

# A Cloud Based Smart Parking System using Iot Technology

L.S.P.Sairam Nadipalli, K. Prem Kishore, B.Manohar Reddy, K. Vamsee Krishna, D. Raja Sai Aravind

**Abstract:** Car parking is the major problem faced in the current major city. There are more number of vehicles around the city and the parking spaces are less in number and we need to solve this problem in the efficient parking management system. By this we demonstrate the use of IoT based Parking system that allows the effective parking space shown in the system utilization using IoT technology. The project we use IR sensors to demonstrate for the sensing things in the parking slots available in the particular parking area along with dc motor to simulate the gates open and close. We use the Wi-Fi modem for internet connectivity and a micro controller for operating system. The system detects the parking slots are occupied using IR sensors. The system reads the number of available parking slots or occupied and updates the data through the cloud based server to allow to check the parking slots are availability in online. This allows the system to check available parking spaces in online from anywhere in the world. This solution is reliable in any circumstances.

**Keywords**—ThingSpeak; IR Sensors; IoT; Node MCU; LED; MicroUsbCable; Jumper Wires.

## I. INTRODUCTION

The parking system is controlled by the cloud system. In the recent times car parking in congested cities. So we go for an easy method using the IoT parking system. In this project we use ir sensor to detect the slot is occupied or available and the data is send through the microcontroller.

The microcontroller will send the data to the cloud server (web page). This displays the users to verify the available parking slots online from anywhere and available free parking. Thus this proposed system rectify the parking issues for metropolitan cities and gets the users an efficient IoT based parking management system. Previously in the parking area there is no automatic system to park the car in the parking slot. They will be collecting an amount from the owner of the vehicle at the free space and then allow the vehicle to park in the parking slot.

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To resolve this regular problems with IoT (Internet of Things).IoT revolution helping in many ways to solve the issue. The present situation proposes taking effective help from Cloud based systems model called smart-parking system (SPS).Here with the parking data additionally added GPS(Global Position System) data to Cloud Data. The data of Parking information will update frequently in every 10 seconds in the cloud, then SPS system will display how many parking's are available to park at respective building lobby or anywhere according to building. Each parking having it's own identity like typical parking.

## II. RELATEDWORKS

More research is going on in this subject. We mainly focus on a management system that assists drivers to find parking spaces in a specific parking district, and satisfies the needs of both parking providers and drivers. In addition, an important goal of the system is to reduce the traffic searching for parking, hence reduce energy consumption and air pollution. In this paper, we review background on smart parking systems, including the performance metrics, existing solutions and challenges. We also briefly discuss the related work.

## III. MODEL OF THE SYSTEM

This system system is the combination of smart parking and slot allocation with the android application and web application. The SPS parking is shown in below figure

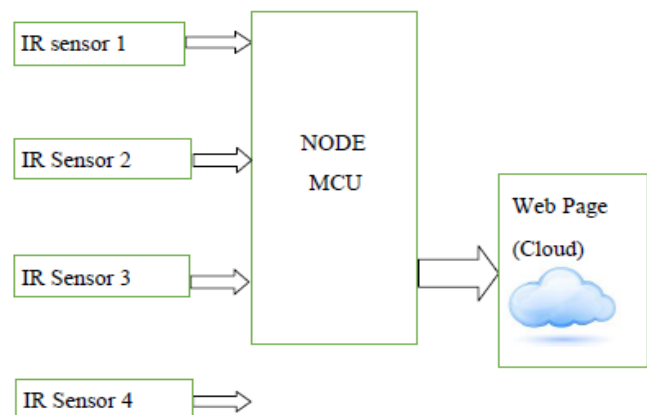


Fig.1.Architecture of thesystem

Here IR Sensors will sense the parking whether car was parked or on the other hand not. It recognizes the obstruction in stopping territory or in the surrounding. The transmitter will transmit IR beams which will be reflected once more from a some article like humans, living things, non living things or vehicles, etc to photo diode. The reflected beam will be gotten by photograph diode and henceforth will affirm the nearness of article and the relating. This creates logic 0 as digital output of the sensor will go to input for NODE MCU digital pin. IR sensor consists of 3 pins, which are VCC and ground and one is Digital output pin. After this receiving input to the microcontroller, That Car Parked info Node MCU sends the data to ThingSpeak cloud.

