

Design and implementation of IoT Based Smart Parking System using NodeMCU ESP8266

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ABSTRACT

The forethought of being a wise city is the Smart Parking Facility. Nowadays every family is maintaining a car and when it comes to weekends or any festive seasons every family likes to go shopping malls, Multiplexes Restaurants, Airport, Railway station, Bus station. Finding an empty slot to park a vehicle is an annoying issue in recent days as we observe. The usage of vehicles rapidly increasing in our daily life. And the drivers used to struggle to identify a halting duration without considering where the slots are available to park their vehicles. And at the meantime for searching a parking space traffic may increase and loss of fuel. In this review, we constructed a prototype of a smart parkland arrangement in the urban domain by using the Internet of Things (IoT) and NodeMCU. The development of web correspondence with real equipment is a commonplace phenomenon. They are fixed with electronic components, web connectivity, and alternative sensors, the above-mentioned gadgets can broadcast and collaborate along with excess over the web, and they can hold control and observe remotely. So, the IoT is inter-associating with real gadgets, automobiles (assigned to as linked gadgets and wise gadgets), apartments (guest parking slots separately), and alternative items linked with electronic components, programming, sensors, actuators, and chain comparability that are found out the particular gadgets to save and swap information. We are uploading data in the cloud (Thingspeak) so that the users can monitor whether the slots are free or not regularly.

KEYWORDS

Smart Car Parking, NodeMCU, Ultrasonic Sensor.

