

Paper Type: Original Article



## Smart Parking and Smart Transportation with AI based Parking and Driving

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Citation:



Alqahtani, H. (2022). Smart parking and smart transportation with AI based parking and driving. *Big data and computing visions*, 2(2), 95-100.

Received: 06/01/2022

Reviewed: 12/03/2022

Revised: 09/04/2022

Accept: 01/05/2022

### Abstract

Parking and transportation becoming crucial from decades, the accidents per day around the world are increasing, so with sensors we can drastically decrease the death rate and accident rate around the world. In this paper I suppose to present you the sensors-based cloud smart parking and sensors-based AI and ML smart transportation.

**Keywords:** Artificial intelligence, Machine learning, Object detection model.

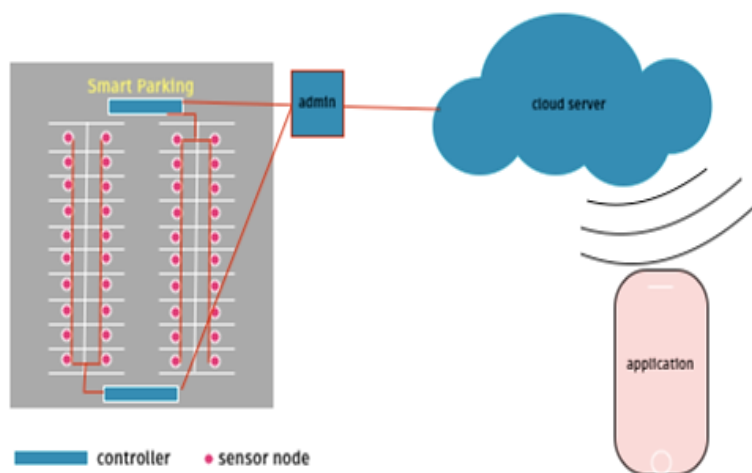
## 1 | Introduction

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The technology of smart parking was being very much useful these to avoid time breakers as well as faster parking at any type of circumstances, with the help of sensors we can overcome these kinds of problems with solutions which are cloud based parking slots [1]. The mechanism of this is simple as picking an apple from bucket of one apple and full of mangoes, firstly there will sensor on every parking slot which are type of ultrasonic which is useful to measure the distance from the sensor to object opposite to it, with this sensor will take bits of data which will be sent to cloud that will analyse the data and then update the status in the application this is how the smart parking works which is explained in *Fig. 1*.

Smart transportation is also becoming advanced in decades, to make driving smoother, easier and safer. The transportation is always a dynamic situation where the treats are different and difficult to handle, while travelling on a highway there will be many vehicles traveling along with, so some may drive like beginners [2]. We all know beginning make problems but here the lives are interacted so this will be major problem if any of minor mistake is avoided, here comes the sensor-based transportation which replaces the human which transportation, the working of this is overly complex because the machine decides the living creature's life, in here sensors are placed all around the vehicle which can take the 3600 snapshot of vehicle and then send it to computer or controller, now this will take action according to the data sent from sensors taking action is not an easy task there will be so

many conditions and statements to be followed while taking a single action then send the action to other output devices which are waiting for task to be taken from controller, this is done with artificial intelligence combined with machine learning where the object detection concept applied and the cruise control is one of the feature in smart transportation where one vehicle will follow the lane and the front vehicle distance and follow according to it in same speed with it to make driver relax a while but not completely independent, this smart transportation is also visualized in *Fig. 1* and cruise control is in *Fig. 2*.



**Fig. 1. Blueprint of smart parking model.**

Smart parking and smart transportation mechanism *Fig. 1* sensor based smart parking *Fig. 2* sensor based smart transportation with AI and literature review the Internet of Things (IoT) is the network of physical objects devices, vehicles, buildings and other items— embedded with electronics, software, ultrasonic sensors, and network connectivity that enables these objects to collect and exchange data [3]. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit; when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities [4]. Each thing is uniquely identifiable through it is embedded computing system but can interoperate within the existing internet infrastructure. Author has done that how the vehicle will occupy in the particular allocated place. Radio Frequency Identification (RFID) sensors detect the presence of a vehicle or other objects [5]. Once a vehicle is detected, the system needs a way to notify drivers, or a parking spot being occupied. The disadvantage is, the parking place will be detected only to the nearby places there is no GPS sensor to search the parking slots from the far place. With the development of road infrastructure, there is a significant increase in number of private vehicles which results in traffic congestion, directly effecting the flow of traffic, and life of citizens [6]. Parking becomes a significant problem in the urban areas. The research paper proposes a smart parking system to solve the current parking problem at affordable cost. Previously automatic car parking system were proposed to reduce the space or size required for parking especially in crowded places with few spaces, such as a multi-story car park providing cars with parking on multiple levels stacked vertically to increase the number of parking spaces [7]. The proposed system utilizes the latest advancement in the information and communication technologies and consists of four layers: application, middleware, networking, and sensor layer. It offers environmentally friendly, reduces harmful emissions during parking, and is a computerized system pre-programmed without human intervention. The research paper highlights the comparison of traditional parking system with smart parking system using IoT. The paper also proposes a framework for smart parking system [8].

**Advantage.**

1. Accurately sense and predict spot/vehicle occupancy in real-time [9].
2. Guides residents and visitors to available parking spot [10].
3. Optimize parking space usage.
4. Simplifies the parking experience and adds value for parking stakeholders, such as merchants and drivers [11].
5. Helps the free flow of traffic in the city leveraging IoT technology.
6. Enables intelligent decisions using data, including real– time status applications and historical analytics reports [12].
7. Smart Parking plays a key role in creating better urban environment by reducing the emission of CO2 and other pollutants [13].
8. Smart Parking enables better and real time monitoring and managing of available parking space which results in significant revenue generation [14].
9. Provides tools to optimize workforce management.

