



# IoT Based Car Parking System

Saveetha G, Arvind.T ,Blesso M  
Department of Electrical & Electronics Engineering  
Dr Mahalingam College of Engineering & Technology  
Pollachi, Coimbatore, Tamilnadu-642003

J Nagarajan M.E., Assistant Professor,  
Department of Electrical & Electronics Engineering  
Dr Mahalingam College of Engineering & Technology  
Pollachi, Coimbatore, Tamilnadu-642003

## Abstract

The mishandling of the parking system makes an apparently straightforward and easy action like parking seem laborious and time-consuming. The maintenance of today's parking systems needs a large staff, and users must look for parking spaces floor by floor. Both the electricity and the user's precious time are wasted on such traditional systems. For a structured setting, like a multi-story office parking lot, this article provides a smart parking system solution. In order to create a user-friendly parking system, the system suggests integrating cutting-edge sensors and controllers with modern Internet of Things (IoT) technology. To enable a central system to access and route approaching automobiles to available spots, the occupied parking spaces are digitally stored on the cloud.

*Keywords-IoT,sensors and controllers ,user friendly parking system.*

## 1. INTRODUCTION

Parking is becoming a big problem for individuals since there are more and more cars on the road. Building these days is nearly difficult and highly expensive in many cities fresh parking spaces for the

cars, as the current ones are almost completely occupied. By utilizing Internet of Things technology, the Smart Car Parking System establishes a network of interconnected devices that facilitates smooth communication and exchange of data. Parking spaces are monitored and managed in real time by this system, which makes use of sensors, actuators, and a centralized management system. By installing smart sensors in parking lots, parking occupancy can be accurately detected and the availability of spaces may be instantly updated. When parking lots are used improperly, traffic jams form for both automobiles and people looking for space. It has been noted that the inability to find parking at a convenient time accounts for between 28 and 45 percent of traffic congestion. According to observations, drivers in France spend an estimated 80 million hours a year looking for the ideal parking space. Urban cities are seeing an increase in traffic, which leads to pollution and a host of physical ailments. In order to improve the quality of life and lessen traffic congestion, parking facilities and resources must be managed. This will also save people's time when looking for parking and may even indirectly reduce pollution. These days, smart cities prioritize sustainability more via advancing resource-management technologies such as the internet of



things. By 2020, the potential and usefulness of smart cities are projected to be worth over \$100 billion, with an annual expenditure of roughly \$17 billion. The prospective parking market has also been seen to be rising annually and quickly; in fact, the International Parking Institute has drawn more attention to it after conducting a survey and drawing conclusions on the developing trends in igniting innovation. Systems for managing traffic and parking infrastructure are the two main components of a smart city. It is only possible to address parking-related issues and the growing traffic in cities if drivers and owners of private vehicles are aware of available spots in advance of their intended destination or reserve a spot in advance of arriving there. There are a lot of features and advantages to IoT integration in parking systems. Drivers can reserve parking spaces in advance, find the closest open spots, and get the most recent information on parking availability through mobile applications and internet platforms. This convenience lessens road congestion, saves time and effort spent looking for parking, and improves customer experience overall. Utilizing the Internet of Things (IoT) to enhance parking management and enhance drivers' overall parking experience, the Smart Car Parking System is a creative solution. Conventional parking systems frequently have problems with traffic, insufficient real-time information, and inefficient use of available space. These parks are linked by the Internet of Things, which is further linked by Wi-Fi networks to the nearby parking lots. Cloud computing and Internet of Things (IoT) technologies are used in this system. In order to determine the shortest way between the customer and the parking lot, the appropriate shortest path algorithm is

defined. reducing the amount of time the user must wait. The project on IoT smart parking systems is to significantly reduce the amount of human labor required at the parking area. This model basically uses the parking area reserved by the app to calculate and observe available slots and calculate the cost for each vehicle. By using IoT technology, this smart system attempts to address these difficulties and create a more seamless and efficient parking experience. This research presents a solution that leverages the Internet of Things (IoT) to optimize the available resources in Smart Cities and minimize traffic congestion while saving time.