In order to create new account in Thingspeak.com, initially the user have to signup or can login with MATLAB account Credentials.

Presently click on new channel and afterward give some name to your channel and afterward fill the fields as demonstrated as follows. Field 1 chart, Field 2 chart, Field 3 chart, Field 4 chart are displayed as result in their fields with a graph. After filling the credentials go to "Save Channel."

Channel will be created, Then you will have the option to see field outlines. The cloud will will give you Write API (Application Program Interface) key and Read API key. These keys are used to upload the info to Cloud for further posting. On successfully uploading, test your code by copying API keys to Embedded C Code after uploading code to Node MCU ThingSpeak charts will be updated for each adjustment in estimations of IR sensors where we continued detecting the vehicle Parking space. Here we are setting field 1, field 2, field 3, field

IV. SYSTEM DESIGN

The system design totally based on Microcontroller Node MCU Here the Node MCU acts as a main controlling unit. As we continuously monitor the data will received by Node MCU from sensors and GPS it first decodes, fetches and will execute its operation finally. Here the simulation circuit of system design is shown below. we can Node MCU as main controlling unit in this connected with Infrared radiation sensors (IR sensors), Web Page (Things Speak).

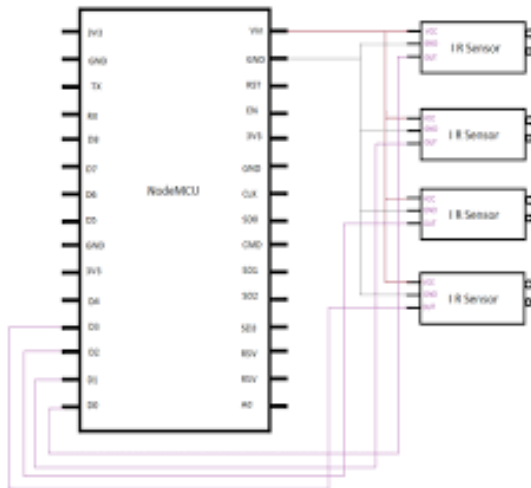


Fig.2. Simulated circuit diagram

A. Node MCU:

Espressif Systems Smart Connectivity Platform (ESCP) of high performance wireless SOCs, for mobile platform designers, provides unsurpassed ability to embed Wi-Fi capabilities within other systems, at the lowest cost with the greatest functionality.

Node MCU is a free source for IoT projects. It have a firmware which can run on the ESP8266 Wi-Fi Espressif systems.

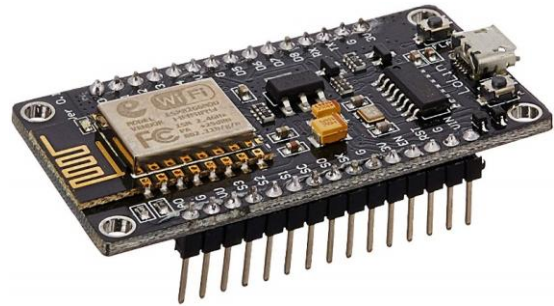


Fig .3. Node MCU

B. IR Sensors:

This sensor is a short range obstacle detector with no dead zone. It has a reasonably narrow detection area which can be increased using the dual version. Range can also be increased by increasing the power to the IR LEDs or adding more IR LEDs.

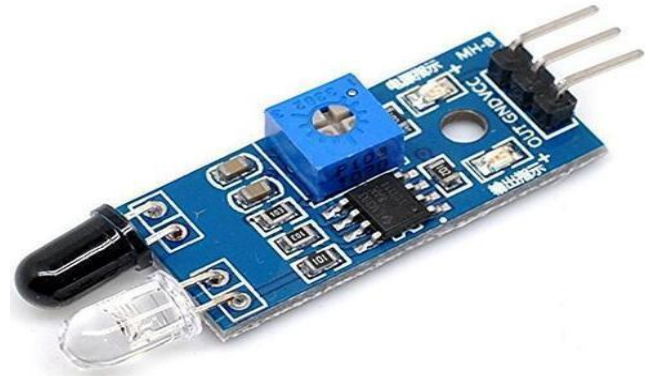


Figure.4. Infrared(IR) Module

C. Things Speak Website:

Thingspeak is an open source web of things (IoT) application and API to store and the recover information from Cloud utilizing HTTP convention over the web.