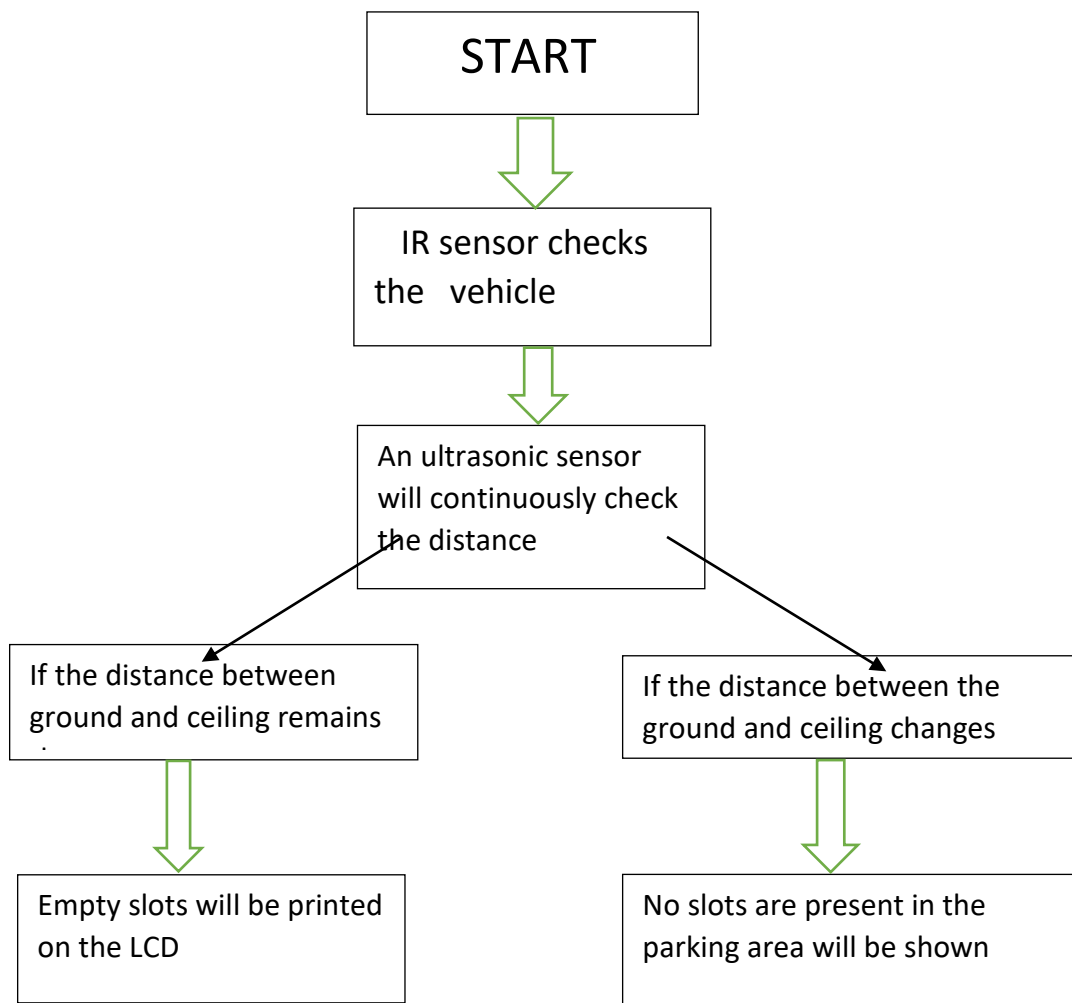
INTRODUCTION

Nowadays every family is maintaining a car and when it comes to weekends or any festive season every family likes to go shopping malls, Multiplexes, Restaurants, Airports, Railway stations, and Bus stations. Finding a space to park our vehicle had become an annoying issue in those busy places nowadays and who go with their families or friends are used to wasting more than half an hour to park their vehicle. And the vehicles especially the cars are taking up a lot of space. Most of the traffic occurs only due to excess vehicles within the urban areas thus people are consuming time in searching for areas especially to park their vehicles. And one more issue is also added is pollution while vehicles are in search for slots to park and the engine will be on so the waste fuel has also occurred.

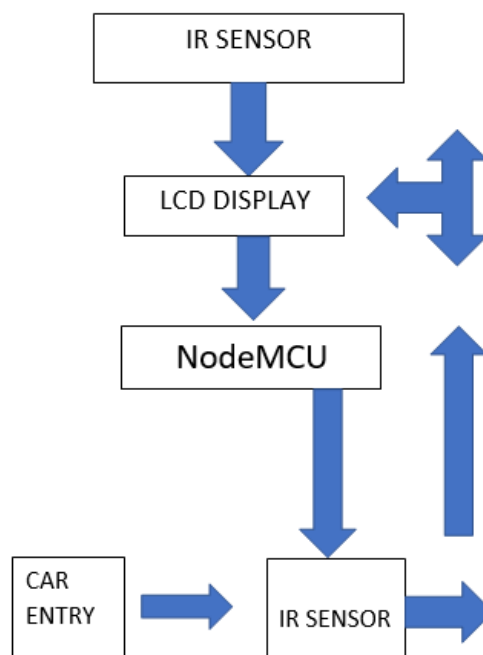
The Internet of things (IoT) is a development of web connectivity in the direction of real gadgets and commonplace phenomena. They are fixed along with electronic components, internet connectivity, furthermore alternative patterns about sensors, the above-mentioned gadgets can get through along with reach out alongside excess done with the web furthermore can be controlled and observed remotely.

The IoT is interconnecting with real gadgets, automation (referred to as connected devices and wise gadgets), apartments, and alternative items implanted alongside electronics, software, sensors, actuators, and web connectivity whatever is created through the above-mentioned objects to gather and swap information. Everything is particularly encountered through its embedded computing. the system still it can interoperate in a period of the actual web framework. The linkage about these embedded gadgets hold normal towards adoption in automation is approximately all ranges, while also permissive leading operation related a wise framework along with spread toward fields in the same manner with smart capital.