## 2. Block diagram

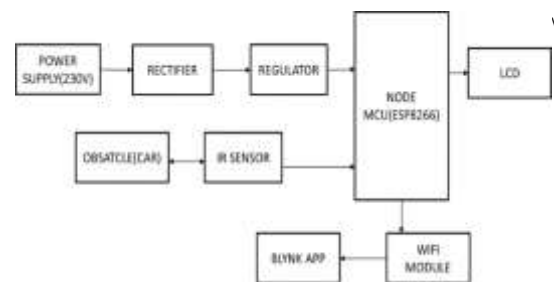


FIGURE:2.1.1 BLOCK DIAGRAM

## 3. HARDWARE SPECIFICATION

1. Microcontroller
2. Wi-Fi Modem
3. IR sensors
4. LED's
5. Transformer



6. Resistors

7. Capacitors

8. Diodes

### 3.1. INFRARED SENSORS

An infrared sensor is a gadget that emanates with the knowledge that the main goal is to recognize different elements of the surroundings. The infrared sensor may detect any movement of things in addition to measuring the brightness of an inquiry. Detached sensors are those that detect radiation rather than transmitting it; they are simply sensors that measure radiation.

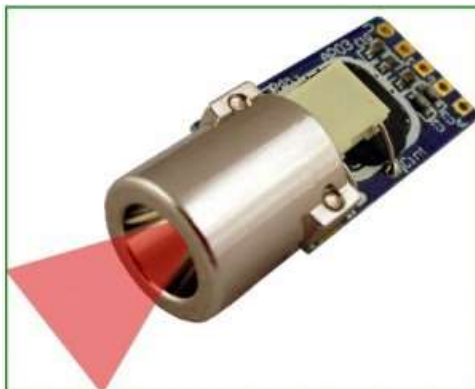


FIGURE:3.1 INFRARED RAYS

### 3.2. NODE MCU



FIGURE:3.2 NODE MCU

An open-source development board called Node MCU ESP8266 is built around the ESP8266 microcontroller. Because it has Wi-Fi connectivity, it can be used for Internet of Things applications. The Lua scripting language is supported by the Node MCU ESP8266, which is a great option for novices and enthusiasts as it is simple to learn and operate. Fig. 3.2: Node MCU The 32-bit RISC CPU of the ESP8266 microcontroller operates at 80 MHz clock speed. It contains an integrated Wi-Fi module that may operate as an access point or client and supports 802.11 b/g/n protocols. Additionally, it contains a number of GPIO (General Purpose Input/Output) pins that are useful for integrating with other hardware, like displays, actuators, and sensors.

Using Lua scripts, Node MCU ESP8266 offers an easy and practical approach to program and interface with the ESP8266 microcontroller. A computer may be used to program and debug the board thanks to its included USB-to-serial converter. Additionally, it offers a specialized API (Application Programming Interface) that grants access to the ESP8266 microcontroller's GPIO pins, WiFi module, and other functions. Because of the Node MCU ESP8266's low cost, simplicity of usage, and integrated Wi-Fi connectivity, it is frequently used for IoT project development and prototyping

### 3.3.LCD DISPLAY



FIGURE:3.3 LCD DISPLAY

Liquid Crystal Display (LCD) is a flat panel technology commonly used in electronic devices like TVs, monitors, and smartphones. It operates by modulating light through a layer of liquid crystals, controlled by electric currents. LCDs consist of pixels, each containing red, green, and blue sub-pixels that combine to produce a wide range of colors. They offer sharp images, consume less power compared to older display technologies like CRTs, and are lightweight and thin, making them ideal for portable devices. However, they have limitations such as restricted viewing angles and slower response times compared to newer technologies like OLED.

