Title: Parking Navigation For Multiple Parking System

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Abstract— **In large crowded cities, to find a vacant parking slot is very difficult. We are also unaware of the available parking slots in the required area.This paper proposes a Smart parking system. In this system,there will a central server, in which information about the registered parking is stored.This system proposes a secure and efficient parking system which will work on sensor communication and secured wireless network.The central server will also maintain the count of the vacant slots in the parking facility and it will broadcast it to the user.Accordingly, the user will select appropriate parking zone.Based on this, the expected shortest path to the selected parking will be calculated and showed to the driver.Using this system, we can easily find vacant space for parking and parking waiting time is reduced efficiently.**

Index Terms—**Android,Navigation, IR sensor, RFID tag ,Wirelessnetwork.**

INTRODUCTION

In major cities, there are limited parking areas which results in traffic congestion, pollution of air and also frustration of driver. Also in large parking area, a driver may exit without the knowledge of the new available parking that have just become vacant. But if another car gets parked before the driver reaches, that may lead to driver frustration. The driver does not have knowledge about the available vacant space before entering the parking facility. Also if the car gets stuck in the traffic congestion, it will take more time to come out of that area.

In this system, we solve the problem of traffic congestion using navigation method. We propose a system that can easily find vacant space for parking. We design a central server that maintain information about the registered parking zones. It also maintain the count of vacant space in the parking facility and broadcast it to the user. So the user can easily take decision based on the nearest parking available.

Thus by using navigation method,the user can get the shortest path to the selected parking zone to avoid congestion.Therefore the parking waiting time is reduced efficiently.

I. RELATED WORKS

For secure and efficient parking system,we use sensor communication and secured wireless network.For communication,we use IR i.e.Infrared Sensor and RFID tag.

In this section,we define some related work.

Using sensor flap parking system for collecting data.Here sensors are installed in each parking zone.whenever a car enters the parking zone,theflap plate for the car is raised and car is parked.But this information is broadcasted to all the drivers and they may take the same decision to park their car and may cause congestion. Morever,the maintainance and the cost of the development tends to be high.

In this system,we will use navigation method for finding the route of the available parking zones.GPS cannot be used in such parking zones because GPS cannot detect inside the building. We can use some range-based positioning methods such as WiFi, 3G etc. By using manual parking there may be congestion due to low width of roads Many parking zones have automated system, but they only broadcast the parking space that have already been allotted and not the empty space count. Also they do not show the driver the route to the parking zone where the car should be parked.

II. COMPARED METHODS: SYSTEM EARLIER USED FOR PARKING:

(1)Open space parking:
Mostly people prefer for parking at open spaces as it is available very easily and at low cost. Also there is no time limit for the vehicles parked. Due to this, congestion may occur at such places because vehicle are not parked in proper manner which eventually results in driver frustration, air pollution, noise pollution etc. Safety of the vehicle is also an issue related to open space parking.

(2)Random parking:
Mostly people prefer for parking at open spaces as it is available very easily and at low cost. Also there is no time limit for the vehicles parked. Due to this, congestion may occur at such places because vehicle are not parked in proper manner which eventually results in driver frustration, air

pollution, noise pollution etc. Safety of the vehicle is also an issue related to open space parking.

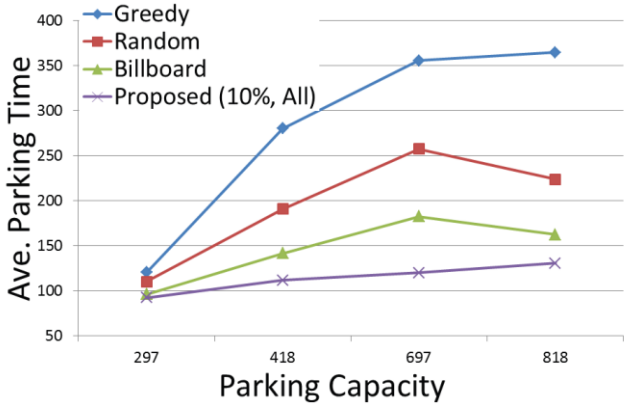

Figure 1. Parking capacity for avg. parking time

(3)Underground parking system

Underground parking system has been proposed which will be an ideal solution to the parking problems in the city and since it is underground, it does not amount to usage of available land, which is already a scarce resource. Mostly there is limited available parking slots in underground parking system and may cause congestion.

(4)Automated multi-storey car parking

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To avoid the disadvantages for open space parking, many of the cities have design and implemented multi-storey car parking system, where drivers have no access, space is utilized very economically in order to use the available capacity as efficiently as possible. A multi-storey car park offers you the highest-possible degree of flexibility in reaching your optimal solution. It is high time that the city adopts globally recognized solutions for traffic woes and implements it at the earliest to save the fragile infrastructure for being further burdened. There are technologically sound, cost effective, time saving and space conserving systems available to be implemented. These globally acclaimed systems are not only conservative of space, but also are quick and efficient.

In this system, the vehicle is lifted by means of rollers at all four wheelers and subsequently parked in a space saving manner. The system is also suitable for building heights well above 15 storey. But for implementing this system, government approval is required for the same. The cost and maintenance of this system is very high and hence it is not feasible for government bodies to encourage it.

(4) Billboard Advertising Parking.

The vacant spaces at the parking slots is advertised on the billboard, therefore the car selects the appropriate target parking zone. If the car is not parked at the selected parking zone, it will select the next available target parking zone.

(5)Greedy Parking.

The drivers tend to park at the nearest available parking zone, therefore the highest popular zone which is the target zone gets full immediately. If the vacant spaces cannot be found even after searching many zones, the driver selects the parking zone randomly.

