International Journal of Advances in Engineering and Management (IJAEM)
Volume 2, Issue 1, pp: 41-44 www.ijaem.net ISSN: 2395-5252

Smart Car Parking System

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Date of Submission: 01-06-2020 Date of Acceptance: 16-06-2020

ABSTRACT: As World's population is increasing each and every day, also the problem of increasing number of vehicles are increasing either. The places for parking of vehicles are growing scarce. Earlier in old days, traditional parking spots use to suffice the needs of people, but as the parking places are growing small and number of vehicles are increasing, newer ways has to be implemented to deal with the parking problems. Many of the systems implemented now works fine, but in the coming near future, those old ways will not be sufficient in solving and dealing with the parking problems. In the proposed system in this paper, we are introducing a algorithm that will increase the efficiency of current smart parking systems and develop a network based parking system. The Smart Parking System will let the user find a parking spot automatically at the least cost by considering the time of vehicle will be parking and the distance coupling it with free places in the car park. This system will minimize the user waiting time substantially.

KEYWORDS: Smart Parking, Parking System, Parking Algorithm, Dynamic resource allocation, Smart car parking.

I. INTRODUCTION

In the wake of recent and intelligent traffic management system, there is also a need of Smart Parking System which will enable the people with a smart and optimized solution of parking their vehicles without much of waiting time. This Smart Parking System aims at dealing the same problem of parking, waiting queues, and not finding the appropriate parking spaces. This system will also impact the cost cutting measures by reducing the staff of parking spaces. The current common methods of parking systems is tedious and time consuming, people have to search for the parking space and park their vehicles without having any prior information about the number of empty spots in parking places. This traditional system sometimes results in failure of providing the parking spot, also resulting in long queues causing dreadful situations. The alternative is to find a car parking with empty parking space to allot to the person wishing to park the car. However this does not solve the common problem of parking which is the distance between the parking space and the person's destination. In the recent lights and technology, vehicle-to-vehicle and vehicle –to-infrastructure interaction with support of various wireless technologies such as RFID, Zigbee, wireless mess network, and internet are used to implement a stronger solution for bigger parking problems. However, solution offered by the current level of smart parking system are not optimized and often fail to cope with the high rising demand of spaces for parking of the vehicle. This study aims to solve the problem by providing beforehand information about the parking spaces for the driver and to make reservation minutes before heading to parking area with supported devices like Smartphones, Tablets, or PCs.

To solve the problem stumbled upon in the traditional and smart parking system; we propose a system which will bring significant change and development in technology. The Internet of Thing (IoT) has created revolutions in many fields, and will be used in proposed system. In this proposed system, we will construct each car parking lots as an IoT network, and the data that includes the vehicle GPS location, distance between car parking lots, and number of free spots to the data centre. The data centre will act as a cloud server to calculate the cost of parking requests, and these costs will be frequently updated and will be accessible by the vehicle in the network. This system will also include the interaction by Smartphone with the data centre network.

II. SYSTEM OVERVIEW

Our system presented a solution to a very difficult problem faced in day to day life by very commuter which is the issue of parking space. Many people today faces parking problem and not getting proper space for parking their vehicles making it unsafe for their vehicles to park out on

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the roads. This makes the busy roads busier eventually results in traffic jam.

III. IMPLEMENTED SYSTEM

The system we implemented in the paper combines real time reservation with share time reservation, thus a driver was able to reserve a parking spot before heading to parking lot. The driver could reserve the parking space minutes before or even days before the actual parking time of the vehicle. Real Time Reservation was achieved with the dynamic resource allocation similar to skill based routing in call centre. Drivers was notified and allocated with the best parking spots until drivers reached the destination. In case of Share Time Reservation, static resource allocation was used so that parking spot can be reserved by scheduling where driver can explicitly choose preferred resource and time frame which will be occupied in the future.

The concept of advance booking of parking spaces and advance payment methods in order to ensure no-time delay in the process of reserving a parking spot is implemented. Also this system was able to reduce the parking lot staff in huge numbers which aided in saving money thus reducing the cost of managing parking lots easier.

