

IoT Based Vehicle Parking Manager

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Abstract

One of the important considerations of being a smart city is the Smart Parking facility. Finding a particular space to park our vehicle becomes an annoying issue. Besides, number of vehicles in like manner rapidly grows once every day. It has been seen that the drivers struggle to find a halting extent without thinking about where parking space is open. The aim of this paper is to propose a design of an Automated vehicle Parking System commanded by an internet of things that regulates the number of vehicles to be parked on designated parking area by automating the Parking and Un-parking of the vehicle with the help of Commands of a server webpage. Our system aims to reduce the human intervention to the minimal by automating the process of car parking. This in turn would prove to be useful in reducing the time required for search of free parking space by manually driving through multiple slots.

I. INTRODUCTION

Variety of occasions turn up when we visit various public places like Shopping malls, 5-star and 7-star hotels, multiplex cinema halls, etc. The difficulty we encounter at these places is finding the availability of parking space. Most of the times we need to traverse through multiple parking slots to find a free space for

parking. The problem becomes more tedious if the parking are multi-stored. Thus the problem is time-consuming [1]. This situation calls for the need for an automated parking system that not only regulates parking in a given area but also keeps the manual intervention to a minimum. Our proposed system presents an Autonomous car parking that regulates the number of cars that can be parked in a given space at any given time based on the parking space availability [2]. According to a report, Smart Parking system could benefit in saving 2, 20,000 gallons of gas till 2030 and 3, 00,000 gallons of gas by 2050, if it is executed perfectly. In order to alleviate this condition, many smart parking facilities evolved but failed to bring relief to all. They could only give the parking information but didn't prove to "smart" enough. Thus this system proves to be useful for the purpose of the car parking automation and thereby helps reduce the car driver's time, as the searching of the free parking space is handled by the Parking Control Unit [3]. There is a lot of fuel and time wasted by countless commuters to find for a place for parking. This became our main motivation to develop a system where commuters can get parking information on finger tips, because time saved is time earned.

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Here, we propose an idea to realize Smart Parking structure in perspective of reservation using Internet of Things (IoT). The wonder of Internet of Things is inter-communication using the Internet where server ranches could assemble the data and look at and control anything. The two magnificent words in IoT are “Internet” and “Things”. The Internet is the vast global network of connected servers, computers, tablets and mobiles using the internationally used protocols and connecting systems [4]. Things could be commonly said as any possession or object. The machine-to-machine (M2M) data that is generated has a wide range of uses, but it is specifically seen for Smart Parking here.

II. LITERATURE REVIEW

Various methods are prevalent for development of autonomous or intelligent parking systems. Study of these systems shows that these require a little or more human intervention for the functioning. One of the intelligent systems for car parking has been proposed by making use of Image processing [5]. In this system, a brown rounded image on the parking slot is captured and processed to detect the free parking slot. The information about the currently available parking slots is displayed on the 7-segment display. Initially, the image of parking slots with brown-rounded image is taken. The image is segmented to create binary images. The noise is removed from this image and the object boundaries are traced. The image detection module determines which objects are round, by estimating each object’s area and perimeter. Accordingly, the free parking space is allocated. A vision based car parking system [6] is developed which uses two types of images (positive and negative) to detect free parking slot. In this method, the object classifier detects the required object within the input. Positive images contain the images of cars from various angles. Negative images do not contain any cars in them. The co-ordinates of parking lots specified are used as input to detect the presence of cars in the region. Haar-like features are used for feature detection. However, limitations may occur with this system with respect to the type of camera used. Also, the co-ordinate system used selects specific parking locations and thus camera has to be at a fixed location. Limited set of

positive and negative images may impose limitations on the system. Number Plate Recognition technique [7] for developing autonomous car parking system uses image processing basis to process the number plates of the vehicles. In this system, the image of the license number plate of the vehicle is acquired. It is further segmented to obtain individual characters in the number plate. Ultrasonic sensors are used to detect free parking slots. Then the images of number plate are taken and analyzed. Simultaneously, the current timing is noted so as to calculate the parking fees. The LCD displays „FULL“ sign to indicate that a parking lot is not available. However some limitations with the system include background colour being compulsorily black and character colour white. Also, analysis is limited to number plates with just one row. Smart Parking system [8] designed proposed a mechanical model with an image processing facility. The car would be parked with the use of lift at multiple levels. Also, image processing is used to capture the number plate and store in database for comparison to avoid illegal car entry. Thus, we aim to propose a car parking system that represents a fully automated model with minimum human intervention and overcome the limitations of existing systems.

