# IOT BASED SENSOR ENABLED SMART PARKING SYSTEM

## G.PAVAN KUMAR[1], C. RAJEEV KUMAR[2], V.JE MANIKANTA[3], AZHAGIRI.M[4]

[1,2,3]*Student, Dept. of Computer Science and Engineering, SRMIST, Tamil Nadu, India*
[4]*Assistant Professor, Dept. of Computer Science and Engineering, SRMIST, Tamil Nadu, India*

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**Abstract -** *In recent years the people are more attracted towards the Smart cities. These Smart cities changed the way of working due rapid growth in the Internet of Things. The Smart Parking System is also part I converting into the Smart cities. Many efforts are made in developing the IoT which helps in making Smart cities. The Smart Parking System makes the Smart cities more comfortable by reducing the traffic and helping the people to find an easy parking slot. In this paper, we present an IoT based Smart Parking System which consists an IoT module at the parking slots. It helps the user by signaling the empty parking slots in the near by area. The Mobile application provides the user to check the available parking slots and book a slot according to the user comfort. The paper also discusses about the Architecture of The System. At the end of the paper it has the working of the system which the proposed system is correct and useful.*

**Key Words***:  Internet of Things, Smart cities, Smart parking, IoT module.*

## 1. INTRODUCTION

Internet of Things are the things which are interconnected to one another by the means of the Internet. The IoT devices are traceable and they can controlled by computer system which are connected to Internet. The IoT devices and internet are mostly to communicate and provide information. The two main things in IoT are "Internet" and "Things". The Internet is globally connected to all the servers, mobiles, computers internationally by using certain provided protocols. The internet is used for receiving, sending and gathering of information. Thing has very large number of meanings in the dictionary. But the basic meaning of the Thing is an physical object. Generally the IoT consists of interconnected network of things. These things collect the data from the location where there are certainly in use and provide the data by analyzing and processing the services. The things are mainly the wearable such as watches, wrist bands and home devices. They are used to communicate by sensing with small objects which provide the data required. The very vast nature of the cloud computing provides the developer and the user to increase the using and collecting the data. It also helps to create a mobile application. The cloud will be a major bonus to store the data collected by the IoT devices. In cloud computing the things are called as nodes. These nodes can be controlled, accessed and monitored by the user from any location through the cloud. The nodes can be removed and added to IoT system.

The idea of creating or developing the smart cities is possible due to the vast development of Internet of Things. Many problems has to be solved while creating or developing the smart city. Parking slots, traffic are some of the problems that are to be removed or developed to create a smart city. During these days, finding a parking slot is one of the major issue. The high rate of parking slots in certain areas make the users to avoid parking in those areas and the user chooses to park in non-parking areas which leads to traffic and disturbance while while exiting the parking area. These kinds of situations are the reason to develop the parking system to create smart city avoid traffic and accidents and reduces the user to search for the available parking slot.

## 2. SMART PARKING SYSTEM

The proposed system helps the user by providing the nearest parking slot available at the user set destination. The proposed system consists of wifi-module, Bluetooth-module and IR transmitter and receiver. These sensors and modules help the user to receive the information about the empty parking slot present in that area. The smart parking system is mainly designed by using the hardware's such as auridino boards and raspberry pi. The mobile application is must to installed in the user mobile so they can use the parking system. The application provides the information about the parking slots. And those parking slots can be using the mobile application.
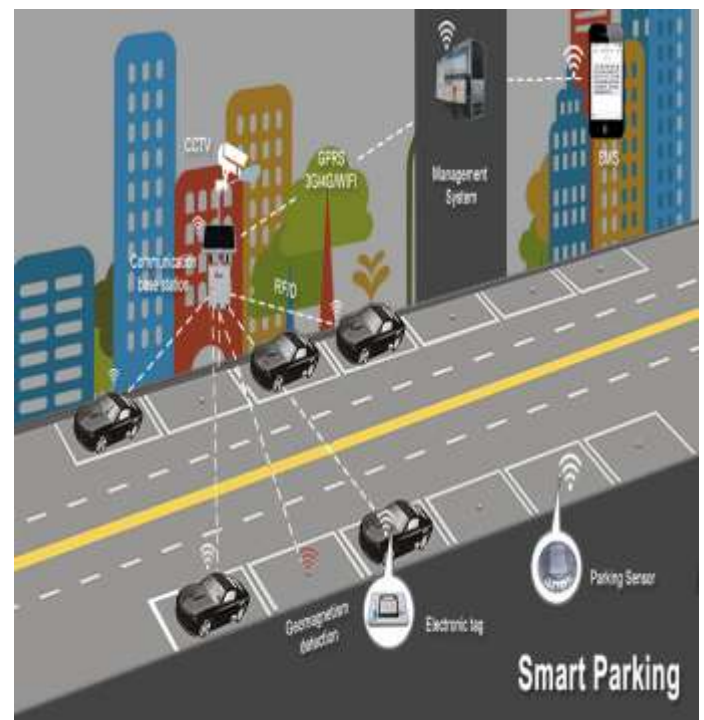


FIG.1SMART PARKING SYSTEM ARCHITECTURE

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## 3. Working

The proposed system mainly works on the hardware's such as auridino board and raspberry pi. The mobile application is must to book a parking slot. The user will be get will two options one to login and the other to register after opening the user. After completing the login or register process. The user will be requested to set a destination where he wants visit. The modules present in that certain area will provide the information about the empty parking slots. The mobile application is used to track the user and gives about the information of empty slots as the user gets near by the destination. The application provides the option to an empty slot as the user enters the parking area. The user will be receiving an conformation notification as the user to conform the booking. As the user conforms the parking slot, the slot will be registered in the user and will be displaying as a filled parking slot to the other customers or users. After confirmation the mobile application will provide the directions to the   parking slot.

