

# SMART PARKING SYSTEM USING IOT

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## Abstract

*In present times the concept of smart cities have gained great popularity. Thanks to the evolution of Internet of things and machine learning the idea of smart car parking now seems to be achievable. unwavering efforts are being made in the field of IoT in order to maximize the productivity and reliability of urban infrastructure. Problems such as, traffic congestion, limited car parking facilities are being addressed by IoT. In this base paper, we present an IoT based cloud integrated smart parking system. The proposed Smart Parking system contain 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. A android application is also provided that allows an end user to check the availability of parking space and book a parking slot accordingly. The paper also describes a high-level view of the system architecture of smart car parking. Wireless sensor networks (WSNs) have attracted increasing attentions from both academic and industrial communities and other public place. It very well may be sent in different sorts of situations to screen and gather data. This paper aimed at developing an intelligent car parking system that is more cost effective and user friendly than the existing systems.*

**Keywords** - Internet of Things; Cloud Computing; Smart Parking; Smart City; Cloud of Things

## INTRODUCTION

Technical advancements have led the advancement and prevalence of Wireless Sensor Networks (WSN) in many of man's activities. The WSN contains of numerous low-costing sensor nodes that are organized to establish an ad hoc network via a wireless communication module that is equipped on the nodes. The sensor nodes are equipped with different types sensors, computation units, and storage parts to collect cooperatively, process and provide sensory data for localization and surveillance

Wireless sensor network technology has been applied in both civil and military applications such as intelligent buildings, smart homes etc. This base paper describes the design and implementation of a WSN used in creating an intelligent car park management system based on wireless sensors. The intelligent car parking system can detect the car when parked in the parking area lot and communicate with a server using Xbee zigbee (Series 2) to display the outcome on the site page and board sign segment that are put between auto stop segments and is easy to understand to improve the accommodation of auto stopping .

The Wireless sensor network project was divided into two phases; the first phase involved making a car detectable to other cars while parked in the parking lot. It was achieved by placing a sensor right above the car at a height of three meters and the second sensor in front of the car with a fifty -five-centimetre ground clearance. The second phase involved inducting & implementing wireless parameters to the experiment to enable the system to communicate the occupancy of the parking sections to the user in the control room. The

system will allow car parking administrators and managers to get real-time information about the parking field thereby promoting easy and enhanced parking management .

Cloud work as a perfect partner for IoT as it acts as a platform where all the sensor data can be stored and accessed from remote locations. These variables offered ascend to the amalgamation of the two advances along these lines prompting the arrangement of another innovation called Cloud of Things. In Cloud of the things(nodes) could be gotten to, observed and controlled from any remote area through the cloud. Because of high versatility in cloud any number of hub could be included or expelled from the IoT framework consistently. In basic terms IoT can be clarified in type of a condition expressing: Physical Thing + Controller, Sensor and Actuators + Internet = Internet of Thing.

The ideal of creating a Smart car parking is now becoming possible with the emergence of the IOT. One of the key issues that brilliant urban communities identify with are auto stopping offices and movement administration frameworks. In now day urban areas finding an accessible parking space is constantly troublesome for drivers, and it has a tendency to end up harder with regularly expanding number of private.

The brilliant stopping framework that we propose is actualized utilizing a portable application that is associated with the cloud. The framework enables a client to know the accessibility of parking spots on an ongoing premise.

Creating WSN applications for cars had changed difficulties. Among them was identifying and following quick moving cars. Our shrewd auto stopping framework was produced to permit the location of an auto when stopped in the parking area and convey the equivalent to the server with the end goal of conveyance.

## **RELATED WORKS**

The Guangdong AKE Technology Co., Ltd, China is a hightech venture with information obtaining and data handling as its center innovation. The organization has created indoor, outside and urban shrewd stopping framework and also stopping administration frameworks. The indoor stopping framework utilizes ultrasonic module and camera as sensors to peruse the protest, auto and convey the equivalent to the framework through the RS485 correspondence link. The framework forms the information procured from the sensors and presentations the yield through RED and GREEN sign to the framework clients. A similar idea is utilized in the open air stopping framework, aside from that it utilizes a geomagnetic sensor which identifies the difference in attractive field in the dispensed zone and imparts the equivalent remotely to the server giving the status of the stopping territory to the client. The urban stopping framework utilizes comparative kinds of the discovery sensors as open air frameworks for observing the accessibility of the stopping in the assigned parking area. The main distinction is that the status of the parking area can be imparted through the LED-based signage, or exchanged over the web, and status can be seen through a versatile application or a web server.

The undertaking utilized existing savvy innovation like the satellite imaging, portable application for information securing and foreseeing the future information for stopping administration frameworks. Their stopping administration framework is sensor-based and utilizes Fiber Braggs Grating sensors. These sensors are implanted in the ground, whereby as weight is applied on the ground where they are put, and sensors' wavelength reflection changes to imply the nearness of a vehicle. Our inspiration for undertaking this venture depended on these advances; straightforward ultrasonic sensors to advance auto discovery and a remote Zigbee (Series 2) convention to impart the information gathered to the server.

## **REQUIREMENT ANALYSIS**

In this area, we examine the prerequisites of outlining a remote sensor arrange for a brilliant auto stop framework. In spite of the fact that the traditional necessities of an auto stop framework can be effectively

fulfilled, regardless we have to address all the more difficult issues by taking focal points of remote sensor organize. In the accompanying, we show some essential prerequisites of an auto stopping framework and afterward break down the possibility from the perspective of remote sensor systems.