III. OBJECTIVE OF PROJECT

The main objective of this project is to design a solution for overcoming the parking issues that exist in public places such as malls multiplexes etc. especially on weekends. The aim is to achieve this by using the concept of Internet of Things (IoT), wherein a server webpage is created, where details are constantly updated by the hardware/server at the location. The features include unique identification for each vehicle, display of available parking slots on the mobile platform, possibility of making reservations for the same, maintenance of a database (for the management).

IV. EXISTING METHOD

In earlier systems presence of a system was necessary for management of parking slots i.e for checking available parking slots, occupied parking slots, allotment of slots for new coming vehicles etc. As this is done manually this may sometimes be erroneous and time consuming

process. There are many problems faced by the customers. Some of them had to wait for a long time for the allotment of slots, when parking traffic increases manifold. This may increase outside traffic as well. The other problem is no proper charges. Details of number of vehicles entering and leaving the parking place may or may not be available with the parking staff. This causes inconvenience to the customers as well as staff managing the system.

V. PROPOSED METHOD

The system will require a Raspberry Pi with various IR sensors attached to it. The IR sensors will determine the parking status. The operating system of the raspberry Pi is Raspbian and to see the status of the parking in the parking lot we use the display unit for monitoring and remote server page. The parking lot setup (Raspberry Pi and IR sensor) will be accessible to the server over Internet of things. The server webpage will be used by users to check the parking status on their cell phones, and hence it will be the User interface of our project. The Raspberry Pi is interfaced with the IR sensors to determine the parking status will be the hardware setup of the project. Hence the raspberry pi becomes the hardware module of the system.

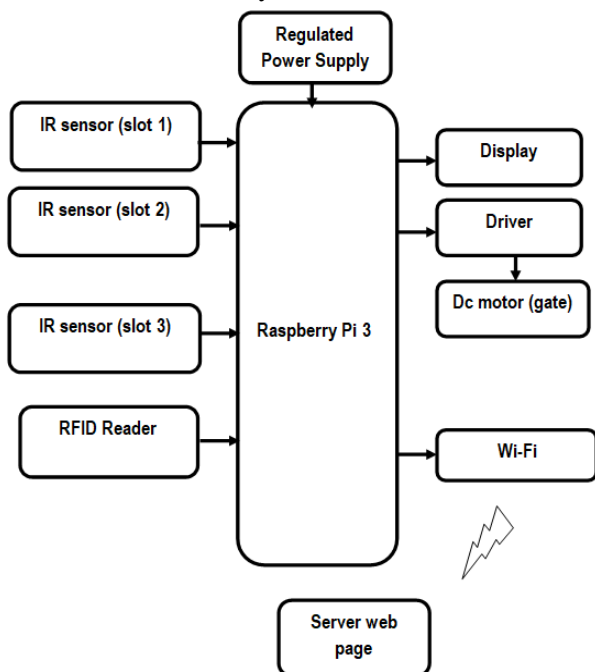


Fig.1: Proposed block diagram

VI. EXPERIMENTAL PROCEDURE

This system needs internet webpage with three slot buttons and boxes.

This system will be running in two modes manual and online

In manual when vehicle reads to the parking place then system reads through RFID reader and deduct some amount from the RFID tag of particular vehicle.

Then the door is opened using dc motor to park the vehicle.

Then the Display is connected at parking area which shows which slot is empty which is detected by using IR sensor.

When a vehicle parks at certain slot that information is updated in display as well as in server page.

In online, initially when user wants to book a slot which is empty then he/she can simply click on that button to book. Then later he/she can park the vehicle as in manual process.

VII. RESULTS AND DISCUSSIONS

After assembling our system, the reading of the sensors has been checked. We have tested the system response in different situations. The sensor reading, auto snapping and sending that information, authentication and current status of the place are displayed using hardware setup as shown in fig.2.

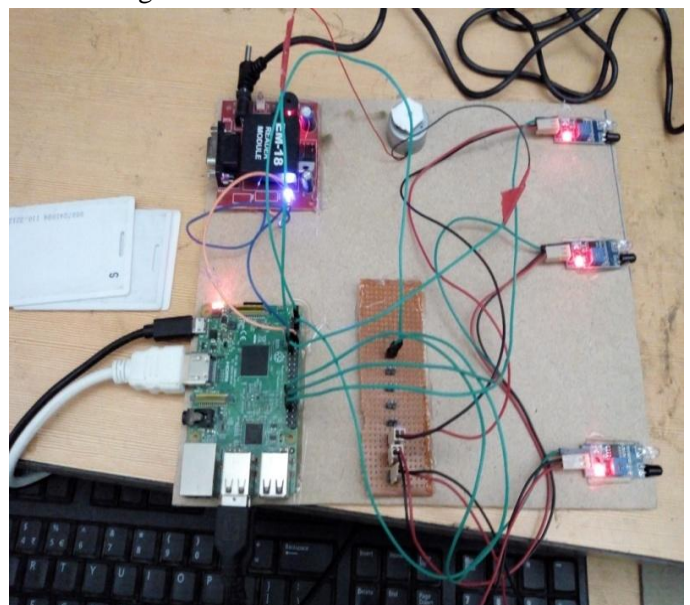


Fig.2: Experimental hardware setup

This system defines the solutions for parking issues using wireless and automation techniques. The display unit is connected at the parking area to show the status of slots before entering into it as shown in fig.3.

