International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 12 Issue: 05 | May 2025 www.irjet.net p-ISSN: 2395-0072

IOT Based Smart Parking System Using ESP8266 NodeMCU

***Prof. Amruta Chaudhari, Gaurav Tayade, Aishwarya Mahankar, Shamal Kherde**

**Professor of Department of Electronics and Telecommunication Engineering, DRGITR Amravati, Maharashtra*
Student of Department of Electronics and Telecommunication Engineering, DRGITR Amravati, Maharashtra

---

Abstract - *Today, parking has become a major problem due to the rising usage of cars everywhere. We are introducing an Internet of Things (IoT)-enabled parking system that allows users to view and book parking spaces. For security purposes, we have an RFID reader placed at the entry gate. Making it easier for consumers to determine whether parking spots are available at an excessive parking area prior to coming is the primary goal of this project. All parking system issues are significantly reduced as a result of the more clever and efficient parking mechanism that is produced. Every slot has a sensor that continuously checks its condition and updates the data to the cloud platform and application, which allows users to verify parking availability and reserve a spot.*

Key words: IoT, sensors, cloud platform, smart parking, secured parking, etc.

1.INTRODUCTION

The Internet of Things (IoT) uses the internet to link different physical items and devices worldwide. The Internet of Things (IoT) is a system that links computers, machines, etc. that have been assigned unique identities (UIDs). It allows data to be sent across a network without the need for communication between the objects [1-4]. IoT is essentially an extension of Internet-based services [5-8]. In order to collect and share data over a network without requiring human-to-human or human-to-computer interaction, the Internet of Things (IoT) is a network of physical objects, such as instruments, devices, and other items embedded with electronics, circuits, software, sensors, and network connectivity [9–11]. The Internet of Things makes it possible to remotely sense and control objects over an existing network infrastructure. also creating opportunities for more direct integration of the physical world into computer-based systems, and leading to improved efficiency and accuracy

Component	Description
ESP8266	The project's brain is a Wi-Fi module (NodeMCU). It manages other parts and establishes a connection with the internet.
3.7V Cell	The system is powered by a rechargeable battery, such as a Li-ion 18650.
7805 Voltage Regulator	Transforms 3.7V to 5V regulated output for LCD and servo components.
IR Sensor	Detects the presence of a vehicle (entrance or exit).
Servo Motor	regulates the opening and closing of a parking gate or barrier.
LCD (16x2)	shows the parking status (e.g., "Slot Full" or "Slot Available").
Jumper Wires	utilized for all electrical connections.
Cell Holder	attaches the 3.7V cell to the circuit and holds it firmly.

Table -1: Component Description

2. BLOCK DIAGRAM

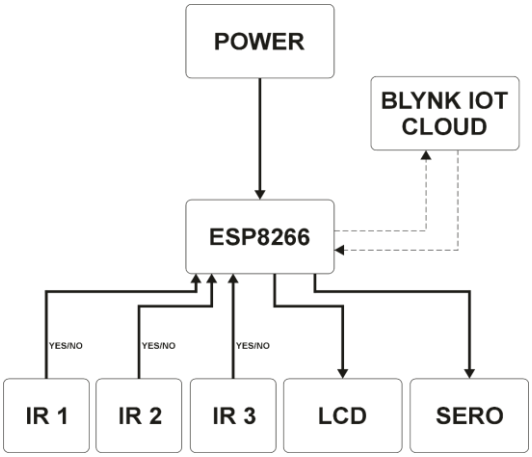

Fig.1: Proposed system block diagram

To determine whether there are cars in parking spaces, the ESP8266 NodeMCU, the primary controller of the Internet of Things-based smart parking system, gets data from IR sensors (IR1, IR2, and IR3). The ESP8266 uses sensor input to control a servo motor that opens or closes the entry gate and shows the parking status in real time on an LCD. Additionally, it transmits real-time parking data to the Blynk IoT Cloud, enabling users to Use a smartphone to verify the slots' availability remotely. The entire system is powered by a dedicated power source.

