

# IOT BASED PARKING INDICATION NETWORK (PIN)

Apsara H S<sup>1</sup>, Joywin Cutinha<sup>2</sup>, S Sanjay<sup>3</sup>, Shreepada R Achari<sup>4</sup>, Harshith K<sup>5</sup>

<sup>1,2,3,4</sup>Dept of Electrical and Electronics Engineering, SIT Valachil, Mangalore, Karnataka, India

<sup>5</sup>Assistant Professor, Dept of Electrical and Electronics Engineering, SIT Valachil, Mangalore, and Karnataka, India

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**Abstract** - Nowadays congestion of traffic level increases with the increasing development of population rapidly, with respect to the amount of population, the utilization of personal vehicles also increased. Managing a parking space is one of the challenges that cities and towns have to face. Due to more use of cars the traffic congestion occurred on the road. Most of the people chooses personal vehicles than public transportation, it is very difficult and time consuming to find parking space in most metropolitan areas, commercial areas, especially during the rush hours. It is often costly in almost every big city in all over the world to find proper and secure parking space. The proposed project is a smart parking system that delivers information to people finding a parking space online, it overcomes unnecessary time consuming for finding the problem of parking space in parking areas. Hence, the website is provided by this project-based system where users can view various parking areas space from the available slots.

**Key Words:** Parking Indication Network, Smart Parking

## 1. INTRODUCTION

The diverse growth in the economy and due to low cost availability of cars, an average middle-class person can afford a vehicle, which is a good thing, but due to this problem such as traffic jams, pollutions, etc. are arisen. The major issue to be taken under consider is the parking availability of those vehicles. Although, there are available parking spaces, a lot of time is spent in finding out the exact parking slot resulting loss of fuel and causes environmental pollution. It will be a great help in finding out the remedy to pin point parking availability slot which will be helpful for the driver and as well as for the environment. Thereafter, resulting in the creation of new innovative solutions to it.

### 1.1 PROJECT OBJECTIVE

Parking Indication Network involves the usage of efficient cost applications and realistic time data used to locate the of low-cost sensors, real-time data and applications that allow users to monitor available and unavailable parking spots. Further going into the advancement of this service will inculcate online payment system, parking notification

and location history of parked location. It is an advantage to both sides to the user as well as the lot owner

## 2. WORKING

The flow chart consists of 3 main sections

- 1) Void setup: Initializing the sensors and motor drives.
- 2) Void loop 1: The Arduino Esp8266 programming statements comes under this section that are in continuous loop manner.
- 3) Void loop 2: The .Net framework programming statements comes under this section that are in continuous loop manner.

The execution flow chart begins with start (Fig.6.1), then the signals flow to the initialization section. In this section the ports of the following devices are initialized:

- IR Sensors
- Motor Driver
- Esp8266 Wi-Fi module

The signal from these are fed to Arduino. The conditional statements are used to identify the allotment of parking spaces under provided conditions. The reference signal as space available (i.e. binary-111) is written down in the conditional statements. In case if the space is not available for parking (i.e. binary-000) will be written down in statements. These values are later sent through Esp8266 module to cloud interface loop where the loop will be on the parking space availability to the interface side.

The device consists of 3 main components, IR sensors, ESP8266 Wi-Fi module, Arduino. Whenever a vehicle comes and parks the vehicle in the parking lot the respective sensors detect the availability of parking area. This data is then sent to Arduino through interface that stores the data and sends the signal to ESP8266 module.

