Smart Parking System Using NodeMCU and IoT Technology

[1]Prof. Tushar Mote, [2]Swaraj A. Gurav, [3]Ruturaj R. Gumaje, [4]Prajakta S. Ghige

Department of Electronics and Telecommunications Engineering
JSPM's Jayawantrao Sawant College of Engineering,
Hadapsar, Pune – 411028

Abstract— **A practicality vehicle leaving framework utilizing NodeMCU is a kind of IoT-based leaving framework that plans to tackle the issue of finding a parking space in a jam-packed region. The framework comprises of IR sensors that are set at each parking spot to recognize the presence of a vehicle. These sensors are associated with a NodeMCU, which is a minimal expense Wi-Fi module that empowers the sensors to speak with a cloud-based server. The server then, at that point, stores the information and sends it to a versatile application or a web interface that the client can admittance to really look at the accessibility of parking spaces continuously. This framework assists clients with saving time and diminishes gridlock by directing them to the closest accessible parking space. Moreover, it additionally helps parking garage proprietors to productively deal with their parking spot and create income by charging for stopping expenses**.

PROBLEM STATEMENT

High vehicle thickness on streets. This outcomes in irritating issue for the drivers to leave their vehicles as it is undeniably challenging to track down a leaving space. The drivers typically sit around and exertion in finding parking spot and wind up leaving their vehicles tracking down a space on roads. In most pessimistic scenario, individuals neglect to find any parking spot particularly during top hours and happy seasons.

I. INTRODUCTION

Presentation in this day and age, urbanization and industrialization have prompted an expansion in the quantity of vehicles out and about, making gridlock and leaving the board issues. A brilliant stopping framework in light of the Web of Things (IoT) utilizing NodeMCU can be a promising answer for this issue. NodeMCU is an open-source firmware and advancement board that empowers the formation of IoT gadgets with Wi-Fi network.

II. LITERATURE SURVEY

[1] "A Keen Stopping Framework Based on NodeMCU and Ultrasonic Sensors" by Li et al. (2021). This think about proposes a savvy stopping framework that employments NodeMCU and ultrasonic sensors to distinguish the nearness of vehicles in real-time
[2] "An IoT-Based Savvy Stopping Framework Utilizing NodeMCU and MQTT Convention" by Jindal et al. (2020). This paper presents an IoT-based shrewd stopping framework that employments NodeMCU and MQTT convention to screen and oversee stopping spots..
[3] "A Savvy Stopping Framework Based on NodeMCU and Picture Preparing" by Kim et al. (2020). This think about proposes a keen stopping framework that employments NodeMCU and picture preparing to identify the nearness of vehicles in stopping parts.
[4] "A Real-Time Stopping Opening Accessibility Framework Utilizing NodeMCU and Ultrasonic Sensors" by Noh et al. (2019). This paper presents a real-time stopping opening accessibility framework that employments NodeMCU and ultrasonic sensors to distinguish the nearness of vehicles in stopping parts.
[5] "An Mechanized Car Stopping Framework Utilizing NodeMCU and Android Application" by Shaik et al. (2018). This consider proposes an computerized car stopping framework that employments NodeMCU and an Android application to oversee and screen stopping spaces

III. SYSTEM ARCHITECTURE

NodeMCU is a famous stage for building IoT gadgets, and its design incorporates a few key parts:
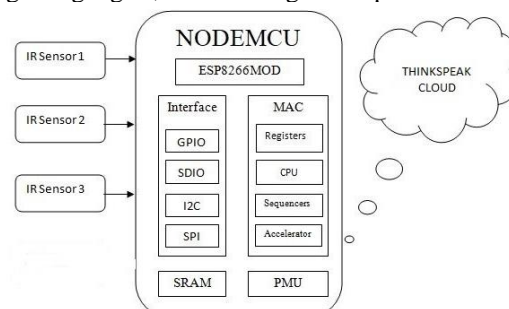

Fig. 1. SYSTEM ARCHITECTURE

1.ESP8266: NodeMCU depends on the ESP8266 framework on-chip (SoC), which incorporates a strong 32-digit microcontroller unit (MCU) and Wi-Fi capacities. The ESP8266 is answerable for executing the code that controls the NodeMCU and speaking with the web over Wi-Fi.
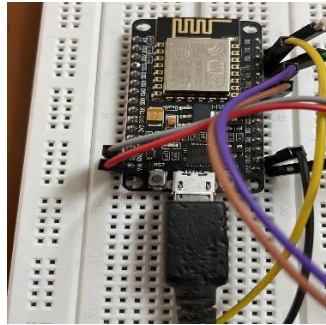

Fig. 2. ESP8266

2.Lua Mediator: The NodeMCU firmware incorporates a Lua translator, which permits you to compose code in the Lua prearranging language. Lua is a lightweight and quick language that is appropriate for IoT applications. You can compose Lua code straightforwardly on the NodeMCU or transfer it from a PC.

