IoT Based Smart Parking System

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Abstract- *This paper introduces the concept of using IoT and RFID Tag based technology in automobile parking services in cities. A high-level view of the projected system is outlined. Our answer makes the older parking system smarter by leveraging the facility of IoT and embedding it with the newest innovation of electronic sensors computers. AN IoT-based intelligent automobile parking system is described. In this paper proposed system that helps users automatically check free car parking slots at the smallest amount of time. Supported new performance metrics to calculate the user-parking Cost by considering the gap and also the total number of free places in every parking area. This cost will be used to offer a solution of adding an available parking space upon a request by the user and a solution of suggesting a new car park if the current car park is full. The simulation results show that the algorithm helps improve the probability of successful parking and minimizes the user waiting time.*

Keywords- Smart Parking, Smart Cities, WIFI technology, MX232, IR Sensor, RFID Tag.

1. INTRODUCTION

The project aim to solve the problem of current parking system. The present study proposes and develops an effective RFID-based Smart Parking System (SPS) solution based on the Internet of Things. The Smart Parking System (SPS) is based on several innovative technologies and can automatically monitor and manage car parks.

The main motivation of this project is to reduce the traffic congestion that occurs in and around the urban areas which is caused by vehicles searching for parking. In the newspapers, we can able to see many articles regarding the parking problem all over India like Pune, Delhi, Mumbai, Chennai, Bangalore and many metropolitan cities. Growing population has created many problems; parking problem is one of the big problems in our day-to-day life.

Currently, the common method of finding a parking space is manual where the driver usually finds a space in the street through luck and experience. This process takes time and effort and may lead to the worst case of failing to find any parking space. However, this is not an optimal solution because the car park could usually be far away from the user destination. So we design mobile application to help users to find the free parking space and design pc application to manage the entire parking slot.

Goal and Objectives

- The main objective of this project is to build a prototype of smart car parking system To get started with IoT-based Smart parking system using RFID.
- Create Parking Management Program.
- Navigate the parking area and shortest distance.

2. RELATED WORK

In some studies [1] [3], 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 of offline problem. Second, they set up a mathematical model describing the of offline problem as a linear problem. Third, they designed an algorithm to solve this linear problem. Finally, they evaluated the proposed algorithm using experimental simulations of the system. The experimental results indicated timely and efficient performance. However, these papers do not mention the resource reservation mechanism (all parking requirements are derived immediately and are placed in the queue), the mechanism for assessing the resources system, the mechanism to guide vehicles to the parking space, the mechanism for handling situations when the request for service is denied and do not calculate the average waiting time and average total time that each vehicle spends on the system.

In another study [4], 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. The results of this paper only implement the proposed architecture; they do not mention the performance of the parking system.

C. W. Hsu [5] proposed an innovative system including the parking guidance service. A parking space can be reserved by a smartphone 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 DSRC. In this paper, the authors have not evaluated the performance of the parking services, they do not provide any mathematical model of the system, and do not consider the waiting time of each vehicle for service.