ARCHITECTURE & WORKING OF THE SYSTEM:



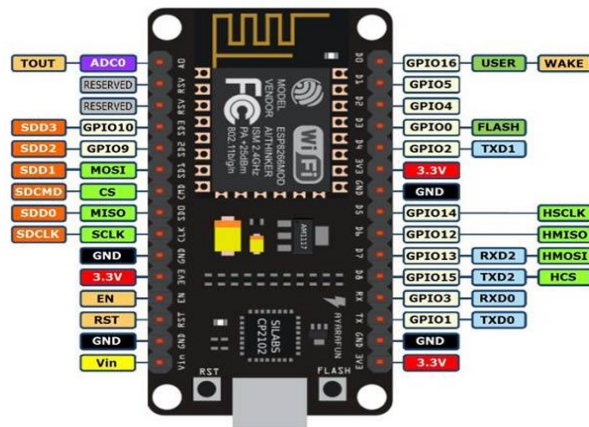
BLOCK DIAGRAM



IMPLEMENTATION & WORKING

As we have discussed the architecture in the above section as we consider the real-time the system by using a flow chart

NODE MCU

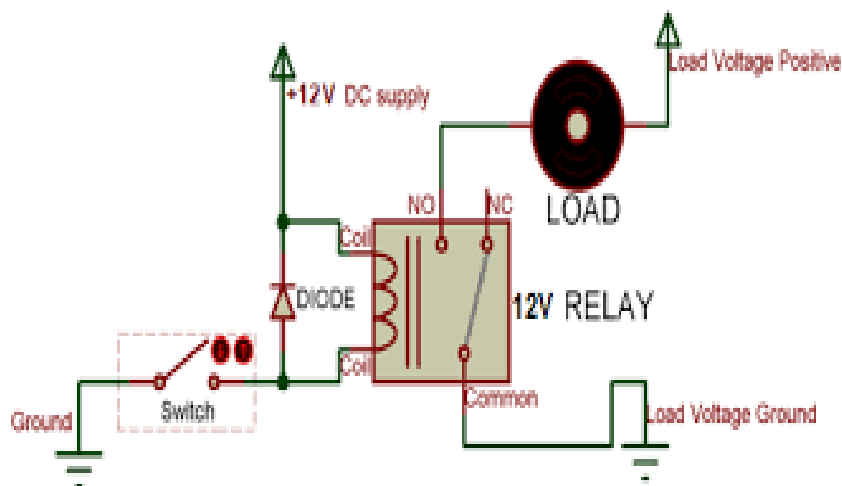


Node MCU has inbuilt WIFI which enables communication with mobile devices by connecting the node MCU with a mobile application. It is a low-cost wifi inbuilt chip used for multipurpose IoT applications.

It is better and cheaper than Arduino.

This is ESP8266 NODE MCU.

Relay

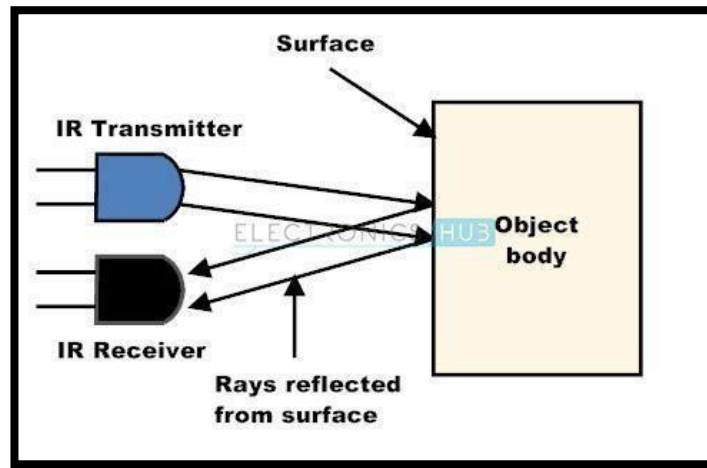


A relay is a device that opens or closes contacts to trigger the operation of another electrical controller.

Whenever we give the command with the help of the mobile application, it is received by the node MCU and as per the code uploaded in the node MCU, it will send the signal to the relay for switching the load or appliances.