3. CIRCUIT DIAGRAM

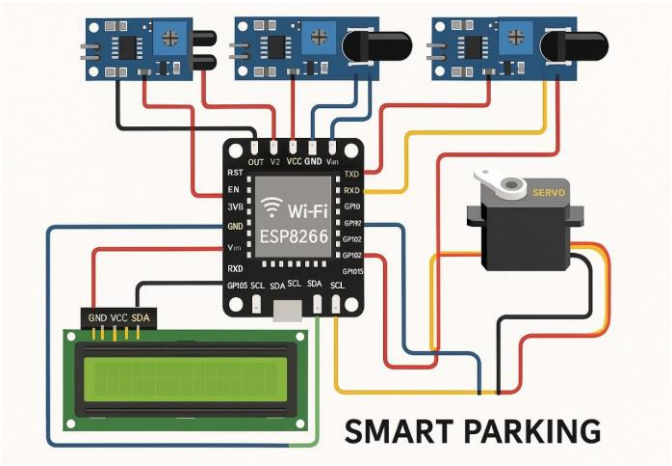

Fig.2: Circuit Diagram Simulation

Three infrared sensors, an LCD screen, and a servo motor are all connected to the circuit's ESP8266 NodeMCU, which serves as its primary controller. When cars are found in parking spaces, the IR sensors relay signals to the ESP8266 via digital pins. The ESP8266 continuously refreshes the LCD display to indicate slot availability based on sensor inputs. Additionally, it manages a servo motor that opens or closes the parking gate automatically when a space becomes available. Furthermore, the system uses the ESP8266's built-in Wi-Fi to connect to the internet and transmits real-time parking data to the Blynk IoT Cloud, enabling customers to verify slot status remotely through a mobile app. The VCC and GND pins on the NodeMCU provide power to every component.

4. MOBILE SOFTWARE USED

Fig.3: Blyink IOT

An IoT-Based Smart Parking System using the ESP8266 NodeMCU makes use of the Blynk IoT platform. Blynk makes it possible for the microcontroller and a user's smartphone or web application to communicate seamlessly. A network co-processor for reliable cloud connectivity, blueprints and templates for effective project design, and device provisioning for a fast and secure hardware connection are some of the key features. Additionally, the technology supports both online and mobile apps, giving users real-time gate access control and remote parking space availability monitoring. The system is intelligent, easy to use, and available from any location thanks to its connection.

5. MODEL & TEST RESULT

Fig.4: Model of The Smart Parking System

A 7805 voltage regulator transforms the 3.7V Li-ion battery that powers the Smart Parking System into the steady 5V output needed by parts like the LCD display and servo motor. As the main controller, the ESP8266 (NodeMCU) manages the system's logic. In order to identify cars as they come or go, it interrupts the infrared beam after processing information from an IR sensor at the parking entrance/exit. The ESP8266 triggers a servo motor to raise a gate, letting a car pass when parking spaces become available. The servo closes the gate after a brief pause. The 16x2 LCD display, which indicates parking status (such as the number of available slots or "Slot Full"), is updated concurrently by the ESP8266. An I2C module connects to the LCD, simplifying wiring and lowering the number of pins needed. The system may remotely monitor parking availability by sending data to an internet server or app with optional Wi-Fi connectivity. Jumper wires are used to arrange the complete system, which makes maintenance and troubleshooting simple.

6. FUTURE SCOPE

IoT-based smart parking systems based on ESP8266 NodeMCU can increase productivity, enhance user experience, and automate parking operations. Future scope includes advanced features like AI-powered navigation, automated billing, and seamless integration with smart city infrastructure. This system can speed up the entire parking process, from finding available spots to paying and departing, thanks to automated gate operations and real-time parking availability updates.

7. CONCLUSION

In the past few years, great strides have been made in the realization of smart cities. As cloud and Internet of Things technologies have advanced, there are now more possibilities for smart cities. Intelligent parking structures and traffic management systems have long been the cornerstones of creating smart cities. In this study, we tackle the parking issue and present an Internet of Things-based cloud-integrated smart parking system. Our suggested solution provides up-to-date data on parking lot space availability. Users from distant locations can book a parking spot for themselves using our smartphone application. Enhancing a city's parking infrastructure is the aim of the work described in this article in order to improve the quality of life for its residents.

REFERENCES

[1] S. K. Nookala Venu (2022). IJFANS, 11 (1), 2323-2330. Machine Learning Application for Medicine Distribution Management System.

[2] S. W. Nookala Venu (2022). A Deep Learning-Based Wearable Drug Recognition System for Visually Impaired Individuals. 12 (1), IJFANS, 2340-2348.

[3] Research and Experimental Analysis on FBMC and OFDM by Dr. Nookala, Venu and Soujanya, Namoju and Goud, Burra Megamala and Bhavani, Thakur Yuktha and Rajashekar, Appidi (July 2022). Innovative Engineering and Management Research International Journal (IJIEMR)

[4] Venu, Amrutha and Dr. Nookala, Sandhya and Katti, Sai Krishna and Ananthula, Rani B, Utilizing IoT to Track the Nearest Gas Pumps and Monitor Vehicle Fuel Level (July 2022). Innovative Engineering and Management Research International Journal 2022,

[5] A, Shiva and U, Krishnaveni and Priya R, Face Mask Detection System Using Python Open CV by Supriya and Tahseen, Anjum and Dr. Nookala, Venu (July 2022). Innovative Engineering and Management Research International Journal 2022,

[6] Raffiudhin, Alcohol Detection and Engine Locking System, Dr. Nookala, Venu and M, Vamshi and V, Akhil and K, Deepika and K, Prashanth and M (July 2022). Innovative Engineering and Management Research International Journal 2022.