#### 4.SOFTWARE SPECIFICATION

- 1.Blynk App
- 2.Internet of Things
- 3.IoTGecko(cloud)

##### 4.1.BLYNK APP

Blynk is a versatile mobile application designed for IoT (Internet of Things) projects, enabling users to remotely control and monitor connected devices through smartphones or tablets. With a user-friendly interface and drag-and-drop functionality, Blynk allows users to create custom

dashboards and control panels without extensive programming knowledge. It supports a wide range of hardware platforms and communication protocols, including Arduino, Raspberry Pi, ESP8266, and more. Blynk offers features like real-time data visualization, push notifications, and cloud storage, making it an accessible and powerful tool for DIY enthusiasts, hobbyists, and professionals alike to build and manage IoT projects seamlessly.

#### 4.2 INTERNET OF THINGS

The modern world is revolutionized by the Internet of Things (IoT). It is a crucial phrase in the realm of technology, has significant effect in engineering, and is currently a hot topic in news headlines and other media. The Internet of Things (IoT) refers to the network of individually recognizable integrated computing devices that are used in conjunction with internet infrastructure. IoT technology encompasses a broad range of networked systems, products, and sensors that leverage advances in multiple domains, including computing power, electronics miniaturization, and things that were previously impractical, like network interconnects to provide new capabilities. The Internet of Things concept can be used in a variety of smart cities with higher internet dependency. Since security has become a big concern in many cities recently, IOT technologies are geared toward security, and IoT plays a significant role in this field. IOT has a big potential since everything can be connected to the internet, everything can be automated, and you can utilize the internet to do a lot of work-related tasks.

##### 4.2.1 IOT-CLOUD INTEGRATION



Cloud computing and IoT have witnessed large evolution. Both the technologies have their advantages, however several mutual advantages can be foreseen from their integration. On one hand, IoT can address its technological constraints such as storage, processing and energy by leveraging the unlimited capabilities and resources of Cloud. On the other hand, Cloud can also extend its reach to deal with real world entities in a more distributed and dynamic fashion by the use of IoT. Basically, the Cloud acts as an intermediate between things and applications, in order to hide all the complexities and functionalities necessary for running the application. Below are some of the factors that led to the amalgamation of Cloud and IoT. Storage capacity: IoT comprises of a large number of information sources (things), which produce huge amounts of non-structured or semi-structured data. As a result IoT requires collecting, accessing, processing, visualizing and sharing large amounts of data. Cloud provides unlimited, low-cost, and on-demand storage capacity, thus making it the best and most cost effective solution to deal with data generated by IoT. The data stored on the Cloud can be accessed and visualized from anywhere through standard APIs. Computation power: The devices being used under IoT have limited processing capabilities. Data collected from various sensors is usually transmitted to more powerful nodes where its aggregation and processing can be done. The computation needs of IoT can be addressed by the use of unlimited processing capabilities and on-demand model of Cloud. With the help of cloud computing, IoT systems could perform real-time processing of data thus facilitating highly responsive applications. Communication resources. The basic

functionality of IoT is to make IP-enabled devices communicate with one another through dedicated set of hardware. Cloud computing offers cheap and effective ways of connecting, tracking, and managing devices from anywhere over the internet. By the use of built-in applications IoT systems could monitor and control things on a real-time basis through remote locations. Scalability: Cloud provides a scalable [29-34] approach towards IoT.

## 5.CONCLUSION

Humanity has always fantasized about smart parking systems and smart cities. However, significant advancements have made the vision of a smart city a reality in recent years. As the Internet of Things has developed, new possibilities for smart city outcomes have become possible. Two key components of creating a smart city are intelligent parking structures and traffic control systems. In the new digital world full of many technologies, where we have access to methods to make our everyday routines much faster and easier, the Internet of Things has been playing a very important role. We have tackled the parking issue and proposed an Internet of Things (IoT) based parking system in this study, which describes a revolutionary solution. The suggested framework offers real-time information regarding parking space accessibility in an area by utilizing data on the utilization of different technologies and cooperative models. This information is obtained from the 2018 International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT). By checking the available parking spaces, drivers or private



vehicle owners could reserve a spot for them. Today's drivers want hassle-free parking, therefore they choose and demand faster, more intelligent services. But smart parking is an essential service, particularly in cities. The paper's smart parking system is steadily improving, saving money, reducing wait times, and generating more income. Operators can optimize their benefits by real-time monitoring of available parking spaces.