3.GPIO Pins: The NodeMCU has a few Broadly useful Info/Result (GPIO) pins, which can be utilized to interface with sensors, actuators, and different gadgets. The GPIO pins can be controlled utilizing the Lua Programming interface, which permits you to peruse input values, set yield esteems, and arrange the pins.

4.ADC: The NodeMCU additionally incorporates a Simple to-Computerized Converter (ADC), which can be utilized to peruse simple signs from sensors. The ADC is gotten to utilizing the Lua Programming interface.

5.USB: The NodeMCU incorporates a USB interface, which can be utilized to drive the gadget and speak with a PC. The USB point of interaction can be utilized to transfer Lua code to the NodeMCU and to screen the result of the Lua translator.
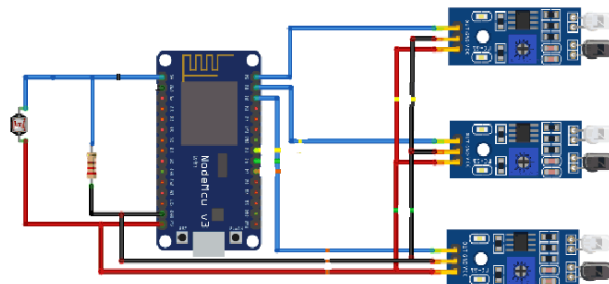
CIRCUIT DIAGRAM:
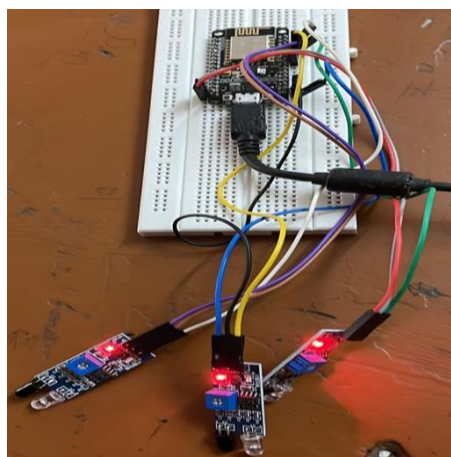

Fig. 3. CIRCUIT DIAGRAM

Fig. 4. Hardware representation

IV. RESULTS AND PREDICTION

It appoints the WiFi organization and ThingSpeak Programming interface certifications, characterizes the pins for the IR sensors, and sets the constants for sensor readings. Then, at that point, in the primary circle, it examines the sensor values, works out the quantity of vehicles left, and distributes the worth to the ThingSpeak channel in the event that there is an adjustment of the quantity of left vehicles or on the other hand assuming that no vehicles are left.
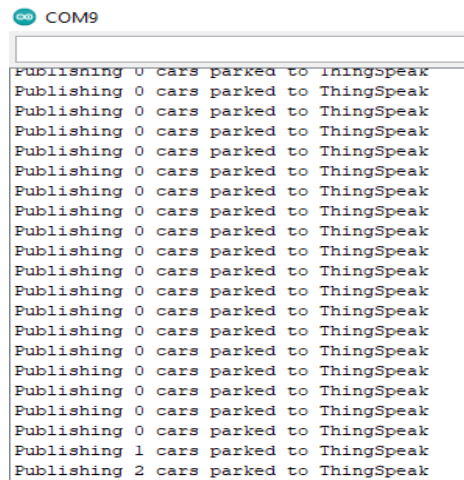

Fig. 5. Serial Monitor

The output appeared over fig.5 indicates the serial screen information given by ArduinoIDE which successfully appears the working of sensors associated after the uploading the code to NodeMCU .It appears the information of how much stopping openings are accessible and is distributed information to thingspeak.

We can now anticipate that the IR sensors will be put at various areas in the parking area to recognize the presence of left vehicles. The code checks the sensor readings each 50 milliseconds, which might be adequate for ongoing observing. In any case, it just reports the quantity of vehicles left, and gives no data about the area or status of individual parking spaces.
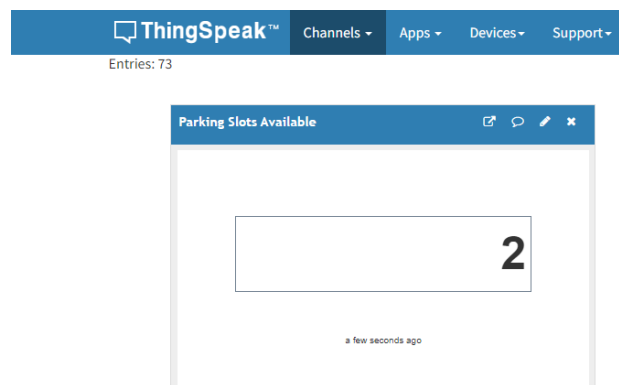