Thingspeak fields production of sensor logging information, area following sensors, and will send this data to interpersonal organization with notices.

Thingspeak clients to breaks down and imagine transferred information utilizing Matlab without signing into account with Matlab permit from Mathworks.



#### D. Micro Usb Cable:

Universal Serial Bus (USB) was developed in the 1990s in an effort to simplify the connections between computers and peripheral devices. It has become widely popular due to its compatibility with many platforms and operating systems, its low cost of implementation, and its ease to use. Most computers that are built today come with several USB ports, and USB is the interface of choice for most home and office peripherals including printers, cameras, modems, and portable storage devices.

USB standards are developed and maintained by an industry body called the USB Implementers Forum (USB-IF). In its original specification, USB defined only two connector types: A and B. Revisions to the specification and demands on manufacturers have expanded the breadth of connectors used for USB devices, but the majority of USB products still use these A and B connector interfaces.



Fig .5. Micro USB Cable

#### E. Jumper Wires :

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires. Though jumper wires come in a variety of colors, the colors don't actually mean anything. This means that a red jumper wire is technically the same as a black one. But the colors can be used to your advantage in order to differentiate between types of connections, such as ground or power. Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard, a male-to-male wire is what you'll need.



Fig .6. Jumper Wires.

### V. HARDWARE CIRCUIT

The implemented hardware circuit is shown in Fig. 6. I2C An instrumental part of our projected was the designing and implementation of a backend hardware system. This system will undertake the task. For powering the Node MCU and IR Sensor modules we used a 12v and 2A power supply.

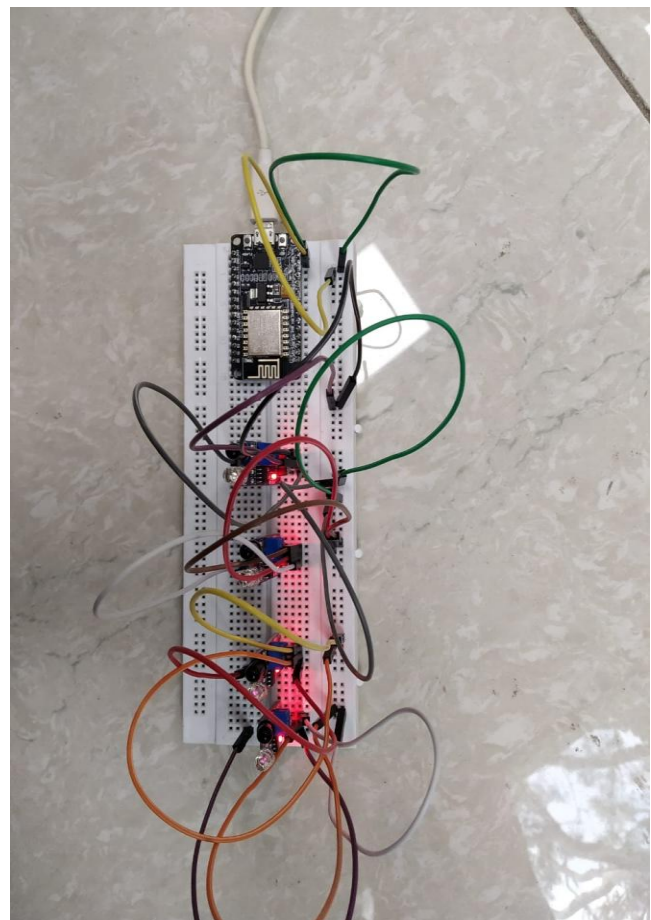


Fig.7. Implemented Hardware circuit

VI. RESULTS ANALYSIS

The project “IOT based Smart Parking system” was designed such that the status of parking slots can be known from anywhere in the users webpage. This is achieved using Wi-Fi communication.

In this system, the user has to be connected to the Wi-Fi network of that particular parking area through which he is given access to the webpage and can know about the status of the parking slot.