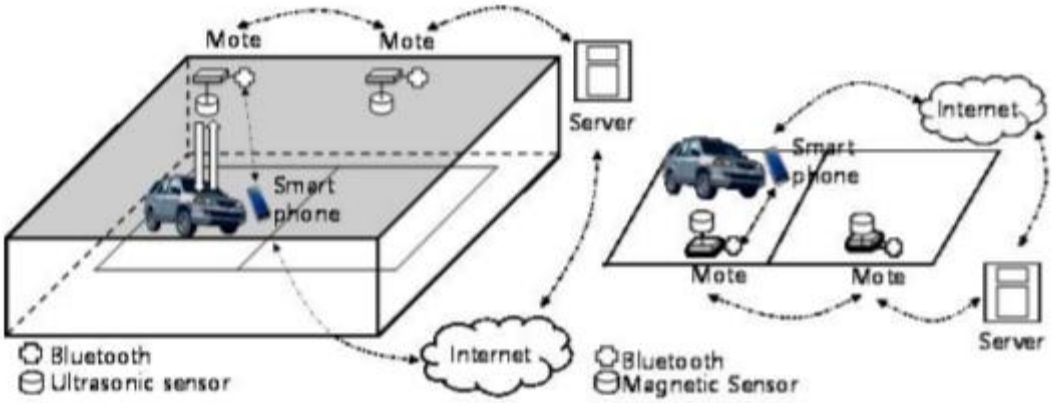

Fig. 1. Indoor and outdoor Parking System.

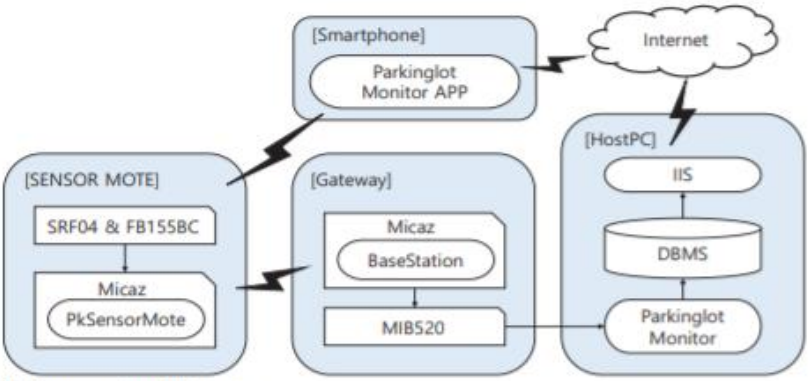

Fig. 2. Software Architecture.

IV. MATHEMATICAL MODELS USED

System S is represented as S= {F, J, R, T, W, C}

A. Set F = {f1, f2, f3 … fn} Where, F is shows as a set of
locations and f1, f2, f3 ….. fn are the number of location of corresponding entity.

B. User Ratings U= {u1, u2, u3 ...un} Where, U is represented as a set of user user location.

C. Location Mining Whiten same city by existing system
Where,
J = {j1,j2,j3 ... jn } where , J is represented as a set of confidence after visiting of right location from

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input and j1, j2 , j3 ….. jn are the number of real ratings for the entity.

E. Dimensions neighbor T= {t1, t2, t3,..tn} Where, T is stands for as a set of nearest nebular and t1, t2, t3 ....tn is number of neighbor.

F. Dimensions Weight: W= w1, w2, w3, wn Where, W is
representing as a set of Dimensions Weights and w1, w2, w3 … wn are number of weights of a entity.