Fig. 6. Slots Available

Above is the representation of the number of slots available for parking in a parking slot and the data is represented on ThingSpeak live and keeps on updating as per the change in slot availability.
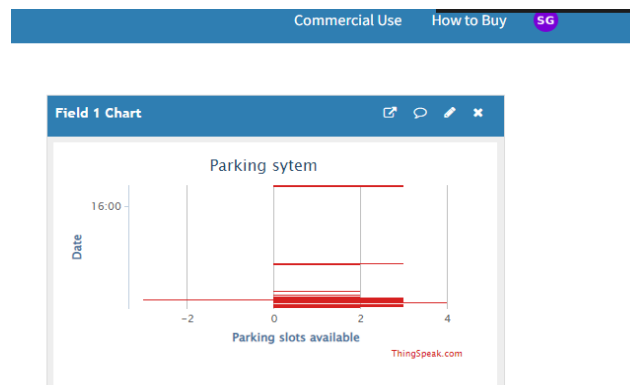

Fig. 7. Graphical Representation

Also, the graphical representation (fig. 7) is done on Thingspeak from the data collected.

As far as results, the option to precisely recognize the presence or nonappearance of vehicles in view of the IR sensor readings. It ought to likewise have the option to dependably distribute the quantity of vehicles left to the Thingspeak channel, given that the WiFi network is steady and the channel qualifications are substantial. In any case, the exactness of the outcomes might be impacted by outside variables like lighting conditions, sensor adjustment, or the presence of articles other than vehicles in the sensor range.

V. CONCLUSION

This extend gives a completely prepared IoT-based Stopping Framework that utilizes NodeMCU to supply arrangements to different parking problems. This module will empower the drivers to pre-book the stopping spaces to avoid them from activity blockage and disturbance. Assist, it'll moreover diminish discuss contamination and give an effective framework with no wastage of time and fuel in looking for empty stopping parcels.

ACKNOWLEDGEMENT

REFERENCES:

1. Li, Y., Huang, X., Yang, X., Zeng, Y., & Liu, Q. (2021). A Keen Stopping Framework Based on NodeMCU and Ultrasonic Sensors. IEEE Access, 9, 52743-52752.
2. Jindal, N., Kansal, A., & Gupta, P. (2020). An IoT-Based Savvy Stopping Framework Utilizing NodeMCU and MQTT Convention. IEEE Internet of Things Journal, 7(7), 6062-6070.
3. Kim, D., Kim, J., & Choi, J. (2020). A Savvy Stopping Framework Based on NodeMCU and Picture Preparing. Sensors, 20(6), 1764.
4. Noh, H., Kim, J., & Kim, J. (2019). A Real-Time Stopping Opening Accessibility Framework Utilizing NodeMCU and Ultrasonic Sensors. IEEE Access, 7, 40036-40042.
5. Shaik, B. A., Kumar, P. V., & Reddy, P. B. (2018). An Mechanized Car Stopping Framework Utilizing NodeMCU and Android Application. Procedia Computer Science, 133, 1155-1162.
6. "Design and Improvement of Brilliant Stopping Framework In light of IoT Innovation" by Vipin Jain and Abhishek Jain. Worldwide Diary of Software engineering and Versatile Registering, Vol. 6, Issue 7, July 2017.
7. "A Savvy Stopping Framework in light of Remote Sensor Organizations" by M. Bahrepour, M. K. Akbari and H. Eslami. Worldwide Diary of PC Applications, Vol. 109, No. 10, January 2015.
8. "Smart Stopping Framework utilizing Remote Sensor Organizations and Web of Things" by M. S. Al Mamun, M. R. Amin and M. F. Ahmed. Procedures of fourth Worldwide Gathering on Advances in Electrical Designing (ICAEE), 2018.
9. "Smart Stopping Framework utilizing IoT and AI" by R. P. Rajendran and M. R. Anitha. Procedures of third Worldwide Gathering on Electrical, Gadgets, Correspondence, PC Innovations and Improvement Methods (ICEECCOT), 2019.
10. "Smart Stopping Framework utilizing IoT and Distributed computing" by K. Manikandan and R. Varalakshmi. Procedures of 2019 Worldwide Gathering on Correspondence and Gadgets Frameworks (ICCES), 2019.