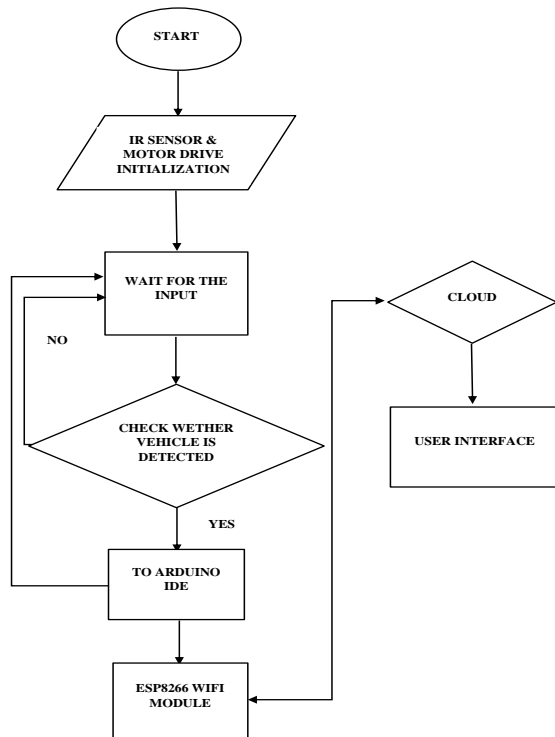


Fig 1 Flow Chart of the Proposed Scheme

The ESP8266 module send this data through internet connectivity to cloud storage. These data stored in the cloud storage are being used for user interface, showing the user the vacant parking space in that area. The user then will able to see the available parking slot area for his desired location through web interface.

The diagram shows the block diagram representation of this project.

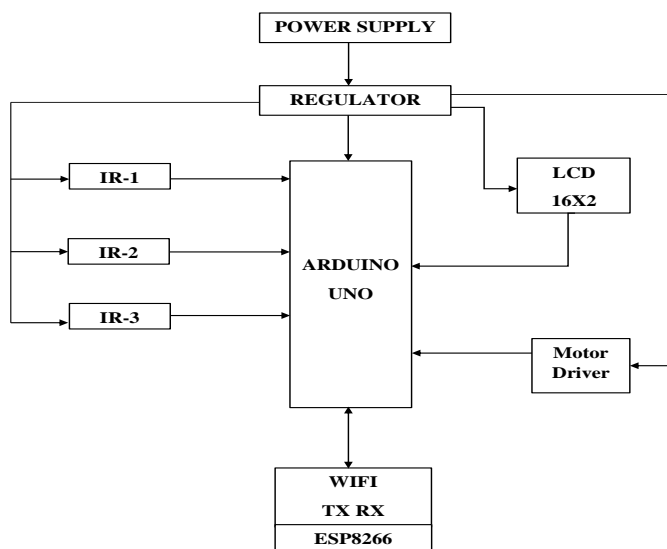


Fig 2 Block diagram representation

### 3. RESULT

The working of the components was done with Regulated DC power supply of 5V. The ESP8266 module successfully sent the information about the available parking slots available and also with the filled ones. Whenever a vehicle was detected by the IR sensor at the parking slot it would send binary values to the Arduino showing the availability of slots. '0' considers slot is occupied, whereas '1' considered as slot is vacant.

An IC is used to covert from 5V to 3.3V for ESP8266 module as supply source. A motor driver L293D is used for driving the motor for hydraulic type parking system. Whenever a vehicle was detected by the IR sensor at the parking slots it would send information to Arduino digital pins. This information that stored in the Arduino is encrypted by the ESP8266 Wi-Fi module and then sent to cloud storage. The information gathered in the cloud storage were decrypted into user interface language through webpage for user to interface with the parking availability information's.

The user could search for the location he needed for parking and could look into the available parking slots at the particular area the user selected. In certain parking there were hydraulic type parking system available for the user to park the vehicle too. The interface for the user can avail is as shown below.

- 1) At first the user should select the location where he wants to park the vehicle from the list.

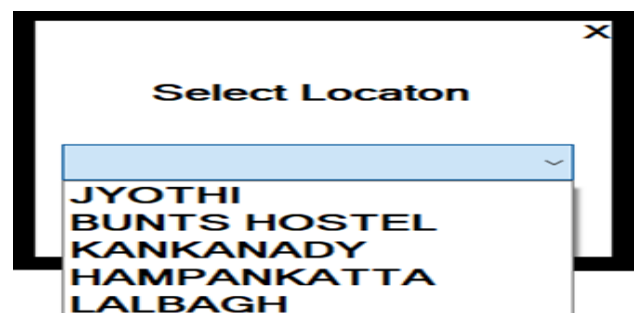


Fig 3 Selection of location

- 2) After selecting the location from the list another screen will show up showing the available parking slot available or not in a particular place where this system is installed

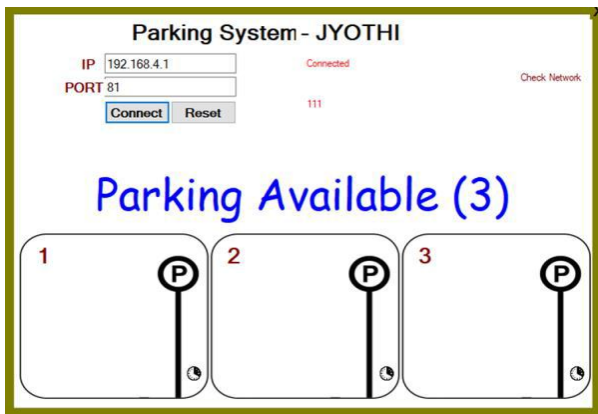


Fig 4 Parking slots available in that location

3) If there are slots filled in the parking slots it will show the available parking slots available.