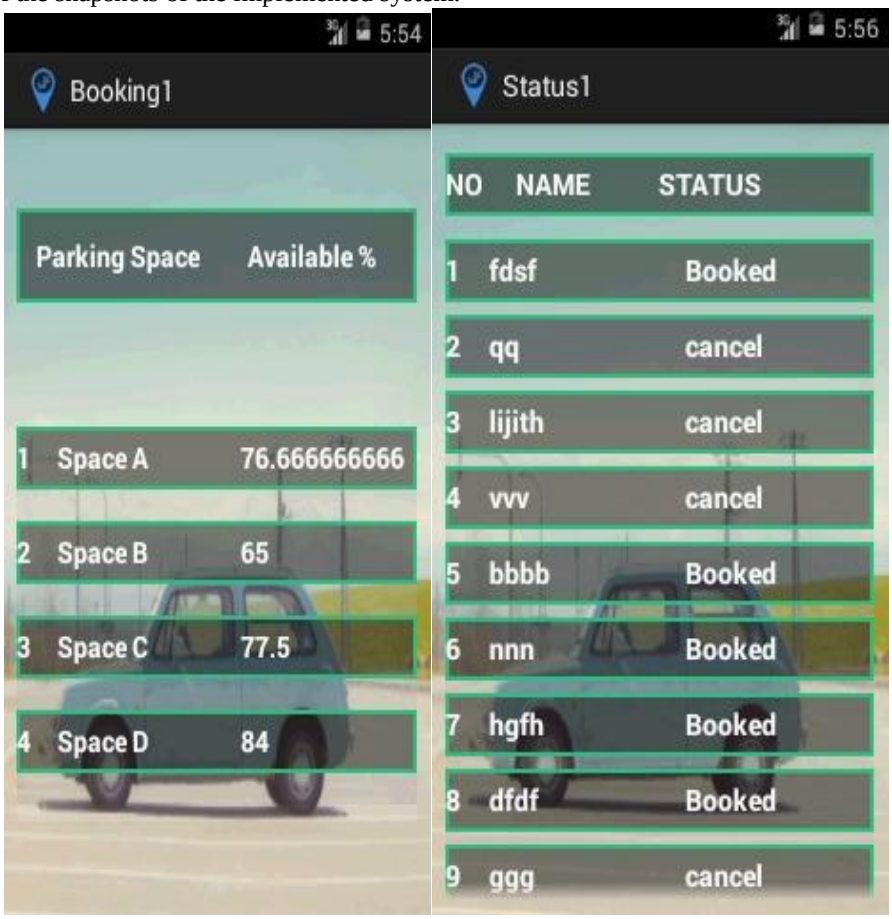
G. User Location Dimension Weight X= {x1, x2, x3 ...xn}
Where, X represents the set of Parking location Dimension Weight and x1, x2, x3 ...xn are the number of weight of overall user location.

F. Overall Trust Evaluation by confidence for find nearest neighbor.
C=∑ m
d=1 td * wd
Where, C - Overall Trust Score td-trust scope for dimension
d=(1m)
wd-weight for dimension d=(1m).

I. Overall Location distance Score Os=C+X/2
where, Os=Overall parking location C= Overall user location
X= parking location Dimension Weight as compare to other parkings.

V. RESULTS AND EVALUATION

Here are few of the snapshots of the implemented system.



As we can see the parking spots has been allotted to the drivers who has made a reservation for the spot. This implementation not only reduced the parking space problem in the testing parking lot, but helped it managing it 60% easier. The manual handling of space was reduced and had a huge impact on how the space is managed, which aided is smooth flow of cars. This system can be implemented in all sorts of parking spaces, making it a flexible system for all the parking lots.

VI. FUTURE IMPLEMENTATIONS

In the future work we will propose a dynamic smart parking architecture based on multi agent systems. Our system will be divided to different process:

• Communication module: It will concern the request send by the driver to the system.

• Coordination module: at this level we find agents which have the role of displaying information to the user in a suitable manner taking into account constraints of the device.

• Processing module: the main role of this module is the processing of different queries sent by the user e.g.: reservation, payment, check-in, check-out, etc.

• Data module: it contains data of the parking saved on real time.

The contribution of our system will concern the data analysis process which is the node of our system.For that reason we will use different modern techniques such as Expert Systems and SMA. We should integrate the two different technologies together in order to achieve a system which is the most

efficient, reliable, secure and inexpensive. Expert systems have a lot of attractive features:

• Increased availability.
• Reduced cost
• Reduced danger
• Permanence
• Increased reliability
• Explanation
• Fast and complete response at all times
• Intelligent Database
• Multiple expertise.

VII. CONCLUSION

As we have seen in the above figures and pictures, the system we have implemented has affected parking reservations in positive way and has the potential to make it better. We have made the system from small parking lots to big parking lots and have observed effective results. This system has a lot of uses in tight spaces and in big cities where parking always creates problems and creates chaotic situations. Our system have improved the parking lot management by 60% and without much human intervention all the users have managed to reserve their parking space effectively.

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Smita Awagan, et. al. "Smart Car Parking System." *International Journal of Advances in Engineering and Management (IJAEM)*, 2(1), 2020, pp. 41-44.

International Journal of Advances in Engineering and Management
ISSN: 2395-5252

IJAEM

Volume: 02 Issue: 01 DOI: 10.35629/5252

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