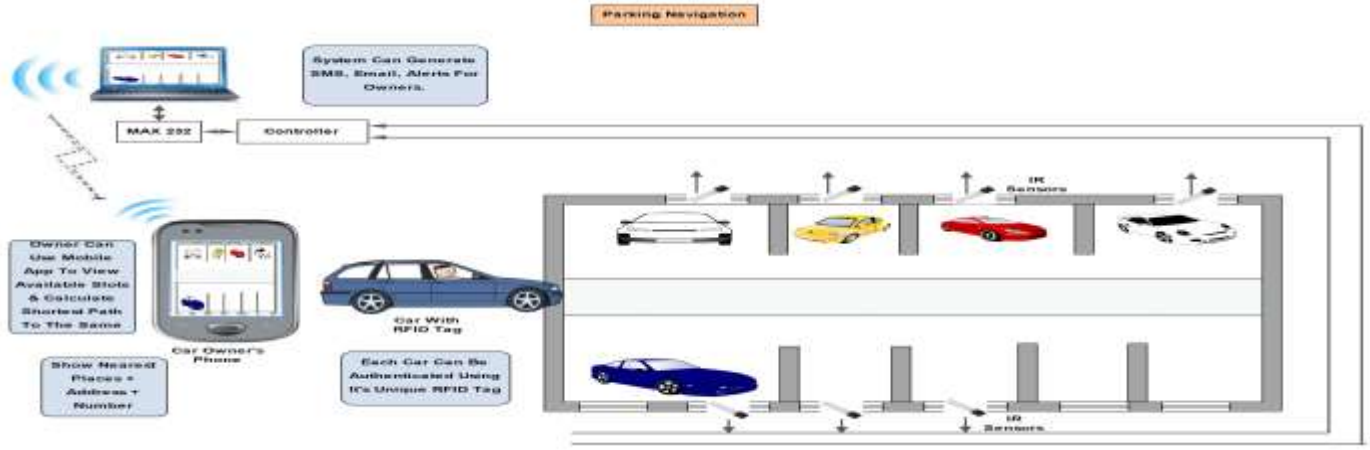

Fig 1: Architecture Block diagram

Other researchers have designed architecture for parking management in smart cities [6]. They proposed intelligent parking assistant (IPA) architecture aimed at overcoming current public parking management solutions. This architecture provides drivers with information about on-street parking stall availability and allow drivers to reserve the most convenient parking stall at their destination before their departure. They use RFID technology in this system. When a car parks or leaves the IPA parking spot, the RFID reader and the magnetic loop detect the action and send this information to the unit controller to update the information on the car park status. This study uses only some simple mathematical equations for the system architecture and does not create a large-scale parking system. In other works, authors have designed and implemented an SPS [7] to solve the parking problem. A part of this system is implemented in the Zigbee network, which sends urgent information to a PC through a coordinator and then updates the database. The application layer can quickly pass the parking information over the Internet, and use the advantages of a web service to gather all the scattered parking information for the convenience of those who want to and a parking space. This paper simply reports the design and implementation of an SPS and does not evaluate the system performance.

3.PROPOSED SYSTEM.

Proposed system helps users automatically find free car-parking zone at the smallest amount of time. Supported new performance metrics to calculate the user parking cost by considering the gap (Time) and also the total range of free places in every parking area. This cost are going to be accustomed provide associate degree of adding an on the market car parking zone upon asking by the user and an answer of suggesting a brand new parking area if the present or notify user if parking area is full.

The system we are proposing here is a RFID based digital parking management system that removes the use of manual labour thus eliminating any kind of manual error which used to occur in the earlier parking systems implemented. We proposed new system that helps to user find (view) free parking slot and shortest path of the same. Therefor we can park car in lesss amount of time. Each car can be authenticated using its unique RFID tag. Entry-point and exit-point of the parking-lots will be under control with IR sensor and MAX 232 controler. Entry-point and exit-point will be handled in a fast manner without having to stop the cars so that traffic jam problem will be avoided during these processes. Parking cost calculated hourly basis.

4. METHODOLOGIES

4.1 ALGORITHMS

DIJKSTRA'S ALGORITHM

Step 0: Temporarily assign C (A) = 0 and C (x) = infinity for all other x.

C (A) means the Cost of AC (x) means the current cost of getting to node x.

Step 1: Find the node x with the smallest temporary value of c (x). If there are no temporary nodes or if c (x) = infinity, then stop. Node x is now labeled as permanent. Node x is now labeled as the current node. C (x) and parent of x will not change again.

Step 2: For each temporary node labeled vertex y adjacent to x, make the following comparison:

If c (x) +Wxy < c (y),

Then c (y) is changed to C (x) + Wxy assign y to have parent x.

Step 3: Return to step 1.