## 6. REFERENCE

- [1] Madhuri, R., Arora, S., & Kumar, A. (2021). Smart parking management system using IoT. *International Journal of Engineering Research and Technology*, 10(1), 119-124.
- [2] Nasir, A., Ali, M., Zikria, Y. B., & Javaid, N. (2020). Design and implementation of an intelligent car parking system based on IoT. *Wireless Communications and Mobile Computing*, 2020, 1-13.
- [3] Jagtap, V. R., Shelke, S. V., & Kulkarni, V. H. (2019). Smart parking management system using IoT. *International Journal of Computer Science and Information Technologies*, 10(5), 6022-6025.
- [4] Mahapatra, D., Sahoo, P. K., Sahoo, A. K., & Das, S. (2020). IoT-based smart parking system using ultrasonic sensors and cloud computing. *International Journal of Distributed Sensor Networks*, 16(1), 1550147720902188.
- [5] Alaba, F. A., Othman, M. A., Hashem, I. A. T., Alotaibi, F. M., & Zemerly, M. J. (2017). Internet of Things security: A survey. *Journal of Network and Computer Applications*, 88, 10-28.
- [6] Dey, S., Middy, U., Biswas, A., & Chatterjee, S. (2018). IoT-based smart parking system using Arduino and ultrasonic sensor. In 2018 2nd International Conference on Advances in Electrical, Electronics, Information, Communication and Bio-Informatics (AEEICB) (pp. 1-5). IEEE.
- [7] Sahoo, P. K., Das, S., Mahapatra, D., & Sahoo, A. K. (2019). IoT-based smart parking system using Raspberry Pi and Android application. In 2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT) (pp. 1-6). IEEE.
- [8] Sharma, N., Sharma, A., & Gupta, A. (2020). An intelligent car parking system using IoT and cloud computing. In 2020 IEEE 4th International Conference on Electronics, Communication and Aerospace Technology (ICECA) (pp. 755-758). IEEE.
- [9] Chatzigiannakis, I., Vitaletti, A., & Pyrgelis, A. (2016). A privacy-preserving smart parking system using an IoT elliptic curve based security platform. *Computer Communications*, 89, 165-177.
- [10] Yanxu Zheng, SutharshanRajasegarar, Christopher Leckie "Parking Availability Prediction for Sensor-Enabled Car Parks in Smart Cities" 2015 IEEE Tenth International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP) Singapore, 7-9 April 2015
- [11] E. I. Vlahogianni, K. Kepaptsoglou, V. Tsetsos, and M. G. Karlaftis, "Exploiting new sensor technologies for realtime parking prediction in urban areas," in Transportation Research Board 93rd Annual Meeting, no. 14-1673, 2014.
- [12] Vishwanath Y, Aishwarya D Kuchalli, DebarupaRakshit, "Survey paper on Smart Parking System based on Internet of Things" *International Journal of Recent Trends in Engineering & Research (IJRTER)* Volume 02, Issue 03; March - 2016 [ISSN: 2455-1457]



[13] Prof.S.S.Thorat, Ashwini M,  
AkankshaKelshikar, SnehaLondhe, Mamta  
Choudhary, "IoT Based Smart Parking  
System Using RFID"International Journal  
of Computer Engineering In Research  
Trends, Volume 4, Issue 1, January -2017,  
pp. 9-12 ISSN (O): 2349-7084  
2018 International Conference on  
Innovation and Intelligence for  
Informatics, Computing, and Technologies  
(3ICT)