPS (Global Positioning System). Finding Parking these days have become a major problem. Whether on roads, markets, malls parking is a major issue. Car drivers waste a lot of time finding the available parking space without any detail or direction. With the rapid increase of cars finding parking in efficient and easy manner without causing congestion is the need of every parking managing system. Current parking systems depend either on Human Personnel to keep a track on available parking space or sensor based system. In both the situations the information is not about the available space but only the total no of space available. In addition the cost of installation and maintenance of sensors is high. This paper shows a GPS based system to detect and indicate the available parking slot. Coordinates are used to detect the available parking slot.

Keywords: Car Park, Coordinates based, GPS based

I. INTRODUCTION

Finding Parking is a difficult task due to which people spend a certain amount of time in finding the parking space thus causing the traffic to slower down and leads to congestion due to lack of information available about the parking space. Different approaches have been followed to find parking such as wireless sensor and vision sensor. Using coordinates the location of the user could be known and also the parking system. By using the haversine formula distance between these two can be calculated which will help the user to find the nearest available parking and it will save time and money too as no infrastructure is needed. Using Google API's navigation can also be provided which will lead the way to the parking slot. User can also release parking slot if does not want to access it.

II. BACKGROUND

Parking has become a serious problem in cities due to the increasing no. of private vehicles. With the emerging problem the current system will not be able to handle the situation as they do not provide any information about the available parking space. Current system will need human resource for managing the parking system. They can provide only minimum information and will not be able to handle all the parking issues effectively. It is a slow process. They could even get the drivers to search the parking on their own which leads to waste of time and can even cause congestion. For effective parking sensors have been used to detect the available parking system. For implementing this, sensors need to be installed in every parking area which will be very costly as the cost will increase with increasing no of parking areas. The GPS based parking is cost effective and easy to use. The system will enhance the scalability using the coordinates for the parking. The detection of available parking space is done by using the coordinates. The primary purpose of this paper is to demonstrate the development of GPS based parking system which can be used to determine the location of available parking spaces and provide feedback on the current location.

III. SOFTWARE ARCHITECTURE

The architecture includes several modules through which parking system using coordinates and GPS system can be achieved. The modules are driver module, communication module and function module.

A. Driver Module

It is responsible for sending the coordinates of the current location to the server. When GPS is turned on it will trace the current location of the user and send the coordinates of the current location to the communication module. The coordinates of the parking system is already present in the database. The distance between the two placed can be found by the communication module.

B. Communication Module

The Distance between the two coordinates can be found using the Haversine formula. The server will compare the current coordinates of the driver with the existing coordinates of the parking system.

The Haversine formula is an equation important in navigation, giving great-circle distances between two points on a sphere from their longitudes and latitudes. It is a special case of a more general formula in spherical trigonometry, the law of haversines, relating the sides and angles of spherical triangles. The first table of haversines in English was published by James Andrew in 1805

For any two points on a sphere, the haversine of the central angle between them is given by:

Where

- *haversin* is the haversine function:

$$\operatorname{haversin}(\theta) = \sin^2\left(\frac{\theta}{2}\right) = \frac{1-\cos(\theta)}{2}$$

  - *d* is the distance between the two points (along great circle of the sphere)
  - *r* is the radius of the sphere,
  - ϕ_1, ϕ_2: latitude of point 1 and latitude of point 2
  - λ_1, λ_2: longitude of point 1 and longitude of point 2

To find the nearest parking available following query can be used:

```
Function getParking()
SELECT P.NAME, P.LATITUDE,
P.LONGITUDE, COUNT(P1.STATUS) FROM
PARKING_SYSTEM P, PARKING_SLOT P1 WHERE
P1.STATUS=0 AND P.PARKING_SYSTEM_ID=
P1.PARKING_SYSTEM_ID GROUP BY P.NAME
ORDER BY ((ACOS(SIN('".$latfrom."' * PI() / 180) *
SIN(P.LATITUDE * PI() / 180) +
COS('".$latfrom."' * PI() / 180) * COS(P.LATITUDE *
PI() / 180) * COS(('".$longfrom."' - P.LONGITUDE) *
PI() / 180)) * 180 / PI()) * 60 * 1.1515) LIMIT 4 ";
```

IV. IMPLEMENTATION.

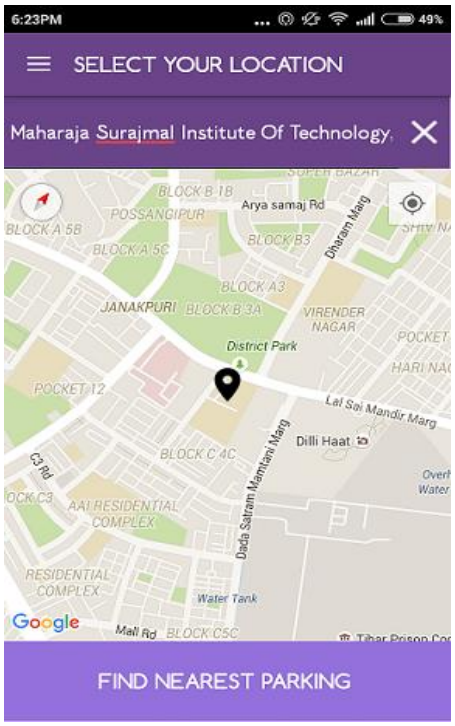

Figure (i): Location of the User

This screen shows the current location of the user. Using GPS current location of the user can be traced which will help in finding the coordinates. Coordinates of the Parking Systems are already present in the database which will help to know the nearest parking available.

