Issue 1 vol 4 ISSN: 2321-8134

IJFEAT

INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

# SMART PARKING SYSTEM USING INTERNET OF THINGS(IOT)

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**Abstract**

*In this modern age the idea of Smart Cities had become very popular. The development of Internet of Things and the concept of smart cities can be readily achievable. Thanks to the evolution of Internet of things to increase the quality of services offered in cities and to improve the productivity and reliability of urban infrastructure. In this paper in recommended the concept of using IoT and Cloud based technology in car parking services in cities. An IoT based cloud integrated smart parking system. The suggested IoT based Smart Parking system consists of an on-site deployment of an IoT module that is used to monitor and signalize the state of availability of each single parking space We design a system so as to eliminate the time wastage and irrelevant frustration faced by the drivers based on IoT for real time monitoring of the empty slots for car parking from anywhere using a webpage or a mobile app. This paper also describes a high-level view of the system architecture. In this paper discusses the working of the system in form of a use case that proves the correctness of the proposed model.*

***Index Terms:*** *Internet of Things, Cloud based technology, webpage, mobile app, architecture, etc*

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## 1. INTRODUCTION

Everybody who has ever been cramped during driving around metropolitan areas in search of parking has wished for a solution that could quickly lead them to that elusive spot. Parking system is being remodelled by new technologies that enable cities to reduce traffic congestion and carbon emission. The concept of Internet of Things (IoT) started with things with identity communication devices. In this IoT based smart parking system the devices could be tracked, controlled or monitored using remote computers connected through Internet. IoT extends the use of Internet providing the communication, and thus inter-network of the devices and physical objects, or 'Things'. It provides platform where things alarm clocks, wearable watches, home appliances, surrounding objects that are become smart and behave alive through sensed, computed and communicated by using embedded small devices which interact with objects which are located at remote location and persons through connectivity. It uses concept of cloud computing which allows developers to create and host their applications on it. Because of high scalability in cloud any number of nodes could be added or removed from the IoT system on a real time basis.

## 2. NEED FOR IOT-CLOUD INTEGRATION

The Internet of Things is becoming the next Internet based revolution. It allows most of devices to be coupled and communicated with each other to send information that enhanced the quality of our daily lives. Under other condition, Cloud Computing provides on-order, beneficial and expandable network access which makes it possible to send computing resources, it turns enables aggressive data integration with various data sources. There are many terms coming in the way of the successful invention of both Cloud and IoT.

## 3. SYSTEM ARCHITECTURE

This system is the combination of the hardware and software to form a complete module. Exchanging of all the information or data between mobile and sensor circuitry is done by CLOUD Talking of the above-mentioned figure, it designed a parking area where our IoT based smart parking system is implementation along with the way in which communication can be takes placed between various actors.

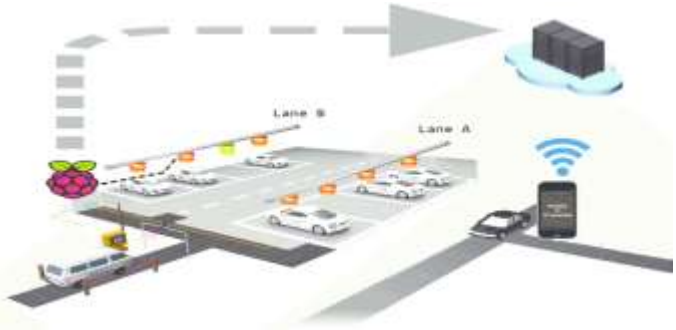


**Fig-1: System Architecture**

## 4. IMPORTANT FACTORS OF SYSTEM

### 4.1 Sensors:

For IoT based parking system we are using sensors like Infrared, Passive Infrared (PIR) and Ultrasonic Sensors. The work of these sensors is the similar i.e. to sense the parking slot and detects whether a parking slot is empty or not. In this situation we are using ultrasonic sensors to detect the presence of a car. We have proposed parking system using magnetic sensors The ultrasonic sensors are wirelessly connected to raspberry pi using the ESP8266 chip.

### 4.2 Raspberry Pi :

In Processing Unit of IoT based smart parking system It comprises of Raspberry pi which is a system on chip. The processing unit acts like an intermediary between the sensors and cloud based server. The Raspberry Pi is a chip, small card sized computer. All the sensors are connected to the processing unit wirelessly . A single one raspberry pi unit comprises of 26 General Purpose Input Output pins(GPIO). It is important that the ground supply of raspberry pi and sensors must be connected for the transfer data using the General Purpose Input Output pins. Information gathered from various sensors is sent to the raspberry pi via the esp8266 chip. The raspberry pi transmits this information to the IBM MQTT Server via MQTT protocol over a communication channel.

### 4.3 Cloud Computing Technology

This is a Web based unit that stores the assets information provided by local units situated in the centre of the system. This server accept the request from clients located via the mobile apps for free parking slot . After receiving the request, it checks for accessible closest parking slots from the client's current location in the central database which is stored in it without accredit the client directly access the local servers of each car parking slots . they have created IoT based smart parking system which is based on the wireless communication network which easily manages time to find out the free parking slots in less time.