III. PROPOSED SYSTEM

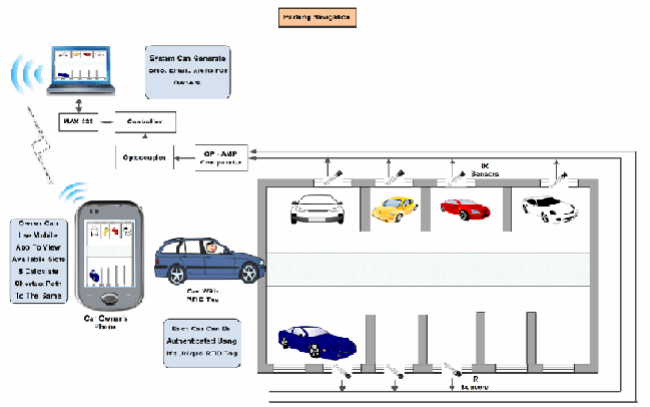

Figure 2.Parking navigation of proposed system

(3.1)Overview

The proposed system comprises of the server part and the vehicle part. The server part in implemented on central server. The central server will estimate the available information and will send the appropriate parking zone available to the user. Accordingly the vehicle part will find the shortest path to the parking zone and will show the route of the parking slot to the driver easily.

A car using this system will get the recommended parking zone and if the car is not parked there it will show new parking route automatically.

(3.2)Server part

The Server will keep the track of the available registered parking zone in the given area. It also maintains the count of the vacant spaces at the parking zones.

Algorithm 1: Server algorithm
Server.string 1{
While true do
Receive data from cars
Accumulate the data to the memory
End while
}
Server.string 2{
While true do
compute parking information
show parking information.
Wait
End while
}

(3.3) Vehicle part

After the driver selects the efficient parking zone,the path from where the car is currently located to the selected parking zone is being estimated at the vehicle part.When the car enters the selected parking zone,it finds its location by an existing method which is based on RSSIs using WiFi anchors.[9] For finding the parking route,it will communicate with the central server.Cars will alternately send their position and condition of the car i.e parking or leaving a parking zone to the server and get the parking possession information.

Once a car needs a suggested parking way (when entering the parking capacity, or the car reached the end of the earlier found parking direction),it calculates the parking course by which the parking coming up time can be minimized.This process is shown in algorithm 2.

Algorithm 2:Vehicle algorithm
Vehicle.string 1{
While true do
approximate current position
Send current situation and position to server
Wait
End while
}
Vehicle.string2{
While true do
Wait until parking path is required
obtain parking information. From server
analyze parking direction
at random select 1 parking direction from top 3
broadcast parking path to driver
End while
}

IV. IMPLEMENTATION

Fig.2 shows the system architecture for parking navigation. As seen in the fig.,there is a central server installed in each parking zone. The server contains the database of all the registered parking available in that area. Also it has IR sensors are installed in each parking zone. Sensors detects only the high and low values. When the car is parked,it will detect low and when slot is empty, sensor will detect high.There is a level convertor that is MAX 232 which convert from TTL to RS232 and vice versa.Microcontroller is used as analog-to-digital convertor and it sends its value to PC using serial communication.Opto-coupler is a component that transfers electrical signals between two isolated circuits i.e.controller and op-amp comparator.For balance communication between IR sensor and central server,we use op-amp comparator. We use RFID tag for authentication of the car. RFID i.e. Radio frequency identification is the wireless to send data, for the purpose to identify and track tags attached to the objects automatically. Owner can use mobile application to view available slots and calculate shortest path to the same easily.

V. EVALUATION

To estimate the projected method, we conducted replication reproducing the actual arrangement of a huge parking resource situated at Nara, Japan. This arrangement is shown in Fig. 3.

We also used traffic outline data collected in the service. We calculated parking wait time in some contexts and estimated the quality of the projected and the compared ways.[1]

Parking Simulator

As we are demanding to replicate traffic in a parking service, we needed to build up a new traffic simulator for that reason. The simulator is based on a cellular machine that is android, and each unit will respond to a 5m × 5m space that will characterize a space that a car will engage. All routes and parking spaces corresponds to units. A vehicle can travel to one of neighboring 8-units which are not in use by an additional vehicle. All moving vehicles travel to a neighboring unit , which communicate to a speed of 5m/s.

The suggested data comprises of the number of the vehicles that enter and depart the parking zone each hour.

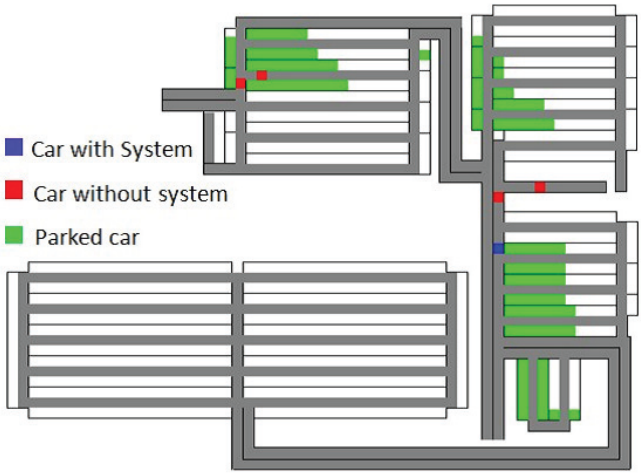

Figure 3. Screen shot of parking simulator

VI. CONCLUSION

In this paper, we proposed a secured and intelligent parking system using central server and sensor communication. The vacant space for parking can be easily viewed to the driver using the mobile application.

In large-size parking facility, we propose a navigation system which eventually reduces the parking waiting time.

Initially the user can select the efficient parking zone from the available parking options along with available vacant space Later after selecting the desired parking zone, the user can get the path to that parking zone.

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