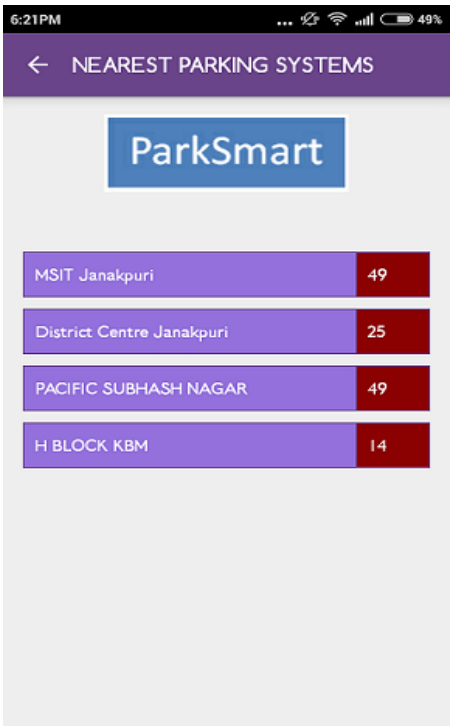

Figure (ii): Nearest Parking System

This is the screen showing the nearest parking systems according to the current location of the user from where user can choose which parking system he wants to use.

Figure (iii): Parking System Details

This screen will show the details of the chosen parking system. It will show the name of the parking system, distance from the current location to the parking system, Capacity of the system and how many are vacant.

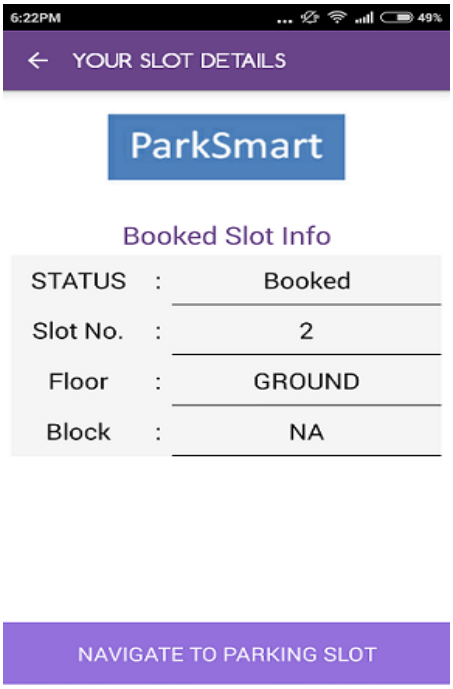

Figure (iv): Booking Status

This screen shows the status of booking whether it is booked or not, which slot is allocated, floor and block details of the parking system.

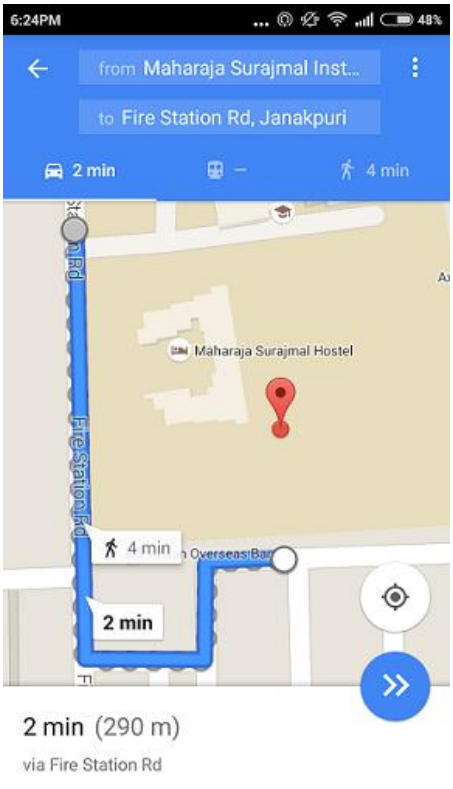

Figure (v): Route map to the Parking Location

This screen will show the route from the current location to the parking system. Using Google API's voice navigation can also be provided to make it easier for the user to find the parking slot.

V. CONCLUSION

This paper has proposed a smart parking system. By using a secured wireless system. The result obtained by testing the Park Smart Application is that it is time efficient, one can easily access the parking, do the booking. The parking process is a non-stop and efficient service.

In future scope of this project is software could be made for parking management system which could be easily managed and using the android application PAS user can easily find the parking slot.

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