



# Smart Parking Detection System using IOT

Pooja Roy, Amit Raj, Anirudh Mathur, Rajani katiyar, Usha Rani

**Abstract -** With the increase in vehicle production and world population, more and more parking spaces and facilities are required. In this paper a new parking system called Smart Parking detection System is proposed to assist drivers in a residential building or office where all the owners or employee will be allotted with a particular parking space to know the occupancy of the parking space if any wrong car is parked in their slot. The new system uses infrared sensors to detect either car park occupancy or improper parking actions. Features of smart parking detection system include detection of car occupancy in a parking slot, getting information of the parked vehicle if it doesn't matches with the car number registered and notify the details of the car parked by sending message to a registered phone number. This paper also describes the use of a metal rack to protect the sensors from external damage.

**Keywords:** vehicle, slot, parking.

## I. INTRODUCTION

Most of the current existing car parking systems in various premises like offices residential housing, universities, etc have a reserved parking slot system in which various people are assigned a particular reserved parking slot. This reservation system is however manually managed and a little inefficient. A wrongful car parking in a reserved parking slot could result in massive inconvenience to user. Hence results in time being wasted in searching for the available parking spaces. This problem usually occurs in urban areas, or in premises with events where number of vehicles is higher as compared to the availability of parking spaces. Hence, a system can easily be deployed by the authorities to have a surveillance over the vehicles parked in a reserved parking slot. And being alerted if a wrong vehicle is parked. The system mainly consists of two sections: Detection of availability of parking slot using IR sensors, and the number plate identification using image processing. The IR sensors work through acrylic sheet while also calculating distance of the vehicle from the sensor hence can be easily sealed and can be used in real life systems that have environment constraints such as rain which could damage the ultrasonic sensors that are normally deployed for object detection. The IR sensor triggers the camera to take a picture to verify if the vehicle present is the correct one and hence sends notification to the user, when car is parked while also alerting user and authorities if any wrong vehicle is parked.

Revised Manuscript Received on June 30, 2020.

**Pooja Roy\***, Student, Department of Electronic and Communication, R.V. College of Engineering, Bengaluru, Karnataka,  
**Amit Raj**, Student, Department of Electronic and Communication, R.V. College of Engineering, Bengaluru, Karnataka,  
**Anirudh Mathur**, Student, Department of Electronic and Communication, R.V. College of Engineering, Bengaluru, Karnataka,  
**Mrs. Rajani katiyar**, Assistant Professor, Department of Electronic and Communication, R.V. College of Engineering, Bengaluru, Karnataka, India country  
**Dr.Usha Rani**, Associate Professor, Department of Electronic and Communication, R.V. College of Engineering, Bengaluru, Karnataka, India country

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

## II. STATEMENT OF PARKING LOT PROBLEM

### Difficulty in Finding Vacant Spaces

Sometimes it is problematic for the user to find free parking lot if the allotted slot is already taken. It effects the user because of the time and system energy it takes to find a free space for parking.

### Improper Parking

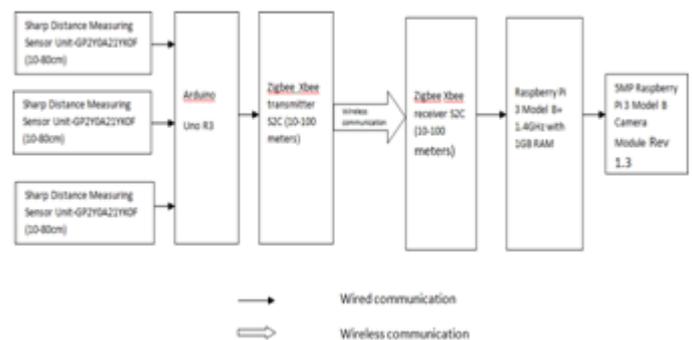
If a car is parked in such a way that it occupies two parking slots rather than one, this is called improper parking. Sometimes improper parking occurs when a driver parks on or a bit outside of the lines of a parking space.