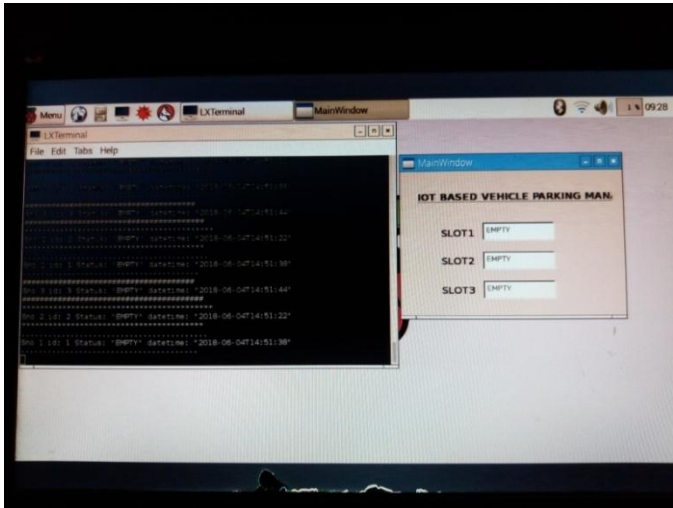


Fig.3: Display unit showing the status of the slots

An IoT web server is used to make the parking facility even more efficient. By visiting this server, a person can check the status and book a slot from anywhere. A web page is created to indicate the information about parking slots is shown in fig.4.

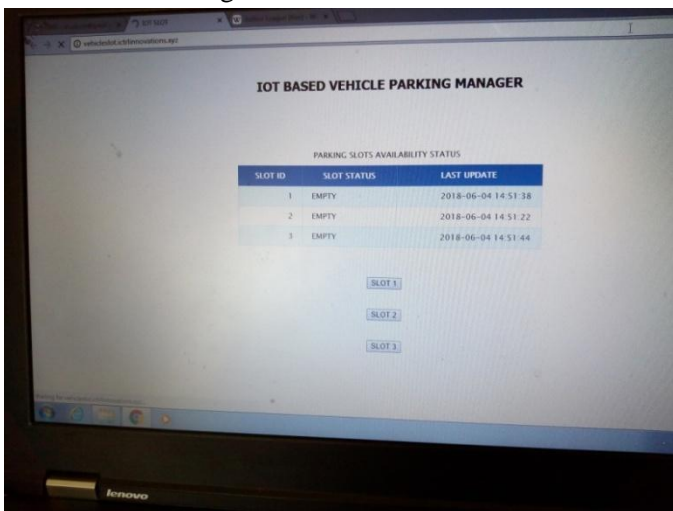


Fig.4: Web server for parking management

When the vehicle reaches near the entrance gate of the parking space, the system will automatically reads the vehicle and makes parking charge transaction which allows the vehicle to enter into the parking area.



Fig.5: Vehicle parking charge deduction

The below figure shows when the vehicles have occupied the slots by using IR sensors for three different slots.

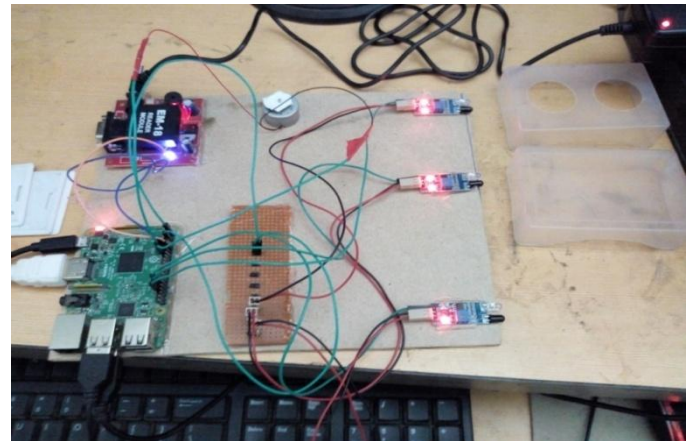
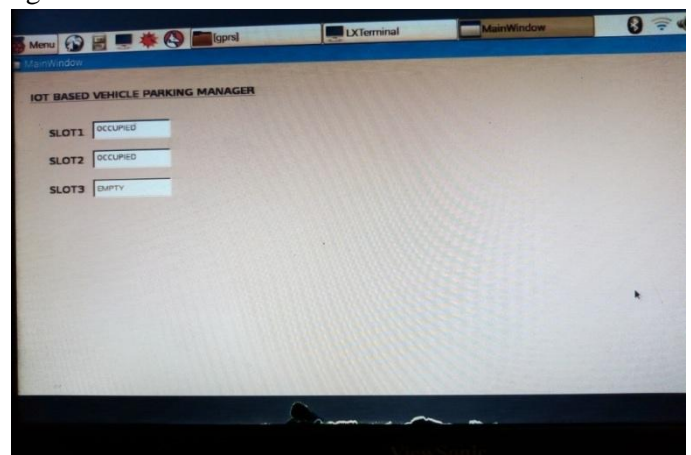