Fig 5 Showing the available parking slots

4) If the parking slots are full in location it will be indicated as below.

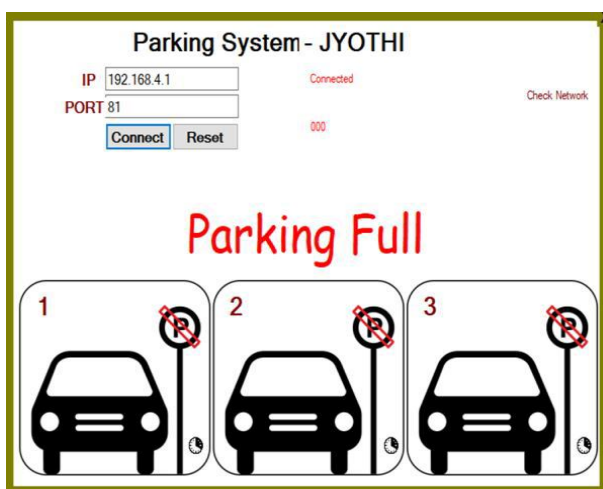


Fig 6 Showing parking is full in that location

5) Similarly, we can see the other parking slots available in other locations.

#### 4. BENEFITS UNDER ENVIRONMENTAL ASPECTS

WHO has declared air pollution as the world's largest environmental health risk. A prime contributor to air pollution, vehicle emissions such as chloro-fluoro carbons, carbon dioxide, methane, and nitrogen dioxide are on the rise as more vehicles take to the roads.

A major culprit of pollution in our cities today is the traffic jam.

##### 4.1. INEFFICIENT PARKING IS POLLUTING OUR CITIES

India is also believed to have the world's highest death rate from chronic respiratory diseases. A major cause of the pollution in Indian cities is vehicle traffic including cargo trucks running on low grade diesel.

Drivers circling around parking spaces in search of a spot frequently to their vehicles, So that insufficient parking also leads to traffic jam, the problem of noise pollution too.

Vehicles that move at a high speed emits less amount of toxins but due to lack of space, traffic jams have become the order of the day. Toxins are thus emitted at higher level as most motorists leave their vehicle engines on even when they stuck in traffic, often caused by other motorists looking for parking.

##### 4.2. IOT BASED SMART PARKING AS A SOLUTION TO RISING POLLUTION

Smart parking can curb air and noise pollution levels through sustainable urban mobility, saving time and energy, reducing traffic problem, and bringing air and noise pollution down.

It uses sensors to indicate the availability of a parking slot, eliminating the need for drivers to waste time searching for space. By directing drivers to open spaces quickly, this can reduce congestion and resultant emission. This system by collecting data in real time, relaying it to drivers through a web page.

Through parking data, this IOT parking system also enable city administrations to access crucial data to prove the way for cleaner environment. Such benefits are unlikely to occur with outdated infrastructure in place and disconnected systems that can't communicate with each other. By leveraging IOT, smart parking easily solve this problem. Additionally, by implementing dynamic pricing based on available space, smart parking can significantly

reduce congestion and overuse of parking slots, thus impacting air and noise pollution,

## 5. CONCLUSIONS

Proposed system will provide a reduction in time and fuel required by vehicle to locate the parking slot location information especially in the city areas.

It is very difficult and time consuming to find parking space in most metropolitan areas, commercial areas, especially during the rush hours. It is often costly in almost every big city in all over the world to find proper and secure parking space. The proposed project is a smart parking system that delivers information to people finding a parking space online. It overcomes unnecessary time consuming for finding the problem of parking space in parking areas. Hence, the website is provided by this project-based system where users can view various parking areas and choose the space from available slots.

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