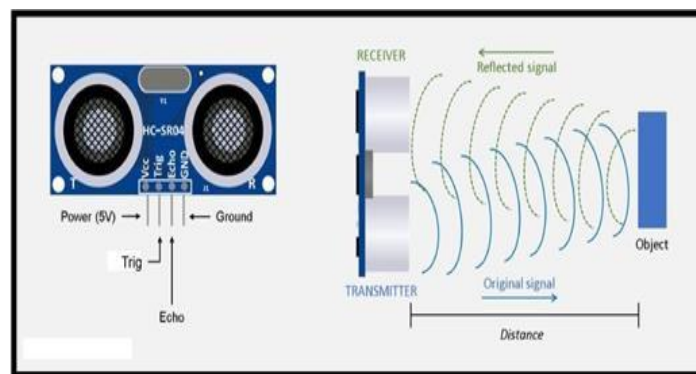
We had materialized the system by working with a toy car, but this process might be implemented in the malls & multi-storeyed buildings. Below are the steps involved in how to park a car from the entrance and pay the bill at the exit.

Step 1: The car enters the entrance of the parking and activates the IR sensor present at the entrance.



Step 2: IR sensor sends the report to the Nodemcu.

Step 3: NodeMCU seeks the information from the ultrasonic sensor which continuously checks the distance from the ceiling to the ground in the parking slot.



Step 4: The ultrasonic sensor sends the report to the Nodemcu.

Step 5: The Nodemcu now activates the LCD that is present at the entrance of the parking area.

Step 6: The LCD shows the message which slot is empty on the display. If all slots are full it displays no empty slots on the LCD.

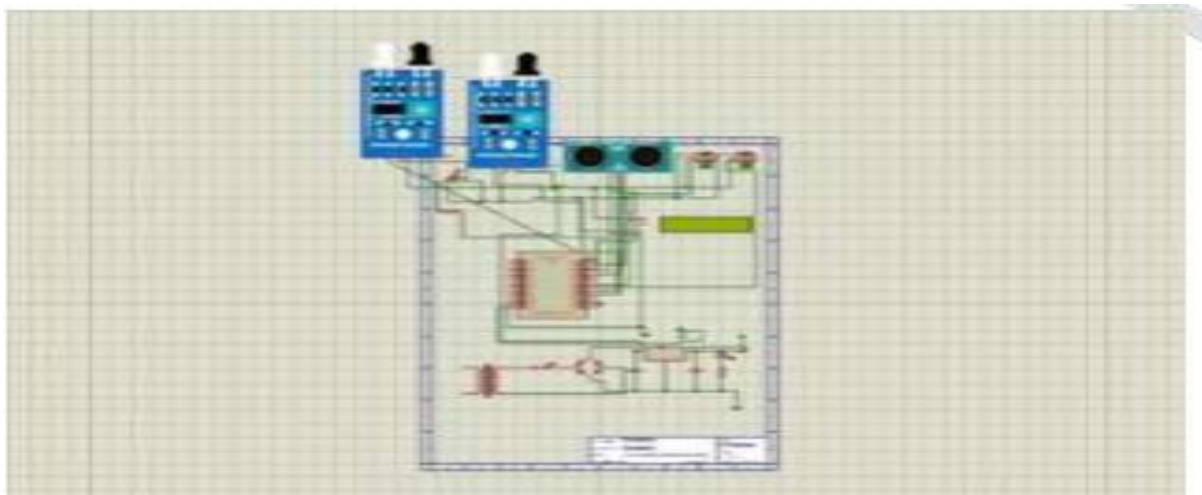
Step 7: now the barricade at the entrance will open and the car will enter inside the parking area. Once the car has crossed barricade will automatically close.

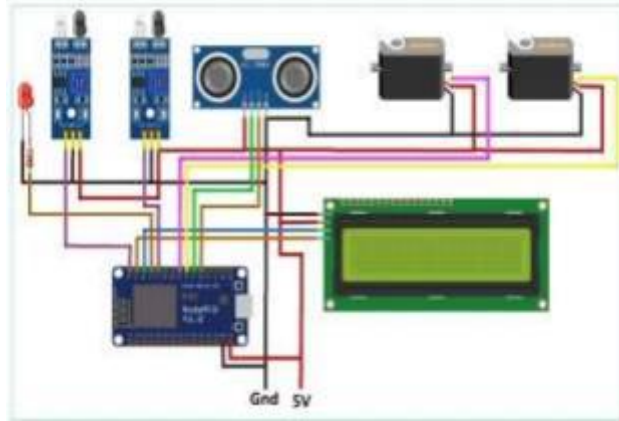
Step 8: When the car is parked in the slot the cloud will automatically save the data of that particular slot

Step 9: Whenever the car is taken out of the slot, the cloud will again notice the changes and saves the report.

