



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 5, May 2017

A Survey On Smart Parking Systems Using Cloud Based Services.

Shubham Bhalerao, Umang Mahant, Megh Makwana

B.E. Students, Dept. of Computer Engineering, AISSMS IOIT, Pune University, Maharashtra, India

ABSTRACT: This Project is based on user interactivity between the app and the parking information given by the sensors through cloud. It is a cloud based intelligent service system to access the application authentication of user can be done using its service by linking their aadhar card number to the database as unique identification. We have studied various cases to improve the accuracy of vehicle detection in the parking space, out of which we are using the Ultrasonic sensor as it is efficient of all other sensors. Real time traffic detection is the main feature of our project, such kind of technology can be used in vertically upward parking lot structures which would emphasis on building the parking space in a upward manner rather than outward, which would result in more parking space and less area will be used. In this scenario we are mainly focusing on Ultrasonic sensor and its effective output. We are also stating the drawbacks of other sensor which are not used in the proposed project architecture such as PIR, IR etc.

KEYWORDS: Energy IOT, Intelligent cloud, cloud management, smart car parking, cloud based parking, time efficient parking, ultrasonic based sensor parking, dynamic parking view.

I. INTRODUCTION

Our solution is to provide the user with a real time viewing of parking platforms which enables the user to view occupied/unoccupied parking space at the very instance , also the number of parking vehicles in the parking space which are yet to be allocated parking space. This enables the user to check availability from their devices from anywhere around the city via our application. To access the application authentication of user can be done using its service by linking their aadhar card number to the database as unique identification. Due to the rapid increase of vehicles in major cities there is going to be a need for more parking space which can be occupied in a time saving manner. With the advancement of wireless technologies, wireless mobile-based methods have been employed in parking systems.

II. RELATED WORK

The parking lots are used by every citizen on a everyday basis [1]. There are various types of assistance involved in parking systems [2]. The driver has to search for a parking slot in parking zone. In order to reduce the effort of the driver, the parking systems provide guidance to the driver for parking the car. Based on this concept various parking systems are developed. The information transmissions are made by mobile and web services in some systems [3, 4]. Then various sensors and technologies are used for implementing parking systems. The parking application extends to reservation for parking, automatic payment for parking and identification of car and vehicle license plate recognitions using camera [5].The devices of parking system perform various functionalities based on the technology of the parking system. Some of the functionalities are monitoring, collection of data, and transmission of data[6

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 5, May 2017

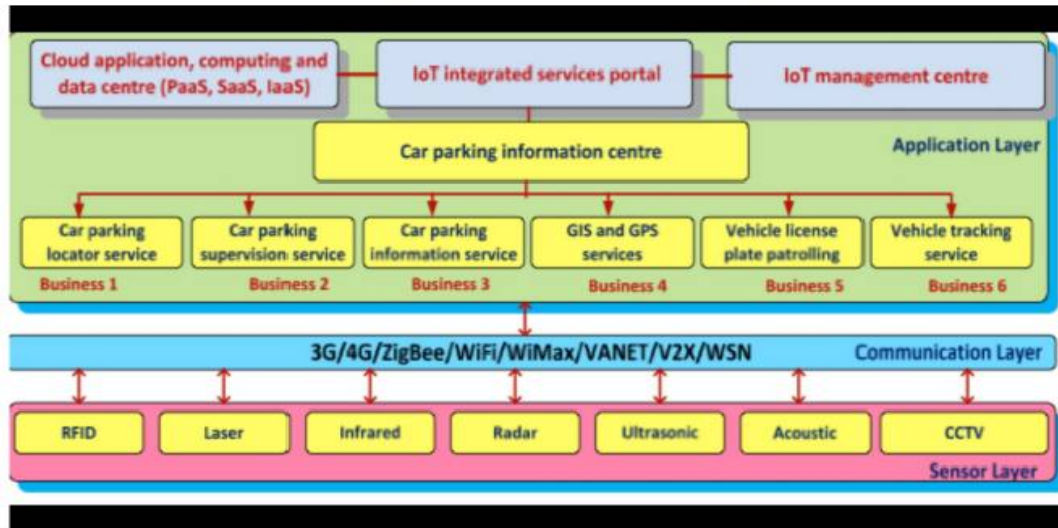


Fig. 1. Basic Architecture

II. LITERATURE SURVEY

In today's world parking lots have become redundant and needs lot of manpower to handle and maintain it. These parking lots are not user friendly and do not provide data regarding availability of free spaces. Many researchers have contributed to this issue and formalized with various methods to better optimize the parking lot to serve the needs. The author proposed smart parking reservation system using short message services (SMS), for that he uses Global System for Mobile(GSM) with microcontroller to enhances security[9]. The ZigBee technique is used along with the GSM module for parking management and reservation [11]. The author uses Global Positioning System(GPS) and Android platform to show available parking spaces. However, reservation for the same is not available.

