



## IOT Based Car Parking Slot Detection (in Malls)

*Fatima Mulla<sup>a</sup>, Zibyan Satopay<sup>b</sup>, Om Kamble<sup>c</sup>, Pournima Kamble<sup>d</sup>*

<sup>a</sup> Fatima Mulla, Dept of Computer Technology, BVIT, Maharashtra, India

<sup>b</sup> Zibyan Satopay, Dept of Computer Technology, BVIT, Maharashtra, India

<sup>c</sup> Om Kamble, Dept of Computer Technology, BVIT, Maharashtra, India

<sup>d</sup> Pournima Kamble, Dept of computer Technology, BVIT, Maharashtra, India

### ABSTRACT

The main aim of developing the parking slot detection system is to make the process of parking in malls easier and effortless, the user will not have to waste their time driving to find the free slot for parking. With the help of our system user can check the vacant slots for the particular parking while sitting at home. This system also notifies the user on the duration of their parking and helps them from getting their vehicle clamped. The main advantage it provides service 24/7 customer service and it reduces manual efforts and time.

**Keywords:** Sensors, Arduino

### 1. Introduction

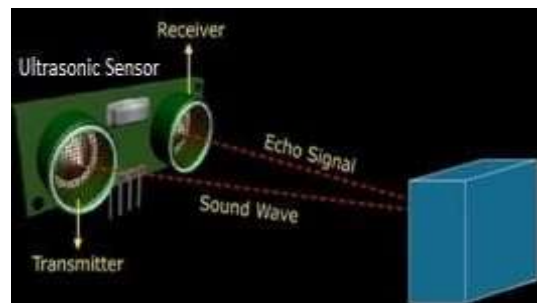
In parking slot detection system the user can see the empty slots for parking by sitting at home or at any place with the help of our application. User does not have drive to the particular mall and then waste their precious time just to find an empty slot and sadly return back if they doesn't find one. It also helps the user with graphical representation of the route to be followed to reach the particular slot selected by the user. This application has a feature that gives a warning message to the user when they are nearing the deadline, it means the user will be notified whenever they are going to exceed the parking time preventing the clamping of the vehicle. This application works for all the malls with a parking system and you can see the empty slot for any mall through a single platform. This application will also have a payment method to pay for the slot via QR code and a wallet system in the application.

There will also be a pre booking floor for the user that want to book a particular slot previously and the payment will be in a prepaid manner. Due to various medium of communication this application is multilingual which means the application works in 3 different languages i.e. (English, Hindi, Marathi).

#### 1.1 Ultrasonic Sensor

An Ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

Ultrasonic sensors are used primarily as [proximity sensors](#). They can be found in automobile self-parking technology and anti-collision safety systems. Ultrasonic sensors are also used in robotic obstacle detection systems, as well as manufacturing technology. [In comparison to infrared \(IR\) sensors](#) in proximity sensing applications, ultrasonic sensors are not as susceptible to interference of smoke, gas, and other airborne particles (though the physical components are still affected by variables such as heat).



## 1.2 Arduino Board

Arduino is an [open-source hardware](#) and [software](#) company, project, and user community that designs and manufactures [single-board microcontrollers](#) and [microcontroller](#) kits for building digital devices. Its hardware products are licensed under a [CC BY- SA license](#), while software is licensed under the [GNU Lesser General Public License](#) (LGPL) or the [GNU General Public License](#) (GPL), permitting the [manufacture](#) of Arduino boards and software distribution by anyone. Arduino boards are available commercially from the official [website](#) or through authorized distributors.

Arduino board designs use a variety of [microprocessors](#) and controllers. The boards are equipped with sets of digital and analog [input/output \(I/O\)](#) pins that may be interfaced to various expansion boards ('shields') or [breadboards](#) (for prototyping) and other circuits. The boards feature serial communications interfaces, including [Universal Serial Bus](#) (USB) on some models, which are also used for loading programs. The microcontrollers can be programmed using the [C](#) and [C++ programming languages](#), using a standard API which is also known as the Arduino language, inspired by the [Processing language](#) and used with a modified version of the Processing IDE. In addition to using traditional [compiler tool chains](#), the Arduino project provides an [integrated development environment](#) (IDE) and a command line tool developed in [Go](#).



## 2. Proposed work

The parking slot detection project is divided into two main parts: the Hardware and the Software. Firstly, let's see the working and requirements of the Hardware. So the main Hardware requirements are ultrasonic sensors, Arduino Uno board, USB A male to USB B male cable, and electrical wires.