Step 10: Then the car is reached the exit barricade the cloud calculates the amount and gives the receipt at the exit barricade.

Step 11: When the car driver pays the amount the exit barricade will open and the car can exit.





KEY APPEARANCE CONSIDERING ACCESSIBILITY IN THE EXPECTED MODEL

It is accessible for handling apps that are often inbuilt on the other platforms Android and iOS. This model pleases the driver and saves their daytime under management in the act of interest creating maximal support through getting rid of stress in consideration of a comfortable parkland location found nearby and driving towards it. He can register the authorization fine points along with the deposits process handling routinely. The above-mentioned fine points are going to be gathered within the cloud index.

The important understanding is a particular parking slot sooner arriving at the parking area. Already stated to authorize enough favourable toward disabled along with a senior civilian. Again, they keep set up payment updated if the car was taken away from the parking slot the driver could settle right away over a computerized payment approach as long as duration based on the particular automobile last placed.

2. Entrance along with Exit

Already a car is placed in a vacancy, and the driver's identification needed to be verifiable. Assuming that a slot is vacant, it will be displayed on LCD. The above mentioned will generate the entry of the car into the parking space and it makes customers feel more convenient. Simultaneously at the exit, a chain of vehicles are less counted aside from the formulation of parking fee done with automated e-payment that benefits drivers and will be experienced for their upcoming use of parking slot.

3. Use for Familiar and Commercial

1. Benefits currently identifying traffic pollution aside from decreasing exhalation rise off vapour.
2. Preserving some certain unit of fuel worth keeping appear an extensive difference between civilization and commercial.
3. Observing traffic jams beside IoT set up benefits keep granting the better resourceful city.
4. Automated money transactions keep redeeming while customers are directed towards bulky amounts.
5. The large number of papers misused might last replaced by computerized bills rather printed paper bills.
6. After all paper slips are skipped in the presently planned ideology and never use of any attendant for collecting slips.

RESULT AND DISCUSSION

With the help of this project, we can continuously check the slots of parking places whether they are vacant or not. IR sensor is used to detect the arrival of vehicles and an ultrasonic sensor placed in the parking slots is used to detect the slot is full or vacant if a slot is vacant, it will be uploaded the data in the cloud (Thingspeak) so that the officials can continuously monitor whether the slots are free or not regularly.

CONCLUSION

A smart parking system will be a quick fix to the prevailing traffic jam to scale back the driver's irritation within the look for vacant parking slots by giving instructions about the current situation of parkland slots. The smart car parking system goes to possess a high demand within the forthcoming days. Still, the smart parkland arrangement previously remains, our estimate is to form the arrangement less expensive and convenient which will help to extend its acceptance within the advertisement. Smart Parking System reduces the time to locate a vehicle in parking areas and hence it reduces fuel consumption. It also eliminates the unnecessary travelling of vehicles across the filled parking slots in a city. Developing Smart Parking Systems within a city solves the pollution problem. Fuel-saving (According to a recent report, Smart Parking can result in 2, 20,000 gallons of fuel saving by 2030 and approximately 3,00,000 gallons of fuel saved by 2050). The proposal was outstanding and less expensive and convenient.

FUTURE SCOPE

This appliance is a basic step for attaining an active result in regular interest.

We can develop this project in many ways by:

- 1) By providing a central management system that confirms only valid instruction is directed to the client that is handling the security issues.
- 2) Also, inquiries are often done using the previous parking data by which users can get instructions or ideas on parking slots and their opportunities in upcoming days.
- 3) According to this analysis can be used while booking a parking slot by a user or while leasing a slot to set the price of the parking slot.
- 4) We can create a mobile application that will be useful for drivers to know the available parking slots at particular shopping malls or multiplexes.

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