The author uses Artificial Intelligence (AI) techniques to process images, which recognizes the parking occupied only by vehicles. The system provides guidance images towards the assigned slots, thus making it intelligent [15]. Inter integrated circuit (I2C) protocol is used along with car parking framework(CPF) to assign radio frequency identification (RFID) to each car which will be used to identify car parked over a slot. Variable message screen(VMS) shows car parked over a given floor [16]. The system assigns and reserves an optimal parking space based on drivers cost function that combines proximity to destination and parking cost. Driver request processing center (DRPC) provides infrastructure to vehicle (I2V) communication for assigning and reserving parking spaces using smart parking allocation center (SPARC) [14].

III. PROPOSED METHOD

A. Design Considerations:

- Initial battery energy min 5v for Arduino / NodeMcu.
- Ultra-sonic sensor used for each parking slot as a node.
- Keeping track of blueprint of the parking space.
- Considered the information automated from IBM Bluemix.
- Receiving data is considered for further processing.
- The data is processed and given to the user application for the parking space details.
-

B. Description of the Proposed Algorithm:

Aim of the proposed algorithm is to minimize the time in life to find a parking space in the preferred area. Minimizing the total fuel consumption and save energy using smart parking apps one of the aims of this project. The proposed algorithm is consists of three main steps.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 5, May 2017

Step 1: Detecting Parking slot availability:

The sensor will detect the parking slot and also verify if there is any object present across its detection range. This data will later be saved or transmitted on cloud. Sensors like PIR, Ultrasonic, IR etc sensors can be used for the detection.

Step 2: Transmission Real time Data:

The transmission of data (TD_{node}) for each parking space from the sensors to the cloud Platform will be done with the help of ESP8266 module. This data is sent on IBM BlueMix or any other such Cloud platforms. During the period of TTR, the data change in latest RATE can be represented by the formula (1).

$$RATE_{latest} = \frac{D_{latest} - D_{latest-1}}{TTR_{latest}} \quad \dots(1)$$

Step 3: Dynamic Display on Android Application:

The data received from the cloud platform will be duly processed and the relevant data will be displayed on the proposed android application made for getting the information about the vacant or the occupied space slots in accordance to the data received. Send signal 0 for empty and 1 for occupied to the slot on app.

If the parking slot is green, then it represents as vacant space. If the slot is seen red, then it will be displayed as occupied.

IV. PSEUDO CODE

Step 1: Collect all the possible sensor data at regular interval Time (5sec).

Step 2: Sense the data and process with transmission of it to cloud.

Step 3: Check the below condition for each user till parking slot is available.

if (There is a request from user to view the parking slots)

 If(username==username && password==Password)

 Show the dynamic real time system

 Else if(username!=username && password!=Password)

 Forgot_password()

 Else

 Resister_new_user()

Step 4: Calculate the total transmission time for all the sensors using eq. (1).

Step 5: Processing of real time data over cloud platform

Step 6: Send signal 0 for empty and 1 for occupied to the graphically available slot on app.

Step 7: go to step 1.

Step 8: End.

V. DESIGN AND IMPLEMENTATION

System for determining availability of vehicle parking, comprising a sensor system configured to monitor a plurality of parking spaces, the sensor system including at least one sensor element that generates a sensor data output signal and a parking availability determiner that receives the sensor data output signal and generates parking availability information the parking availability determiner is configured to determine from the received sensor data output signal at least one parking space of the plurality of parking spaces that is occupied, to include an indication in the parking availability information that the determined at least one parking space is occupied, and if at least one further parking space is included in the plurality of parking spaces other than the determined at least one parking space, to include an indication in the parking availability information that the at least one further parking space is available for parking. Sensors technologies are categorized as either intrusive or non-intrusive. Intrusive sensors need to be installed directly on the pavement surface, so digging and tunneling under the road surface are required. Magnetometers, pneumatic

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 5, May 2017

tubes, inductive loops, weight-in-motion sensors[9].