SHA1 ALGORITHM (FOR PASSWORD SECURITY)

Step 0: Initialize some variables
Step 1: Pick a string
Step 2: Break it into characters
Step 3: Convert characters to ASCII codes
Step 4: Convert numbers into binary
Step 5: Add '1' to the end
Step 6: Append '0's' to the end in this step you add zeros to the end until the length of the message is congruent to 448 mod 512.
Step 6.1: Append original message length

Step 7: 'Chunk' the message we will now break the message up into 512 bit chunks.
Step 8: Break the 'Chunk' into 'Words' break each chunk up into six- teen 32-bit words
Step 9: 'Extend' into 80 words this is the first sub step. Each chunk will be put through a little function that will create 80 words from the 16 current ones. This step is a loop. What that means is that every step after this will be repeated until a certain condition is true.
Step 9.1: XOR We begin by selecting four of the current words in loop.
Step 9.2: Left rotate Perform a carry through left bit rotation by a factor of one after step nine is complete we will now have 80 words
Step 10: Initialize some variables set the letters A–E equal to the variables h0–h4.
Step 11: The main loop will be run once for each word in succession.
Step 11.1: Four choices depending on what number word is being input, one of four functions will be run on it.
Step 11.2: Put them together After completing one of the four functions above, each variable will move on to this step before restarting the loop with the next word.
Step 12: The end once the main loop has finished there is very little left to do. If these variables are longer than 32 bits they should be truncated. If the original message took more than one 'chunk' to represent, the result from
Step 11 for each chunk will be added together here.
OUTCOME

The outcome of the proposed optimization sets can be considered as design steps of an efficient friendly parking lot of SPS. The results indicate a reduction in real power losses and improvement in the parking profile through the smart Parking. They also show the competence of the utilized system making intelligent time-dependent decisions in off-peak and on-peak times for smart parking lots.

5. CONCLUSION

This study has proposed a parking system that improves performance by reducing the number of users that fail to find parking slot and minimizes the cost of moving to the parking space. Our projected architecture and system has been with success simulated and implemented in a real situation. The results show that our algorithm significantly reduces the common waiting time of users for parking. Our results closely agree with those of our proposed mathematical models. The simulation of our system achieved the optimal solution once most of the vehicles with success found a free car-parking zone.

REFERENCES

[1] Y. Geng and C. G. Cassandras, ``A new `smart parking' system based on optimal resource allocation and reservations," in Proc. 14th Int. IEEE Conf. Intell. Transp. Syst. (ITSC), Oct. 2011, pp. 979 984.

[2] Y. Geng and C. G. Cassandras, ``New `smart parking' system based on resource allocation and reservations," IEEE Trans. Intell. Transp. Syst., vol. 14, no. 3, pp. 1129 1139, Sep. 2013.

[3] X. Zhao, K. Zhao, and F. Hai, ``An algorithm of parking planning for smart parking system," in Proc. 11th World Congr. Intell. Control Autom. (WCICA), 2014, pp. 4965 4969.

[4] L. Mainetti, L. Palano, L. Patrono, M. L. Stefanizzi, and R. Vergallo, ``Integration of RFID and WSN technologies in a smart parking system," in Proc. 22nd Int. Conf. Softw., Telecommun. Comput. Netw. (SoftCOM), 2014, pp. 104 110.

[5] C. W. Hsu, M. H. Shih, H. Y. Huang, Y. C. Shiue, and S. C. Huang, ``Veri cation of smart guiding system to search for parking space via DSRC communication," in Proc. 12th Int. Conf. ITS Telecommun. (ITST), 2012, pp. 77 81.

[6] R. E. Barone, T. Giuffrè, S. M. Siniscalchi, M. A. Morgano, and G.Tesoriere, ``Architecture for parking management in smart cities," IET Intell. Transp. Syst., vol. 8, no. 5, pp. 445 452, 2014.

[7] C. Shiyao, W. Ming, L. Chen, and R. Na, ``The research and imple-ment of the intelligent parking reservation management system based on ZigBee technology," in Proc. 6th Int. Conf. Meas. Technol. Mechatronics Autom. (ICMTMA), 2014, pp. 741 744.

[8] D. J. Bonde, R. S. Shende, K. S. Gaikwad, A. S. Kedari, and A. U. Bhokre, ``Automated car parking system commanded by Android application," in Proc. Int. Conf. Comput. Commun. Inform. (ICCCI), 2014, pp. 1 4.