

# SMART CAR PARKING SYSTEM ; IoT BASED APPROACH

Mrs. PARIMALA. S. SORATUR

Senior Lecturer

Department of Electronics & Communication Engg. , Government Polytechnic Vijayapur, Karnataka.

**Abstract** – In earlier days the number of cars that were in use were less as most of the people preferred public transport system. But now days with the ease of getting loans from large number of banks, concept of pooling, time management and several other factors most of the people prefer to buy private cars. It is a known fact that for every action there will be a reaction, so in this case the more number of cars on the road is creating a chaos of car parking. Now a days in some of the big cities the government and sometime some private players are coming up with pay and park facilities for the cars. But here the driver has to often waste time in finding a space for parking the car. In today's fast moving world time has become more valuable than money. So we have to design a system which will help the driver of the car to find the space in the parking area within some accepted time without causing delays.

**Key Words:** ESP8266, RFID, IR sensor, Web server.

## 1. INTRODUCTION

As the standard of living of the people is increasing with growth in economy of our country the number of cars are also increases exponentially that demanding more parking space. The increasing number of cars on the road is starting to pose the challenge of management of parking space. Hence it is becoming mandatory for us to use the technology available

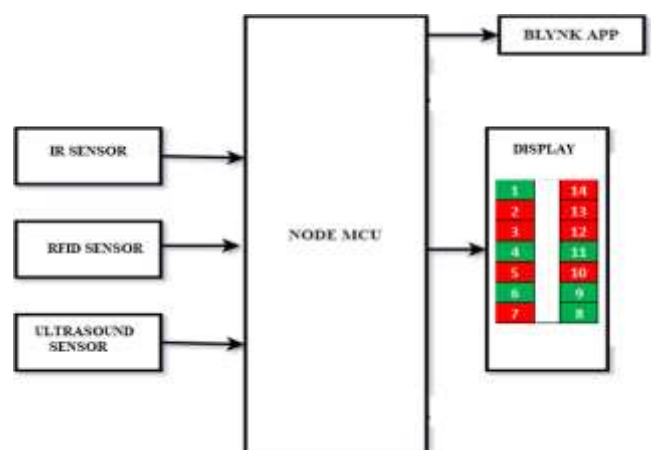
to develop a smart parking system. This system should aim at providing the following features

1. Provide indication if the parking space is available.
2. In case the parking space is available it should show the spaces available
3. It can show the space which can be accessed in the shortest time
4. And in case the parking space is full it should display that parking area can is full.

This helps in effective management of parking space that will manage the space efficiently.

There are hundreds of paper that have been published stating how the Internet of Things can be used in agriculture, irrigation, manufacturing. A list of the papers [1] to [8] have been listed in the references provided at the end of this paper.

## 2. CONCEPTUAL FRAMEWORK



**Fig 1:** Block diagram of the system

The conceptual frame work of the smart parking system is as shown in the figure. The number of parking slots available in the parking area can be configured in the Node MCU. Whenever the car enters the parking area and is parked in the preferred slot; the space available for parking is automatically decreased by one. On the contrary if the car moves out of the parking area the space available for parking is automatically increased by one. The Node MCU can be suitable programmed so that the threshold limit of parking is not breached at any instant of time.

The ultrasound sensor or IR sensor can be used to detect the presence or absence of the car in the parking area and hence communicate the availability of parking space. There can be RFID that can be attached to each of the parking slot. Whenever the car gets parked in the parking area the corresponding area that can be activated. There can be a display showing the spaces available for parking in the parking area at the entrance. The led pertaining to preferred slot for parking can be made to blink. Also the status of parking space available can be made available on the personalized app that can be configured through Blynk web server or Thingspeak web server

### 3. COMPONENT DESCRIPTION

#### 3.1 NODEMCU

The entire system is build around the NodeMCU. The NodeMCU is an open source firmware used for IoT based application. This microprocessors operating voltage is 3.3V. It has 1 analog input pin and 12 digital pins which be used as GPIO. It also has a built in Wi-Fi ,which makes it ideal for IoT applications. The IR sensors/UV sensors and RFID sensors as many as required for accounting for

number of parking spaces available are connected to the NodeMCU via a multiplexer.the depending on the The various sensors attached to the NodeMCU collect the current status of the parking slot. The NodeMCU processes the collected data from various sensors and automatically the status of the parking slots on the display screen provided at the entrance of the parking area and also online web page through the web server.

#### 3.2 IR SENSOR/ULTRASOUND SENSOR

Either of the two sensor can be used for detecting whether the car is parked in the space or not. IR sensor works on the principal of reflection of light.If the car is parked then the amount of light received by IR Sensor will be more and in case the parking slot is empty then the amount of light received by IR Sensor will be less.

Ultrasound Sensor works on the principal of reflection of sound. If the car is parked then the distance traveled by the ultrasound will be less and hence time taken by ultrasound will be less .On the other hand if the car is not parked then the distance traveled by the ultrasound will be less and hence time taken by ultrasound will be more.

#### 3.3 RFID SENSOR

Each parking slot may be coupled with a RFID sensor which gets enabled when the car gets parked in a particular slot. Once RFID is enabled the status of the parking space will be updated.

#### 3.4 DISPLAY

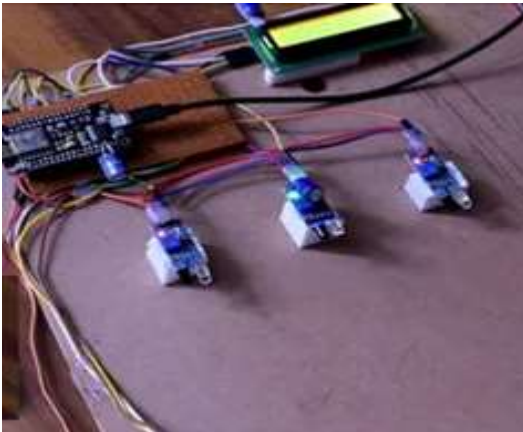
The status of the parking space available can be updated on the display provided at the entrance.

### 3.5 WEB SERVER

The capability of NodeMCU to directly connect to internet is utilized to update the status of the parking area on the net.

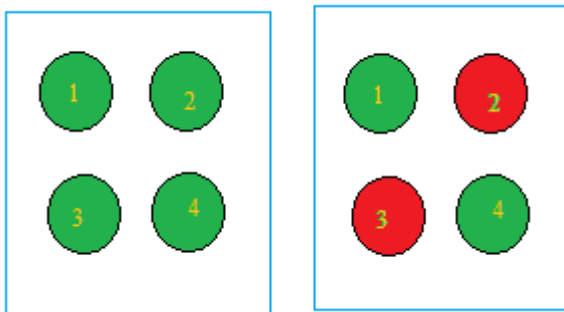
### 4. RESULTS

The Fig 2 shows a snapshot of the hardware setup that is used.



**Fig 2.** Hardware Setup

The Fig 3. shows a snapshot of the status of parking area displayed on the webservice.



**Fig 3.:** Empty and half filled parking space

### 5. CONCLUSION & FUTURE SCOPE

In the proposed system they have shown how that how the power of IoT to implement an effective parking system; a system which will help in reducing the unnecessary chaos at the parking areas. In future we can develop an app and that can be shared to the authorized customers who want to avail the parking area. Also we can have the concept of reservation of a spot, Time of the day booking etc. By doing so we can make the parking of a car a happy experience.

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