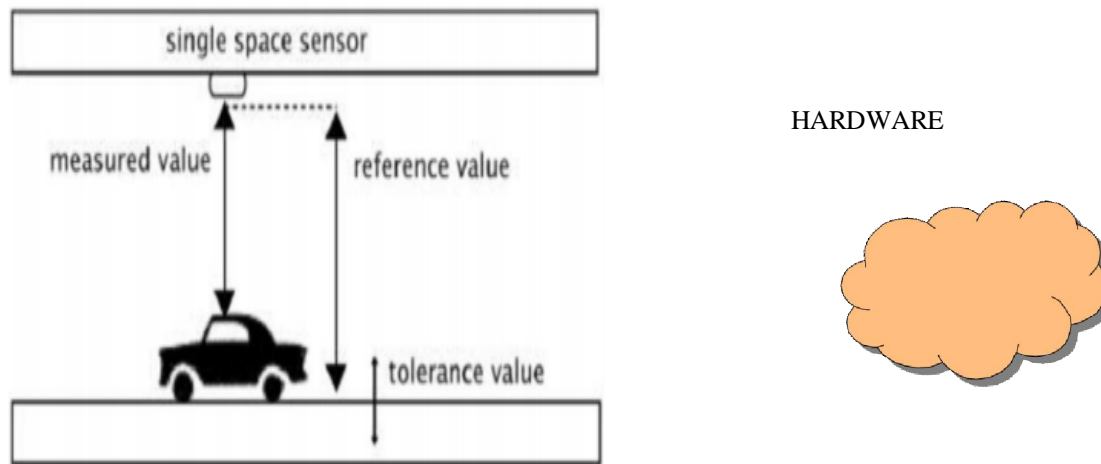


Figure 2. How an Ultrasonic Sensor Works [11]

ANDROID
APP

Non-intrusive sensors only require fixing on the ceiling or on the ground. Ultrasonic sensors are categorized as non-intrusive sensors, meaning that they require simpler installation compared to intrusive sensors. Ultrasonic sensors transmit sound waves between 25 kHz and 50 kHz. They use the reflected energy to analyze and detect the status of a parking space. Ultrasonic waves are emitted from the head of an ultrasonic vehicle detection sensor every 60 milliseconds, and the presence or absence of vehicles is determined by time differences between the emitted and received signals. Ultrasonic sensors can be used for counting vehicles and assessing the occupancy status of each parking space. Despite the low cost and easy installation of ultrasonic sensors, they do have some disadvantages, particularly sensitivity to temperature changes and extreme air turbulence. Figure 2 shows how ultrasonic sensors work.

Our proposed SPS detection system is based on ultrasonic sensors. For each individual car park, this would require one sensor fixed on the ceiling above each parking space. Ultrasonic sensors work based on echo-location. The sensor transmits a sound, which hits a solid object (car or ground) and is reflected back to the sensor. The time between the sent pulse and the returned echo is used to calculate distance. In a vacant space, the time between transmitted sound and reflection is longer than in an occupied space, hence the sensor can detect when a space is occupied.

Quickly finding a vacant space in a multilevel parking lot is difficult if not impossible, especially on weekends or public holidays. One study showed that 86% of drivers face difficulty in finding a parking space in multilevel parking lots [3]. Finding spaces during weekends or public holidays can take more than 10 minutes for about 66% of visitors. Stadiums or shopping malls are crowded at peak periods, and difficulty in finding vacant slots at these places is a major problem for customers [4]. Insufficient car park spaces \ lead to traffic congestion and driver frustration [5].

VI. CONCLUSION AND FUTURE WORK

Due to a exponential increase in traffic in major cosmopolitan cities managing parking lot facilities have become a major issue, the development of a real time automated system would provide the user with nearest parking lot facility along with real time monitoring of parking space. Thus reducing the users time, fuel, energy of finding a vacant parking space on his own.



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 5, May 2017

REFERENCES

1. Samir A. El-Seoud¹, Hosam El-Sofany² and Islam Taj-Eddine "Towards the development of smart parking systems using mobile and web technologies". Society and Internet HSI'03, pp. 302-311, 2016.
2. Ashwin Sayeeraman, P.S. Ramesh "Zigbee and Gsm based secure vehicle parking management and reservation system" Systems, pp. 958-9618, 2012.
3. Jihoon Yang, Jorge Portilla, Teresa Riesgo "Smart Parking Service Based on wireless sensor network" Vol.2, Issue 4, pp. 450-455, 2012.
4. P.Dharmareddy, A.RajeshwarRao, Dr. Syed Mustshak ahmed, "An intelligent Parking Guidance and Information System using image processing technique" vol. 1 Issue 2, ISSN 2320 – 4486, 2013
5. Manjusha Patil, Vasant Bhonge "wireless Sensor Network and RFID for smart parking System", ISSN: 2248-9622 Vol. 2, Issue 2, 2012.
6. yangfeng geng, Christos G. "New smart parking system based on resource allocation and reservations" 2013.
7. Hitlal al-kharusi, Ibrahim al-bahadly "intelligent parking management system based on image processing" Volume 9, No.11, 2014
8. NoorhazrinHanyMohamadHanif, Mohd Hafiz Badiozaman, Hanita Daud " Smart Parking reservation system using short message services ", 31750 Tronoh, Perak, Malaysia, 2012.