### 2.1 Working of Sensor and Arduino

The main working of the system depends upon the Ultrasonic sensor. The sensor has a receiver and a sender. With the help of coding, the sensor is given a value that is the distance, which is calculated from the sensor to the ground level. The sensor sends sound waves to the specified distance and returns back to the receiver, and this process repeatedly occurs at an interval of some seconds. As soon as something comes in between the sensor and the ground, the sound wave will not reach the particular distance and will return from the point of obstruction, and will give the receiver the point of obstruction. The second part is the Arduino Board; this works as a connection between the Ultrasonic sensors and a device that is connected to the server. The Arduino board takes the input from the ultrasonic sensor and gives it to the device.

## 2.2 Software Working

Further working is based on Software part. The application is based on java on android studio and it also requires a server to keep the data and for faster & easier working of the application. Once the data is fetched from the Arduino board to the device the device is connected to the server, every second the device gets a data and it calls web service in the server to fetch the data. The web service works in classifying the data send by the device and storing the classified data in the database. When a user calls a particular function in the application, the application again calls a web service and then the classified data is shown to the user with the help of GUI (Graphical User Interface). All the process happens in fraction of seconds and we can set the duration in which the sensor sends the sound waves. We can also handle when the device should call the web service and send the data, In this case we have to make sure that the device sends data only when the slot gets full. Above all the working is for the ground floor, further we have a first floor. In our model which is prebooking type of system and can only be accessed by car that has a pre booking of the particular slot.

## 2.3 Payment System

We will also have a payment system and a wallet system. In our application so the application user just have to scan the QR code that is present at the entrance as well as the exit, once the user scans the QR at the entrance the time starts at the time and as the user leaves he has to scan the QR code at the exit to make the payment through the money in the wallet of the app. There will be one more QR code scanning system for entering the first floor of the system to enter the pre booking floor you must have a already booked slot.

## 3. Literature review

- Prof. Yashomati R. Dhumal<sup>1</sup>, Harshala A. Waghmare<sup>2</sup>, Aishwarya S. Tole<sup>2</sup>, Swati R. Shilimkar<sup>2</sup>-2016 has proposed Android Based Smart Car Parking System : The purpose of this system is to computerize the parking space reservation. Its talk about undertaking which introduces a miniature model of car parking that can direct and manage the number of cars that can be parked in given space at any given time based on availability of parking space after doing the registration by user using android application on his smart phone. Car-mated parking is a strategy for parking and leaving cars utilizing detecting device i.e., sensors. The entering to or leaving from parking lot is also commanded by an android based application. This provide users to book parking spaces online in advance for given location and then park the vehicle with minimal fees. We have concentrated on some current systems and it shows that the current systems are not totally car-mated and require a certain level of human interference and communication with the system. The difference between our system and existing systems is that we intend to make our system as less human independent by car-mating whole parking area.
- Vishwanath Y<sup>1</sup>, Aishwarya D Kuchalli<sup>2</sup>, Debarupa Rakshit- 2016 has proposed A survey paper on smart parking system based on internet of things a Smart Parking system. It provides an optimal solution for parking problem in metropolitan cities. Due to rapid increase in vehicle density especially during the peak hours of the day, it is a difficult task for the drivers to find a parking space to park their vehicles. The aim of the paper is to resolve the above mentioned issue which provides the Smart Parking system. This system uses cloud computing and Internet of Things (IOT) technology. A suitable shortest path algorithm is used to find the minimum distance between the user and each car park in the system. Thus, the waiting time of the user is minimized. The paper also introduces the usage of android application using smart phone for the interaction between the Smart Parking system and the user. RFID technology is used in this system to avoid the human intervention which minimizes the cost.

## 4. Advantages and Disadvantages of the System

### 4.1 Advantages

- Easy to access.( The concept is advanced and it is easy and simple to use or access.)
- Can hold data for multiple malls.(It can holds the whole data of parking system of every mall.)
- Fast and high response time.( The system is fast and work with high responses time.)
- Multilingual.( The system is created with multiple languages like:English,Marathi,Hindi.)

### 4.2 Disadvantages

- Each slot require individual sensor.( So every slot required a particular sensor which is main aspect.)
- Requirement of server.( Because the requirement of the server it is not profitable.)
- Cost of server is high.(So the server cost is high, it is not profitable again.)

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## 5. Conclusion

Our project detects the empty slots and helps the drivers to find parking space in malls . The average waiting time of users for parking their vehicles is effectively reduced in this system. The optimal solution is provided by the proposed system, where most of the vehicles find a free parking slot successfully.

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## 6. Future Scope

The future scope for this that there will the additional of the per-booking slot for the parking in the app, the wallet system for the making the payment easier and faster .As a further review , distinctive sensors frameworks can be added to enhance this framework to distinguish the question and the guide the driver or client speediest .

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