International Journal of Science, Strategic Management and Technology
Volume **02** Issue **05** May-**2026** | ISSN: **3108-1762 (Online)** | Impact Factor: 3.8
An International, Peer-Reviewed, Open Access Scholarly Journal Indexed in recognized academic databases

AI-Based Smart Parking System: Empty Parking Space Counting and Display for Parking Guidance

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https://doi.org/10.55041/ijsmt.v2i5.028

Cite this Article: Dandvate, S., Wakchaure, A. & Yadav, A. (2026). AI-Based Smart Parking System: Empty Parking Space Counting and Display for Parking Guidance. International Journal of Science, Strategic Management and Technology, *02*(05). https://doi.org/10.55041/ijsmt.v2i5.028

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ABSTRACT

Our world has been developing into a digital era since the introduction of technologies which is responsible for the evolution and changes in the lives of many people. However, there are still no development on the issue of parking system that is usually full especially in crowded areas to notify people on the absence of parking spots that ends up wasting their time. The anxiousness and worries of people results in their daily schedule change to fit in the time taken to look for a parking spot. The project that is made to be implemented focuses on a web-application to notify users on the availability of parking and the location of the parking. This project allows users to locate and identify available parking space with the view of just a web application. Light-dependant resistor(LDR) sensor is used to detect the presence and absence of car .The data transferred from the sensor to the web application is sent by using ESP32. The feature available in the web application is the indicator of an occupied parking space and a free parking. To enhance the effectiveness of the web application, we made it available to be used on website to ensure users are able to apply and use the system in real timeshould be between 150 and 250 words and must reflect the core contribution of the paper. Please avoid citations in the abstract.

Keywords: web application, ESP32, LDR sensor

I. INTRODUCTION

The idea came to light after an observation was made in daily life when going to crowded areas. Status quo shows that car parking areas do not have an indicator to indicate vacant parking space to individuals that are looking for a parking space even during this modern era technology-based society. Parking space has been a very crucial on current day and age since most individual owns a car, therefore there are an increase number of parking spots occupied, which makes it harder to find one especially when someone is in a rush. This is a global issue that is not addressed due to the perception of the issue considered as a non-primary objective to be focused on. The anxiety and worries of no available parking spot has a huge impact in people's daily lives to an extend of people rescheduling their daily time table to be able to secure parking to be on time for work [5]. With this project, we are able to help users by having an indicator system through a web-application so that people will be able to find parking spots at a faster rate especially in crowded areas.

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are a lot of people looking for parking in the area.

1. 2.0 LITERATURE REVIEW

An occupied parking detection system is a system that is developed to identify a series of parking space and sends data back to alert whether the parking space is occupied or vacant. This system has been developed previously with different ways of implementations on the project. The difference between the projects existed using this system is the sensors used to detect the presence of vehicles and the ways each project utilize the data gathered from the system.

1.1 Home Automation Using ESP32, Arduino and XBee In this research paper, it focuses on the connection of home automation to the internet. It is a simple and basic design which has a humongous functionality of monitoring and wireless control by only using the Internet. The basic approach on developing the project is to ensure all automation work can be controlled and status monitoring is available through the internet on mobile phones or computers [1]. Home automation has been booming and developing since the past decade and it has been hard to keep track and control the existing automation. Creating an online system to monitor and control will save numerous times to notice system failure and status [2]. In this project, all electronic equipment that is compatible with the system will be able to connect and display its status through the home automation device and is able to be control remotely.

Figure 2 shows the home automation system with wireless control

From the project above, there are a few downside that can be improved. Firstly, the project uses two microcontroller which is not ideal. It complicates the project into linking the ports and data from arduino to the ESP32 to be sent wirelessly and enable wireless control. One of the changes can be made is by using only one microcontroller to unify the system and reduce the total amount of device used whichcan reduce the cost of the project as well. Secondly, the devices data sent to the microcontroller is wireless. This is a bit problematic for houses that has a bigger range and needs a few Wi-Fi to enable the other devices to connect. One improvement that can be made is by sending data to the microcontroller without wireless signal. This would reduce the needs of using Wi-Fi and only connects the Wi-Fi with the microcontroller and enables a more stable connection and control from the remote to the other devices.