Fig 1: Improper Parking

## III. METHODOLOGY

The proposed project is divided into two parts: transmitter and receiver. The transmitter part consist of arduino uno, three sharp distance measuring sensors unit 10-80 cm-GP2Y0A21YK0F, Zigbee Xbee Module S2C (10-100 meters). The receiver is consist of Raspberry Pi 3 Model B+ 1.4GHz with 1GB RAM and a 5MP Raspberry Pi 3 Model B Camera Module Rev 1.3.

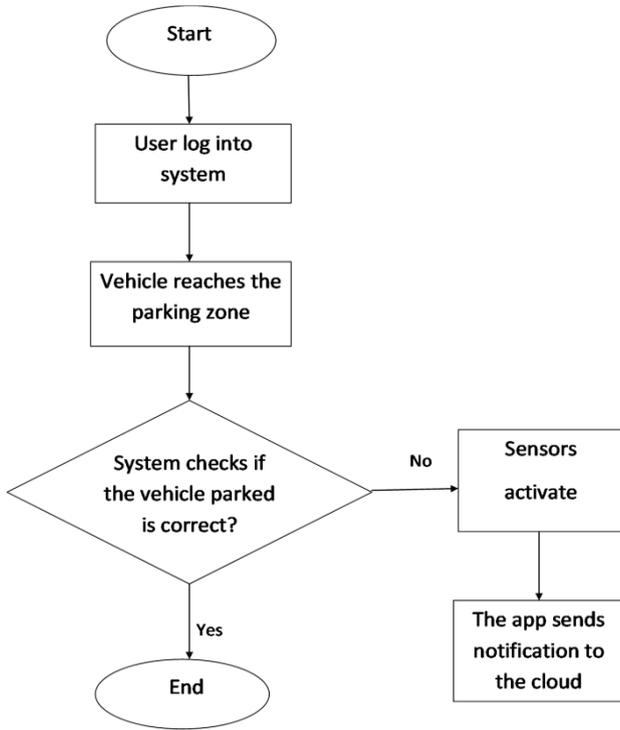


Block Diagram 1: Smart parking detection system using IOT

In the system designed, three sharp distance measuring sensors will be deployed in the parking slot under a metal rack which is supported by a spring system. The metal rack will protect the sensors from heavy weight of the car. If any car enters, all the three sensors will be activated which in turn is connected to the arduino Uno.



Arduino uno is connected to the zigbee module which will send message to the raspberry pi wirelessly which in turn will activate the pi camera. Pi camera will capture the picture of the number plate and compare it with the plate number already stored in the database. If the plate number doesn't match, it will send message to a registered number.



**Flow Chart 1: Data flow of the working of smart detection system using IOT**

## IV. CHALLENGES

In smart car parking systems there are several problems related to the setup of incoming parking sensor info, which involves filtering and data fusion. Data fusion approaches allow for the collection of information by segregating sensor data from multiple sources. Data filtering is needed to minimize the data received through the network as far as possible. Nevertheless, problems often exist as to when and how to conduct data fusion or filtering. Data analysis is deemed essential at network level, since the unrequired and private data should not be transmitted across the network. Data can not be transmitted to the cloud in the continuously produced unused sensors which is not cost effective. Another issue is to formulate the techniques of machine learning and will help to solve the knowledge obtained. Nonetheless, it is crucial to insure that both sides have a good real-time interface and prevent errors as far as is possible.

## V. RELATED WORK

Throughout the past several parking structures were installed. It is evident that car parking schemes introduced in developing nations are carried out utilizing the sophisticated techniques described in the parking lot. This section discusses specific research undertaken on the smart parking program. Some studies of car parking systems are operated by sensors which normally processed the query pointing to an empty parking slot. Related factors have also been found and may contribute to additional traffic problems as there are several parking spaces to utilize.