### 4.3 Internet Of Things

The internet of things is interrelated computing approach that determine the idea of everyday real objects being connected to the internet and identifying themselves to other devices. The term is closely analysed with Radio Frequency Identification (RFID). The way of communication, although it also may contain other sensor technologies, wireless technologies or QR codes. The IoT is powerful because an object that can represent itself digitally becomes something larger than the object by itself. No longer does the object describe just to its user, but it is now connected to enclosing objects and database data. When many objects act in unison, they are called as "ambient intelligence".

### 4.4 Mobile App:

The mobile app behave like an intermediate between the end users and smart parking system to collaborate with the system. The application is developed using Apache Cordova and Angular JS technology used by JavaScript as a programming Methodology. The aim of using Apache Cordova is to create applications that can run on both android or iOS platforms with the same source code. This mobile application is connected with the IBM Mobile Quee Telemetry Transport (MQTT) server via securely communication channel. The aim of this mobile application is to provide data regarding availability of free parking slots and allowing the end user to book a slot appropriately. Transmission of data takes place in JSON format between IBM Mobile Quee Telemetry Transport (MQTT) server and the mobile application. In this way to assured proper communication between both the Raspberry pi and mobile application must be advocated to a particular communication channel on IBM Mobile Quee Telemetry Transport (MQTT) server.

## 5. WORKING OF THE SYSTEM

In the earlier section we described about the architecture and technical terms which are related to the IoT based smart parking system. Now we discuss about working of the system in a real-world object. The all procedure for booking a free parking available slot. In this parking a car in that slot and leaving the parking area is described with the help of the following flow diagram.

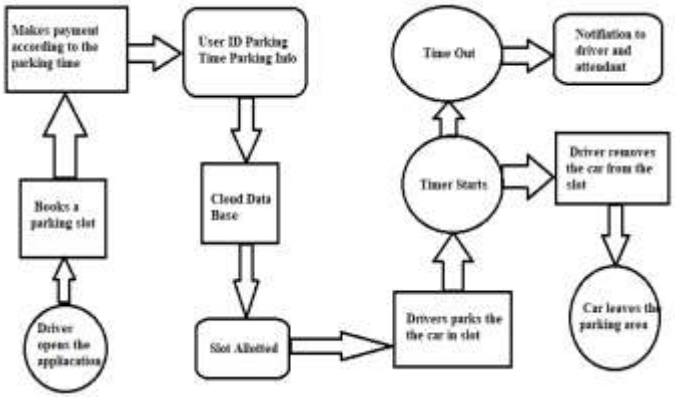


**Fig-2: Flowchart of System**

Following is the process for driver needs to follow in way to park the car in free parking slots using our IoT based parking system.

Step 1: First install the smart parking application on your mobile device or access website from PC

Step 2: Search for a parking area on and around your destination.

Step 3: Select a particular free parking area.

Step 4: Browse through the various parking slots available in that parking area.

Step 5: Select a particular parking slot.

Step 6: Select the time required for which you would like to park your car in free parking slot.

Step 7: Make a Payment of parking charges with your e-wallet or your credit card.

Step 8: If you have successfully parked your car in the selected free parking slot then confirm your occupancy using the mobile application.

## 6. ADVANTAGES

- Manage traffic well without any havoc.
- Guides driver to find nearest available parking slot.
- Reduced stress and time.
- It plays important role in making our environment pollution free.
- Save fuels and reducing searching for parking area.
- Huge advancements have been made in making smart cities a reality.
- Improves the flexibility, productivity and reliability of modern areas infrastructure.
- Problems such as, traffic congestion, limited car parking facilities and road safety are solved.

## 7. FUTURE SCOPE

- Multi-Platform application
- Improving the sample area
- VIN number and IPv6
- Security
- Data Size

## 8. CONCLUSION

The ease of parking system is quite a challenge in modern days. Since the advent of industrialized cities, number of cars has been increasing and day by day people are facing bigger trouble while trying to manage their cars into a parking lot. This scenario of parking crisis gives rise to new solutions with the help of Internet of things (IOT) thus managing car parking systems. IoT based Smart parking System facilities and traffic management systems have always been at the core of constructing smart cities. In this system, we address the issue of parking and present an IoT based Cloud integrated smart parking system. The system that we propose provides real time information regarding availability of parking our system addresses the crisis of car parking across a remote city and comes out with an IoT based assistant mobile application system. The proposed project provides real time information of a car parking lot and is able to coordinate with the mobile application thus giving user the feasibility of booking a parking lot staying at a distance.

## ACKNOWLEDGEMENT

We sincerely express our deep sense of gratitude towards our respected guide Prof. S.L.Thombare for his valuable guidance, profound advice, persistent encouragement and help during the completion of this work. His time to time helpful suggestions boosted us to complete this task successfully. He has helped us for gathering the materials and report preparation.

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