**Disadvantage.**

As the sensor are directly connected to controller there will be no issue with sensor controller connection, but controller should send status to cloud which is done via internet so the poor or defected internet connection [15]. Object recognition is a vital function for any device that communicates with humans; it is the most popular computer vision feature. Many external identification problems were studied, however. Most instances refer to objects in which humans often communicate, such as other person and body arts, such as ears, hands, and arms, as well as vehicles, such as cars, aircraft, and animals [16].

**Disadvantage of existing system.**

The existing systems are working well but efficiency is bad due to bad Central Processing Unit (CPU) requirements.

## 2 | Proposed System

The sensor based parking slot availability checking for user in parking lots via application and autopilot system with sensors for smart transportation where user experience smoother, easier, and safer travelling.

### 2.1 | Algorithm Used

**Algorithm: Smart parking**

- *Step 1. Start.*
- *Step 2. Detect the vehicle using ultrasonic sensor and send data to controller.*
- *Step 3. Analyse and structure the data and send it to cloud server.*
- *Step 4. Update the status of the parking area in server.*
- *Step 4.1. Go to Step 2.*
- *Step 5. Retrieve in smart device’s application.*
- *Step 6. End.*

**Algorithm: Smart parking**

- *Step 1. Start.*
- *Step 2. Detect the vehicles using sensor and send data to controller.*
- *Step 3. Analyse the data and check for conditions satisfaction.*
- *Step3.1. If (okay).*
- *send signal to output device*

- else
- go to Step 2
- **Step 4.** Move according to output signal.
- **Step 4.1.** Go to Step 2.
- **Step 5.** End.

### 3 | Result and Discussion

Traditional systems use loop detectors in the entry and exit points in the tracking process of parking availability. However, the new smart parking system needs the installation of wireless sensors in individual, single parking on streets [17]. It has been observed that in such instances, there will be some loopholes in the forthcoming years and even in the later stages of heterogeneity. There is a wide range of seminars involved in the subject of IoT, which cover various views and, therefore, address the sectorial ideologies that suggest that universes do not argue with themselves [18].

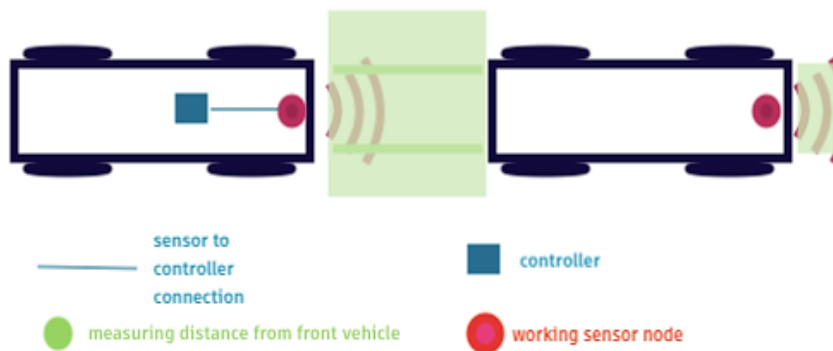


Fig. 2. Sensor based cruise control mechanism.

Various communication solutions are utilized in the device model (to overcome issues that are normally inherent to a single point of failure). Issues such as susceptibility to the distributed lack of service attack and the cases of distant hijacking attacks can make parking unavailable [19]. Furthermore, there are issues that expose the sensitive information belonging to drivers and their parking information, which is stored in the database due to the risk of privacy breach and loss [20]. The enormous number of interconnected devices gives rise to the scaling issues and the flexible infrastructure that is needed to deal with the security threat in an effectual surrounding. When there are no application layers, the smart parking system is limited in the performance of primitive tasks [21]. The application layer must make provision for the real-time information, which assists motorists in making proper decisions. The architecture must be compact that it can deal with the massive amount of information and the provision of services to a large scale of users. As a way of achieving this, there is a need to deploy cloud infrastructures in the public or in the private sphere [22]. The data could show the sections that need a high concentration and suggest an alternative for consumers who are nearby. Additionally, the data could be used to make parking predictions and provide information about the availability of spaces in areas where there are no sensors and there is poor communication coverage [16]. Commercially, the perspective of this information could be of significance as a service point that proves the nearby sites where there is high vehicular congestion [23]. Furthermore, construction companies can receive help from the information derived from the analysis of data on different parking aspects, especially when finding the places where they can construct more parking lots and increase the number of parking spaces [18].

### 4 | Conclusion

The smart parking system can be very much useful for faster parking and user can be able to have a look into it from anywhere with the internet connectivity, although parking is difficult in terms of identifying the free space in parking lot, this application can easily give solution in seconds without this user have

to search for free space in entire parking lot, so this made parking into smart parking. The smart transportation must be implemented very carefully because of complex mechanism and harder conditions where living life will be affected. This makes humans to completely rely on the artificial intelligence, artificial intelligence based applications are increasing dramatically in every kind of habitats. Autopilot makes driver to feel less pressured when any obstacles entered the lane by automatically slowing down the vehicle and stops in necessary conditions, this had been first implemented in aircrafts where pilot must work on controlling aircraft for hours this system now came into all kind of transportation vehicle which reduces accidents, deaths and increases safer rides worldwide. This kind of technology may need sensors with high efficiency and accuracy, so companies are kept on pushing further for creating new sensors with less space taking ability, less energy consumption, less manufacturing costs and more accuracy.

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