## VI. CONCLUSION AND FUTURE WORK

This work has implemented a smart parking network that enhances the appropriateness of saving users time to locate a convenient parking spot and decreases the whole capital needed to redirect to designated parking spot. The apparently given result arising from this study is that it has recommended a smart car parking device that would that the details received across the network. Reduces control in the framework of thought, too. Although the consumer time is decreased in the application layer, traffic congestion is ignored, usable parking slots are checked and the vehicle air ejection is managed by drivers. We demonstrated the specialized field methodology and the techniques it needs. Also, daily improvement and research on the other queries is continuing, based on the papers shown, and will be featured in forthcoming articles. The future research will include carrying out the recommended procedure on a broader scale in the original world and running a check to validate the findings. Finally, the next move will be to develop an interface for users to check and let them know about limited parking spaces via this interface.

## REFERENCES

1. A. Chatterjee, S. Manna, A. Rahaman, A. R. Sarkar, A. Ghosh and A. A. Ansari, "An Automated RFID Based Car Parking System," 2019 International Conference on Opto-Electronics and Applied Optics (Optronix), Kolkata, India, 2019
2. W. Alsafery, B. Alturki, S. Reiff-Marganec and K. Jambi, "Smart Car Parking System Solution for the Internet of Things in Smart Cities," 2018 1st International Conference on Computer Applications & Information Security (ICCAIS), Riyadh, 2018
3. A. Menon and B. Omman, "Detection and Recognition of Multiple License Plate From Still Images," 2018 International Conference on Circuits and Systems in Digital Enterprise Technology (ICCSDET), Kottayam, India, 2018 Smart Parking Detection System using IOT Department of Electronics and Communication Engineering 2019-2020
4. Tejas K., Ashok Reddy K., Pradeep Reddy D., Bharath K.P., Karthik R., Rajesh Kumar M. "Efficient License Plate Recognition System with Smarter Interpretation Through IoT," 2018 Soft Computing for Problem Solving. Advances in Intelligent Systems and Computing, vol 817. Springer, Singapore
5. C. Lin and C. Wu, "A Lightweight, High-Performance Multi-Angle License Plate Recognition Model," 2019 International Conference on Advanced Mechatronic Systems (ICAMEchS), Kusatsu, Shiga, Japan, 2019
6. C. Lin and Y. Li, "A License Plate Recognition System for Severe Tilt Angles Using Mask R-CNN," 2019 International Conference on Advanced Mechatronic Systems (ICAMEchS), Kusatsu, Shiga, Japan, 2019, pp. 229-234.
7. K. Hassoune, W. Dachry, F. Moutaouakkil and H. Medromi, "Smart parking systems: A survey," 2018 13th International Conference on Intelligent Systems: Theories and Applications (SITA), Mohammedia, 2018
8. R. K. Kodali, K. Y. Borra, S. S. G. N. and H. J. Domma, "An IoT Based Smart Parking System Using LoRa," 2018 International Conference on Cyber-Enabled Distributed Computing and Knowledge Discovery (CyberC), Zhengzhou, China, 2018
9. M. Paker, "Comparison of Tensorflow Object Detection Networks for Licence Plate Localization," 2019 1st Global Power, Energy and Communication Conference (GPECOM), Nevsehir, Turkey, 2019
10. P. Wan and M. Uehara, "Spam Detection Using Sobel Operators and OCR," 2012 26th International Conference on Advanced Information Networking and Applications Workshops, Fukuoka, 2012, pp. 1017-1022.

14. M. Yang, Z. Yao and X. Li, "Structure design of hinged beam type clamp for miniature linear ultrasonic motor," 2015 Symposium on Piezoelectricity, Acoustic Waves, and Device Applications (SPAWDA), Jinan, 2015, pp. 304-308.
15. Purcaru, I. M. Gordan and A. Purcaru, "Study, testing and application of proximity sensors for experimental training on measurement systems," 2017 18th International Carpathian Control Conference (ICCC), Sinaia, 2017, pp. 263-266.
16. K. N. K. Kumar, H. Natraj and T. P. Jacob, "Motion activated security camera using raspberry Pi," 2017 International Conference on Communication and Signal Processing (ICCSP), Chennai, 2017