1.2 Application of Wireless Internet Networking using NodeMCU and Blynk Application

Well known arduino projects that connects via wireless network usually uses the ready-to-use Blynk Application. Blynk is an application which enables user to control projects related to Arduino, and Raspberry Pi to connect to the Internet and having control over them. Blynk service is offered on iOS and Android platform which is available for both android and iphone users. It is an application that allows users to build a digital dashboard and freely control the graphic interface by using the infamous drag and drop widgets. Moreover, Blynk application is very flexible as it is not tied to any type of hardware devices. Whereas, NodeMCU is known as a controller unit which is known as a very cheap open source IoT platform.It is able to run any wireless hardware related especially if it is based on the ESP module.

This project studies the connection between NodeMCU and Blynk application on how responsive, good, and limitations. NodeMCU offers Wi-Fi network in order for hardware to connect to Blynk application. Projects made and analyzed in the research includes Tiny Internet Weather Station and Wireless Light Control.

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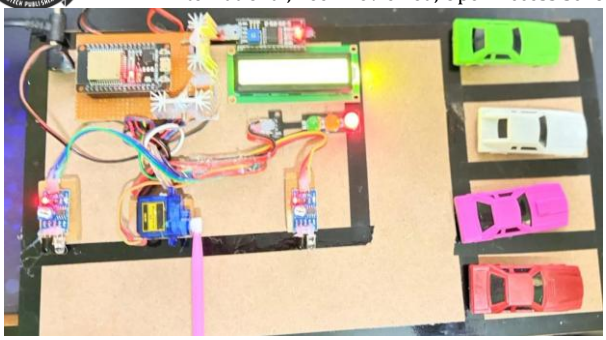

Figure 3 shows the Tiny Weather Station Project

From the project above, the major problem is the usage of blynk application. Blynk is a powerful tool to make a prototype, but it is a web server that depends on the status of the host. If the host of Blynk application breaks down, we cannot access the data wirelessly even though the project is successfully made.

5. Discussion

From the project above, we are able to achieve the results we wanted based on our objectives. Although there are a few miscalculations and unexpected situation, I am able to make the project and the prototype as close as possible.

Firstly I managed to create a hardware system using ESP32, LEDs, and LDR sensor. ESP32 is used for the I/O input/output pin which is code by using Arduino IDE. LDR is able to detect light source while green LED and red LED reacts accordingly to the LDR sensor. One of the problem is the circuit since it requires too many wires, it ends up costing a parking space to be malfunctioned and needed repair.

For the web server and web page, I managed to create a web server that has a home page and a layout page. The homepage will redirect towards the parking layout according to the location chosen on the homepage.

Lastly, from the results above, I manage tosuccessfully make a project that answers to all of the objectives which is to use LDR sensor for my parking detection system, LED to indicate the availability of parking in physical form, and a parking layout that displays the parking in accordance to the input of the LDR sensor.

6. Conclusion

In this project, we aim to create an online parking system where we are able to detect the availability of a parking, and display the data received on a web page in accordance to the layout designed. LDR sensor is used to detect the availability of a parking by sensing the presence of light, while green and red LED is used to indicate the parking physically.

When the LDR sensor detects an absence of light, it will turn on the red LED while switching off the green LED. Whereas if the LDR sensor detects the presence of light, greed LED will turn on instead and the red LED will be turned off. While this is happening, the web page will display the data received from the LDR sensor via the webserver of ESP32.

ESP32 will send the data to the web page, and the web page will change the colour of the parking based on the layout and the designed set. If LDR sensor sense the presence of light, the parking layout in the web page will display the parking spot as green as an indicator for available parking online, whereas if LDR sensor detects an absence of light, it will change the colour of the parking to red to indicate that the parking is occupied.

For further improvement of this project, one of the things that can be added on is the detection of disabled parking and women only parking by using RFID. This will make things easier to detect if cars parked at the disabled spot and women only spot has registered for the parking.

Moreover, this project can be improved more by simplifying the circuit to use less wires, by using rgb light to change the colour of the light instead of using 2 LEDs, and by using a relay to reduce the amount of input and output of the project.

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