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Optimum Utilization of Parking Area

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Abstract*—*This paper aims to manage automatic car parking system with reservation to the next level in JOT. As there is an enormous increase of vehicle usage in each and every place where human lives all over the world makes the scarcity of the parking place for vehicle is increasing rapidly and unavailable. So we have proposed cloud based parking lots and GSM is used for monitoring the available spaces through which the reservation is made with the help of android application for the users and provide optimum utilization of parking area.

1. INTRODUCTION

In recent years, research has used vehicle-to-vehicle and vehicle-to-infrastructure interaction with the support of various wireless network technologies such as radio frequency identification (RFID), wireless mess network, and the Internet. This study aimed to provide information about nearby parking spaces for the driver and to make a reservation minutes earlier using supported devices such as smart phones or tablet PCs. Furthermore, the services use the ID of each vehicle in booking a parking space. However, the current intelligent parking system does not provide an overall optimal solution in utilising the space provide for the vehicle because each vehicle has its own shape and size.

To resolve the aforementioned problems and take advantage of the significant development in technology, the Internet-of-Things technology (IoT) has created a revolution in many fields in life as well as in smart-parking system (SPS) technology.

2. RELATED WORKS

In some studies the authors proposed a new algorithm for treatment planning in real-time parking. First, they used an algorithm to schedule the online problem of a parking system into an offline problem. In another study, the authors propose an SPS based on the integration of UHF frequency, RFID and IEEE 802.15.4 Wireless Sensor Network technologies. This system can collect information about the state of occupancy of the

car parks, and can direct drivers to the nearest vacant parking spot by using a software application. However, in this work, the authors have no mathematical equations for the system architecture and do not create a large-scale parking system.

In another study, the author proposed an innovative system including the parking guidance service. A parking space can be reserved by a smart phone via Internet access. Upon entering the car park, the reserved parking space will be displayed on a small map using wireless transmission for vehicles under the dedicated short-range communication protocol however they do not provide any mathematical model of the system, and do not consider the waiting time of each vehicle for service.

Different author gives different proposal, but there is an issue regarding proper utilization of area of parking based on the size of the vehicle. They took standard area for a vehicle whether it is a small one or a bigger one. If a small vehicle took a place of a large vehicle then it will be an improper utilization of a parking area due to which less vehicle will be accommodate in large area.

Other issues arises due to improper utilization of parking area are waiting time will increase, efficiency of parking system will decrease, managerial cost will increase and driver will be in trouble to park their vehicle in parking area.

3. CONTRIBUTIONS

With the aim of overcoming the disadvantages of the systems mentioned above and inspired by proposal given by different authors and some relevant works we introduce latest SPS architecture based on IoT and build a mathematical model of the system operation. First, our algorithm adopts a mechanism to search car parks at the least cost. Second, we adopt a mechanism for proper utilization of parking area by identifying the area between the two vehicles and compare them with our standards.

Standards mainly are of three types based on the size of the vehicle i.e. hatchback, sedan, xuv. When we got the request from the android device to book a slot for parking a message is sent from application to server and as according to our program it detects which car it is and on the bases of their size it provide the nearest location for parking.

Size can be calculate by calculating the distance between the two cars with the help of RFID which sends a signal to the cloud server in which a mathematical model perform its operation and provide it's acknowledge message to the android device. With the help of navigation system it relocates the location for car parking.

Car parking area totally depends on the adjacent vehicle, if the adjacent area is vacant then only it goes for area calculation otherwise "no area vacant" message received by the server and if more than one car area vacant in the adjacent of vehicle then on the basis of area it calculates for which type (three standards) of vehicles can be accommodate in that area. It randomly changes the availability of parking area because it depends on the type of vehicle present in the parking area and type of vehicle which request for parking area. If the XUV vehicles are more than less number of vehicles can be accommodate in same parking area and if hatchbacks are more than more number of vehicle can be accommodate in the same area. But overall more number of vehicles can be accommodated in same area and that we called as a optimum UTILIZATION of parking area.

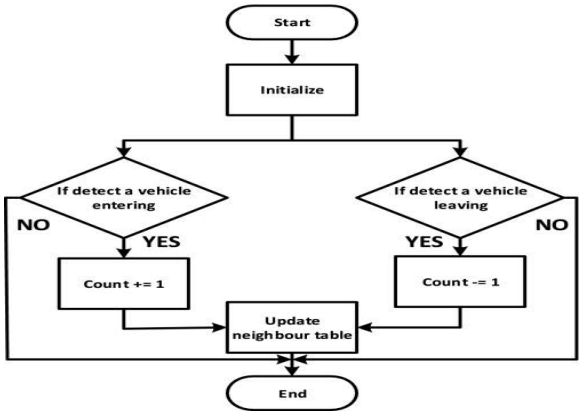

Figure 1. Flow chart of detecting of Entering and Leaving of vehicle in parking area.

Our system achieves better performance compared with other parking systems. We evaluated the performance of our system through simulation and implementation. The results of the simulation are close to our mathematical models and achieve better performance than the other systems. The cost defined here is the time that the user must wait for the service, thus helping users save time and money and reducing environmental pollution.

4. CONCLUSION

This study has proposed a parking system that improves performance by reducing the number of users that fail to find a parking space because more number of vehicles can accommodate in the same parking area just because we properly utilised the parking area. The average waiting time of each car park for service becomes minimal, and the total time of each vehicle in each car park is reduced. In our future study, we will consider the reservation for the physically disabled people to get parking area as soon as possible and that too near to the entry and exit gate.

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