Fig.6: Parking slots occupied by the vehicles

At the parking side, the display unit shows the current status of the vehicles available which is shown in the fig.7.



As this system is implemented mainly to book a slot online where the person can reserve the parking slot before he/she reaches the place as indicated in fig.8.

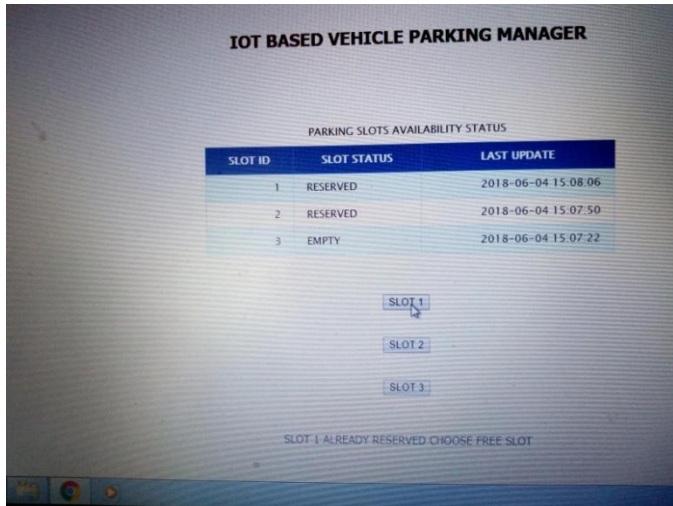


Fig.8: Web page showing the booking procedure of parking slots.

VIII. CONCLUSION

Internet of Things stands out to be the indispensable technology implemented along with Cloud Computing. To be a smart city, Smart Parking facility is an essential service. Previous technologies were exploited which proved to be either not efficient or too expensive. The sensors used to detect the vehicle are the essential components. Here, we have employed Raspberry-pi which seemed to be cost efficient with easy installation and maintenance. The components used for the implementation of the system provide efficient output at various stages of implementation. The interfaces established between various components provide an effective communication across the overall working of the system. Thus, the system functioning is efficient and is recommended for commercial implementation.

IX. FUTURE SCOPE

We infer that our future work would facilitate parking issues and decrease traffic congestion and pollution created by the search for parking. System can be extended to multi-level and multiple parking areas by making potential changes in the hardware setup. SMS sent through Android Application can be made secure by

applying encryption algorithms. Also, for security purpose, Login facility can be provided to the users.

REFERENCES

- [1]. A Reservation-based Smart Parking System, The First International Workshop on Cyber-Physical Networking Systems, 2011
- [2]. Smart Parking Assist System using Internet of Things (IoT), International Journal of Control Theory and Applications, Volume 9-Number 40,2016
- [3]. Automated Vehicle Parking System using RFID, ITSI Transactions on Electrical and Electronics Engineering (ITSI-TEEE), Volume -1, Issue -2, 2013
- [4]. R. Yusnita Fariza Norbaya Norazwinawati Bashruddin. "Intelligent parking space detection system based on image processing". International Journal of Innovation, Management and Technology, 3:232-235, 2012.
- [5]. Hamada R.H. Al-Absi Patrick Sebastian Justin Dinesh Daniel Devaraj Yap Vooi Voon. "Vision-based automated parking system." 10th International Conference on Information Science, Signal Processing and their Applications (ISSPA 2010) 2010.
- [6]. M.M. Rashid A.Musa M.Ataur Rehman N.Farhana A.Farhana. "Automatic parking management system and parking fee collection based on number plate recognition." International Journal of Machine Learning and Computing, 2:93- 98, 2012.
- [7]. M.O. Reze M.F. Ismail A.A. Rokoni M.A.R. Sarkar. "Smart parking system with image processing facility". I.J. Intelligent Systems and Applications, 3:41-47, 2012.
- [8]. Amba James Garba Adamu Murtala Zungeru, Adamu Murtala Zungeru. "Design and implementation of a short message service based remote controller". Computer Engineering and Intelligent Systems, 3:106-119, 2012.