The Microcontroller processes this data and transmits over Wi-Fi, which will be received from MOBILE. In achieving the task the controller is loaded with a program written using Embedded „C“ language. The user who wants to park the vehicle is connected to the Wi-Fi network of that particular parking lot through the password. The IR sensors send the status to the microcontroller where the data processing is done. The microcontroller sends information to the webpage about the status of the slot to the user using IOT. This way the user can easily find a parking slot without any congestion and in less time.

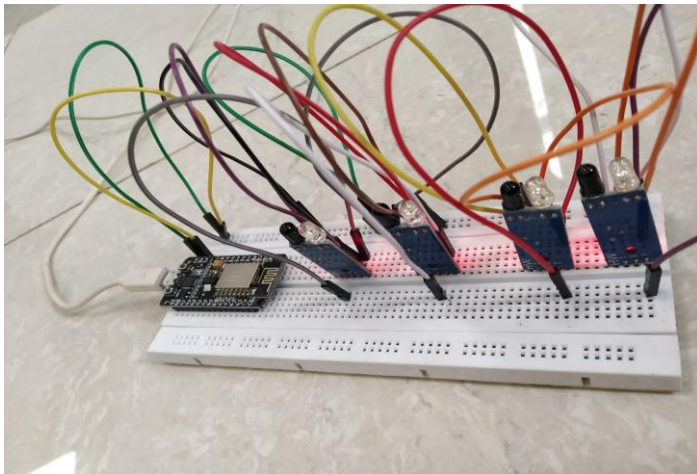


Fig.8.Implemented Hardware circuit.



Fig.9.1.Result of ThingSpeak Field 1 Chart

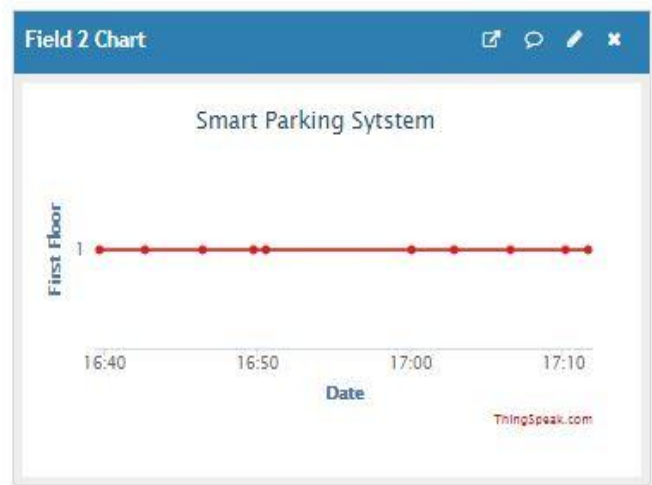


Fig.9.2.Result of ThingSpeak Field 2 Chart.

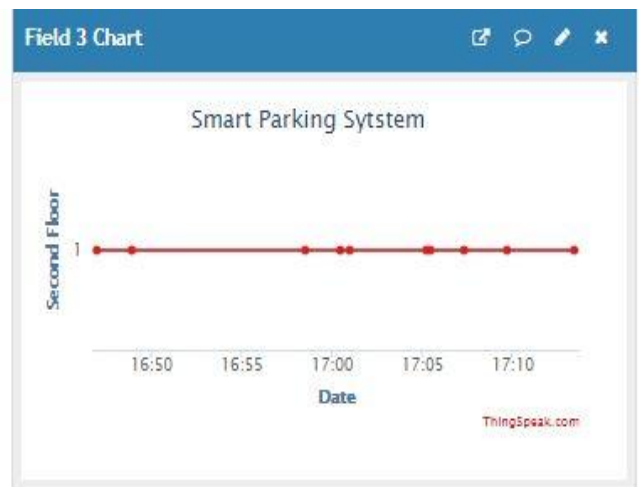


Fig.9.3.Result of ThingSpeak Field 3 Chart.



Fig.9.4.Result of ThingSpeak Field 4 Chart

## VII. CONCLUSION

The objectives of the Smart Parking project have been obtained. .. This security includes the feature of the system is enhanced with the password entrance to the parking IoT. This proposed system could be applied everywhere due to its ease and effectiveness. This project can be extended by adding an application of booking the parking slot before reaching the destination. This can be achieved by using GSM and RFID communication.

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