

# IoT Based Smart Parking System Using RFID

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**Abstract** :-With the exponential increase in the number of vehicles and world population day by day, vehicle availability and usage on the road in recent years, finding a space for parking the bike is becoming more and more difficult with resulting in the number of conflicts such as traffic problems. This is about creating a reliable system that takes over the task of identifying free slots in a parking area and keeping the record of vehicles parked very systematic manner.This project lessens human effort at the parking area to a great extent such as in case of searching of free slots by the driver and calculating the payment for each vehicle using parking area. The various steps involved in this operation are vehicle identification using RFID tags, free slot detection using IR sensors and payment calculation is done on the basis of period of parking and this is done with the help of real time clock.

**Keywords:**IoT, RFID, IR sensors.

## 1.Introduction

The basic definition of an Internet of Things(IoT) can be defined as anything which could be connected to internet results into "Internet of Things" The things in Internet of Things are sensors, actuators, RFID tags.The things could be tracked, controlled or monitored using remote computers connected through Internet. IoT extends the use of the Internet, providing the communication ,and thus inter-network of the devices and physical objects ,or 'Things' IoT , in general consist so finter - network of the devices and physical objects, number of objects can gather the data at remote locations and communicate to units managing, acquiring, organizing and analyzing the data in the processes and services. It provides a vision where things (wearable, watch, alarm clock, home devices, surrounding objects with) become smart and behave

alive through sense computing and communicating with embedded small devices which interact with remote objects or persons through connectivity. Due to high scalability in the cloud any number of nodes could be added or removed from the IoT system on a real time basis and Iot is well known to reduce human effort storage at extent.

The ideal of creating a Smart City is now becoming possible with the emergence of the Internet of Things. The Internet-of- Things technology (IoT) has created a revolution in many ways in life as well as in smart-parking system (SPS) technology. As parking becomes a very essential need of our day to day life.

Therefore, this system looks forward to plan and acquire a smart parking system before heading out towards our destination in order to reduce the hassle of driving around looking for a parking spot during peak hours. In present day cities, finding an available parking spot is always difficult for drivers, and it tends to

become harder with ever increasing number of private car users. This situation can be seen as an opportunity for smart cities to undertake actions in order enhance the efficiency their parking resources, thus leading to reduction in searching times, traffic congestion and road accidents. Recent advances in creating low-cost; low- power embedded systems are helping developers to build new applications for the Internet of Things.

As the number of population increased in the metropolitan cities, the need of vehicles also got increased. Ultimately, it causes problems in parking which leads to traffic congestion, driver frustration, and air pollution. When we visit the different public places like Shopping malls, multiplex cinema hall & hotels during the festival time or weekends it creates a lot of the parking problem. According to the recent research found that a driver takes nearly 8 minutes to park his vehicle because he spend more time in searching he parking slot. This searching leads to 30 to 40% of traffic congestion. Here we are going to see how to reduce the parking problem and to do secured parking using the smart parking system.

## 2. Literature review

2.1 Smart parking reservation system using short message services (SMS) .[1]:

This system provides a unique algorithm which increases the capability of the current cloud based smart Parking system and it also develops a network architecture based on the Internet of Things technology.

### 2.1.1 Advantages

1. Enhanced security due to password requirement.
2. System can be used and applied anywhere due to ease of usage.

### 2.1.2 Disadvantages

1. Cost of implementation is high.
2. GSM feature creates bottlenecks
3. The microcontroller will have to take a lot of the load which can crash the system.

2.2 Intelligent Parking Management System Based on Image Processing. [2]: The Intelligent parking system aims to manage the parking area by capturing the number plates of each vehicle for unique identification of vehicle. This information is then used for payment calculation of each user.

### 2.2.1 Advantages

1. The system captures and processes the rounded image drawn at parking lot and produces the information of the

empty car parking spaces.

2. A camera is used as a sensor to take photos to show the occupancy of car parks.

3. Single camera can detect the presence of many cars at once

### 2.2.2 Disadvantages

1. The weather conditions affect the System i.e.in terms of visibility.

2. The camera should be in apposition where it can see all the car parks and not be obstructed by any objects.

3. No guidance is provided in the parking lot.

2.3 Car Park Management, with Networked Wireless Sensors and Active RFID. [3]:

This system uses networked wireless sensors in order to monitor the cars in the parking area. Every car consists of an active RFID tag embedded in it in order to uniquely identify.