The mobile application will start the clock to calculate the amount of time the user uses the parking slot. According to the amount of time the user used the slot, the parking charges will be collected. The user will be paying his payment through the application. The application will calculate the exact amount of money to be payed. The application will also accept the payment from the other applications such as paytm, google pay, paypal and some other applications. As the user completes the payment and exists the parking slot, the parking slot will be shown.

### 3.1 IR Transmitter and Receiver

These infrared transmitter and receiver helps the user to get the information about the parking slots. The transmitter will be attached to the footpath beside the parking slot. The transmitter will send the send information to the receiver about situation of the slot. The receiver will receive will receive and it will send the information to the wifi module. The receiver is attached to parking slot light along with wifi module.

### 3.2 WIFI

The module is attached to the light at parking slot. These wifi modules gather the information from the IR receiver. Each parking slot has a light and each has a wifi module. These gather the information and they provide the information to the gateway. All the information from different modules will gather at the gateway.

### 3.3 GATEWAY

All the information received from the modules is stored in the gateway. The will send the details and information of the vehicle and the user to the cloud. Only one gateway will be present at the parking area. It gathers the information.

### 3.4 CLOUD

The cloud stores all the data received from the gateways. The will store the data permanently. It has very  huge capacity of data storage. The login and register details of the user will be stored in the cloud itself. The storing of login details helps the user for easy login. It also stores the vehicle details and regular schedule of the user.  According the regular schedule the stored in the cloud the user gets the notification to book the parking slot at the regular time. It will be helpful to the previous bookings. It stores the reviews given by the users about the parking slot. The developer can remove any nodes from the cloud and any number of nodes to the cloud and which will gives a new feature in the mobile application.
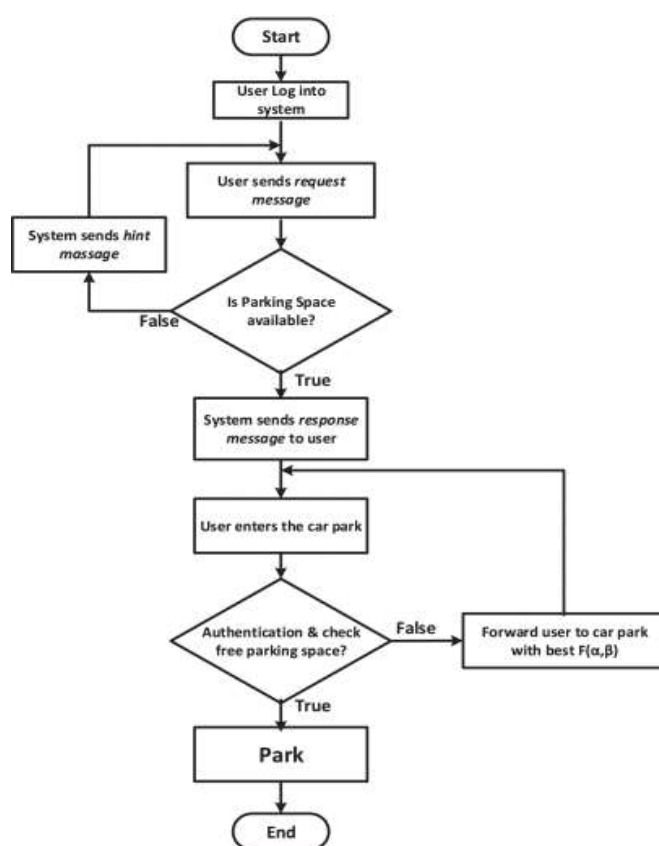
## 4. DATA FLOW AND ALGORITHM
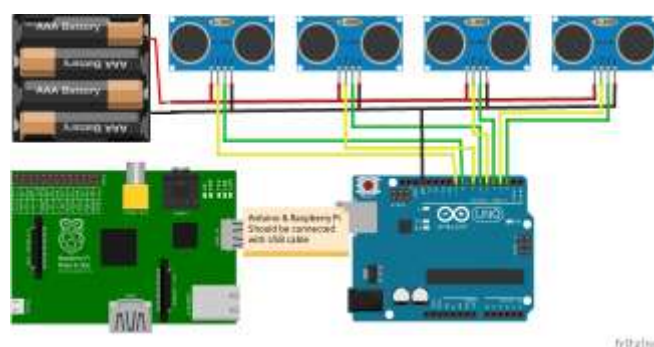


FIG.2.DATA FLOW

## 5. CIRCUIT DIAGRAM



FIG.3CIRCUIT OF THE SYSTEM

## 6. ALGORITHM

Step 1: Install the parking system application in your mobile phone.

Step 2: Search the available parking areas in your destination through the application.

Step 3: Select the specified area.

Step 4: Browse the empty parking slots in the parking area.

Step 5: Select the parking slot.

Step 6: Confirm the parking slot.

Step 7: After returning to the parking area the exact amount for the time, the vehicle is present.

Step 8: The application provides the user amount to be paid for parking.

Step 9: The user has different options to select the mode of payment.

Step 10: After completion of payment, the user will be requested to give the feedback.

## 7. CONCLUSION

From the past five years there was a rapid growth in the development of Internet of Things and cloud computing. These two platforms provide basic needs to develop a city into smart city by eliminating and providing the basic needs for being a better city. Parking system and traffic are the most unsolvable problems in every city. By the proposed system, we discuss the problems about the parking system and provide an IoT based smart parking system which helps to check the parking areas and to select the empty parking easily. Thereby aiming to improve the quality of the life of people.

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