The shared objective for all auto parks is to pull in more drivers to utilize their offices from the business viewpoint. In this manner, their fundamental offices are required to satisfy the accompanying ordinary necessities:

- (1) The area of the auto stop ought to be anything but difficult to discover in the road organize.
- (2) The passage of the auto stop ought to be anything but difficult to find.
- (3) The number of parking areas ought to be wealth and a parking garage ought to acquire an extensive space enough to stop an auto in.
- (4) Easy to exit and to return by walking.

In any case, a keen auto stop framework ought to give more accommodation and robotization to both the business and clients. It ought to likewise fulfill the accompanying prerequisites:

- (1) The framework ought to give a lot of enlightening directions or rules to assist drivers with finding an accessible parking garage.
- (2) The framework ought to give great capacities to encourage executives and administrators to deal with an auto stop.

As per the above necessities, a shrewd auto stop framework ought to limit human tasks and supervisions, in order to lessen the expense of labor and the lost from human oversight and to upgrade productivity. Additionally, the auto stop framework is required to give higher precision, heartiness, and adaptability in tasks, more comfort to clients, bring down expense of working and keeping up by and large framework.

### **AN OVERVIEW OF OUR SYSTEM**

In this segment, we depict the outline and work stream of our keen auto stop framework. To start with, we will present the equipment segments utilized in our framework. Second, we will talk about the outline and foundation of the framework dependent on the remote sensor organize.

#### **The reason why we choose these components:**

Ultrasonic sensors are financially savvy and accompany better precision. Xbee radios can impart remotely between one another and it can transmit motion over huge separation (indoor limit 40m and open air limit 120m). Arduino Mega module can fill in as a server, it tends to be valuable for keeping up site page and has vast store limit. Arduino Uno module can function as a switch, it has better memory administration and it's good with XBee radio. Driven can be noticeable from each course and it is control proficient.

#### **Hardware Components**

At the point when an auto lands in parking area, it is detected by ultrasonic sensor which is one of the segments of the sensor level. In the wake of getting information from the ultrasonic sensor, Arduino Uno.

In the second stage, Arduino Mega module, Ethernet module, and XBee radio were utilized for the foundation of the web server circuit. The Ethernet module was interfaced over the Arduino Mega module and a Xbee radio set above it. The Web server program transferred in the Arduino Mega module, Ethernet module got associated with the system and when the ultrasonic sensor got the flag from the from Arduino Uno module, it

radiated sonic waves which were then reflected by the protest and detected by the sensor. The time among transmitting and accepting sonic waves was corresponding to the separation between the question and the sensor, whereby longer time was taken when the separation between the sensor and the protest were bigger. The Ultrasonic sensor at that point sends a planning heartbeat to the Arduino Uno module which would be equal to the separation and the program transferred in the module forms the time got from the sensor. In the event that the information demonstrated that the separation between the two sensors is more prominent than 150 centimeters, the conditions fulfilled the auto stopping condition; at that point the module sends the flag to the server indicating that the parking garage is unfilled, and makes the red LED OFF and the green LED ON. On the off chance that the separations got from the two sensors are beneath 150 cm, modules send flag to the server which indicates that parking garage is involved, and it makes the red LED ON and the green LED OFF.

The web server hub program utilized the two ultrasonic sensors for programmed refreshing. The occasion for auto identification was when the two sensors had the status=1, while the occasion status=0, there was no auto recognized. The web server was customized to perceive these two occasions and change the stopping status naturally by means of the Zigbee. At the point when the sequential even=1 (auto distinguished) or sequential even=0 (no auto identified), the web server perceived the occasion and refreshed the auto

stop status over the Zigbee. The site page showed that occasion as possessed (or not), utilizing the red and green LED separately.

XBee radio correspondence introduced between Field circuit, LED circuit and Web Server. Further, two LEDs, one red and the other green were associated with the module. Pins A0 and A1 were associated with the red and green LED individually.

## **RESULT OF THE EXPERIMENT**

The savvy auto stopping framework is worked for genuine applications. In this manner, quality and consistency are obligatory. In this way, we did some testing investigations utilizing the model framework to assess its reliability. The test territory comprised of two stopping regions of ten parts each partitioned into area An and B. Be that as it may; hardware were just introduced in parking garage A1 where the physical testing was conveyed. It was impractical to test the outcome physically for the two parts: A1 and B1, subsequently for this venture we took the assistance of the reproduction apparatus (XCTU) to exhibit the inhabitation of the auto stop A1 and B1.

## **FUTURE WORK**

This idea can be connected to the techno-business use of the auto stop. Later on, we will consider the case with 200 auto parks. In the experimentation, the 200 auto parks will be separated into 4 segments every one of 50 parts individually. For every five parcels, we will require one Arduino, ten sensors, and one XBee ZigBee (Series 2) module, coming to 40 Arduino, 400 sensors and 40 XBee ZigBee modules for the entire investigation . These will be facilitated with server Zigbee module to enable the head to see the accessibility of parts in plain view. This work can be stretched out to self-governing auto parks where the presentation will be utilized to distinguish the accessibility of parking areas and additionally tolerating diverse installment techniques. The framework might be connected to PDAs through versatile applications to empower customers to hold parking areas utilizing their cell phones. The framework could likewise be associated with GPS frameworks to enable customers to look for void parking garages in various stopping regions remotely while driving in this manner sparing them time .

## **CONCLUSION**

It is evident that the interest for the savvy auto stopping framework will keep on expanding in the up and coming years. In spite of the fact that the savvy stopping framework as of now exists, our venture is gone for making the framework more financially savvy and easy to understand in this way expanding its appropriation

in the market. The task was fruitful and financially savvy, easy to understand and had 90% exactness. Future works will stretch out the framework to manage 200 parking areas and join other diverse advancements, for example, interlink with PDAs and GPS framework to expand its trustworthiness.

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