### 2.3.1 Advantages

1. The main advantage of the gate management model is its low cost and simplicity over lot management model.

2. Gate management service: Another use of RFID tags is gate management. As an example, a gate can be opened Automatically using an RFID reader and the vehicle's tag at the gate.

### 2.3.2 Disadvantages

1. No driver guidance systems to guide towards the parking lot.

2.4 Automated Parking System with Bluetooth access. [4]:

The Automated parking system uses Bluetooth device to find a vacant space in the parking area and the information about the vacant parking space can be obtained only within the range of the Bluetooth.

### 2.4.1 Advantages

1. The system uses the use mobile's Bluetooth for identification and registration.

2. The vehicle is transported to the parking location with the help of a rack and pinion mechanism for linear motion.

3. It automatically detects the unique registration numbers to read in the Bluetooth chip to check if the new vehicle is to be parked.

### 2.4.2 Disadvantages

1. Cannot be used in the existing parking system.
2. The whole parking lots is to be designed with mechanical components such as rack and pinion

mechanism.

### 3. Proposed Work

#### 3.1 Architecture Description

The architecture ,mainly consists of the following components:-

1. Mobile Application
2. Slot Detection Using IR Sensors
3. Vehicle Detection Using RFID
4. Payment through Online Banking
5. Database
6. Raspberry PI3
7. Tracking of Vehicles

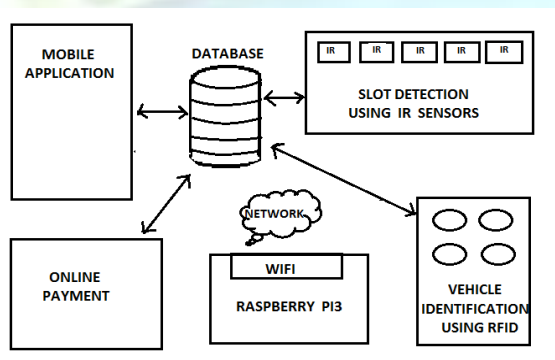


Fig 1: Architecture of Proposed System

The transitions indicate the flow of the data between the database and the rest of the components. As the fig. suggests the user has to first register himself through the mobile application which indeed stores his information onto the server. This data is useful to track the user later if he tries to breach the system policies. After registering into the parking system his user has the privilege to go into the application and checkout for a free parking space available and then he can actually go and park his bike there. The application is updated each time when the bike is detected on the parking area with the help of IR sensors. IR sensors are responsible to detect if a particular slot contains bike or not. Vehicle identification is done with the help of RFID tags which are present on each bike which indeed helps us in calculating the amount to be paid by each user separately. RFID readers are present on the parking area which captures the RFID information of each user. Before generating the parking bill, IR

sensors and RFID tags work together to know which vehicle is being parked and depending on the time and the amount the corresponding bill is generated. Raspberry PI3 is a processor which performs all of the above functions through the use of Internet. Payment of the parking bill is done through online banking which will be done using the mobile application.

All of the data generated above is stored and retrieved from the database. The tracking system is an integration of several modern embedded and communication technologies. To provide location and time information anywhere on earth, Global Positioning System (GPS) is commonly used as a space-based global navigation satellite system. The location information provided by us GPS systems can be visualized using Google Earth technology. The implemented tracking system can be used to monitor various parameters related to safety, emergency services and engine stall.

### 4. Conclusion

Our system minimizes the parking waiting time in a large-sized parking facility. It also helps in maximizing the venue generation for the parking facility owners. It would also help reduce the need for man-power in the parking facility which would greatly reduce the cost and errors in the process. Also this method would minimize the usage of paper ensuring a green system. This work can be further extended to booking of parking lots over a period of time from advance. The mobile application can be extended up on other operating systems such as iOS, Windows, etc. In the server, services can even be extended to the safety measures such as fire, theft, etc.

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