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Parking system controlled by a mobile phone

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1. Introduction

Now days finding parking in busy areas is very hard and there is no system to get the details of parking availability online. Imagine if you can get the parking slot availability information on your phone and you don't have roaming around to check the availability. This problem can be solved by this smart parking system. Using the IoT based parking system you can easily access the parking slot availability over the internet. This system can completely automate the car parking system. From your entry to the payment and exit all can be done automatically.

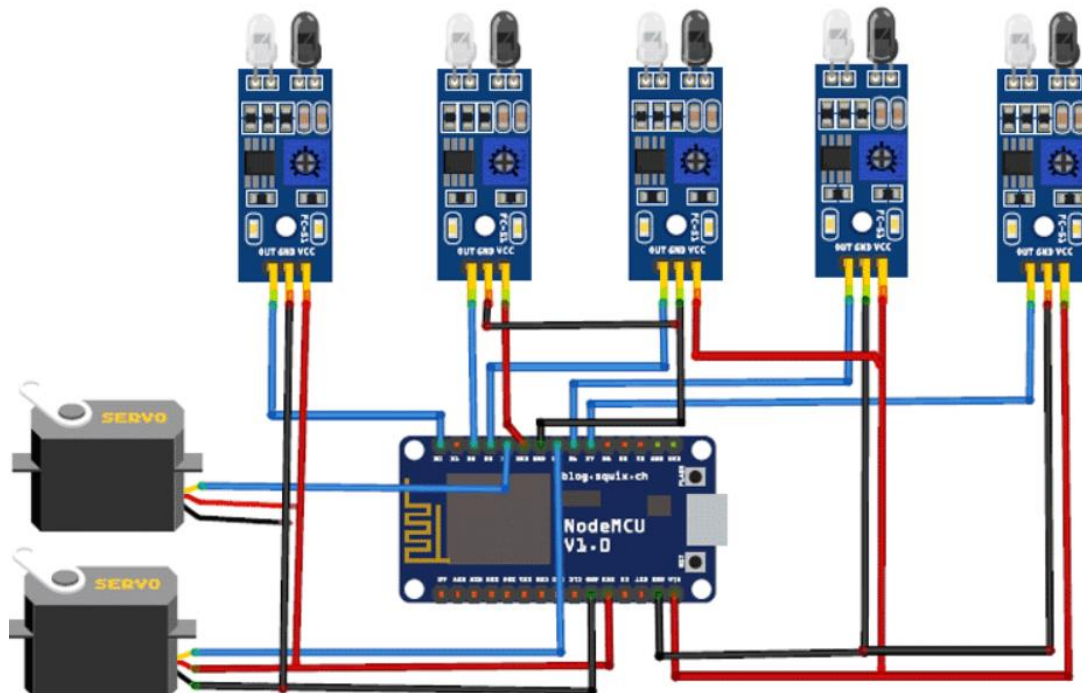
2. Theoretical Background

So here we are building an IOT based Car Parking System using NodeMCU ESP8266, five IR sensors, and two servo motors. Two servo motors are used as entry and exit gate, so whenever the IR sensor detects a car, the servo motor automatically rotates from 45° to 140°, and after a delay, it will return to its initial position. Another three IR sensors are used to detect if the parking slot is available or occupied and send the data to NodeMCU. Here we are using the Adafruit IO platform to show publish the data on cloud which can be monitored with ease. Adafruit IO dashboard also has two buttons to manually operate the entry and exit gate

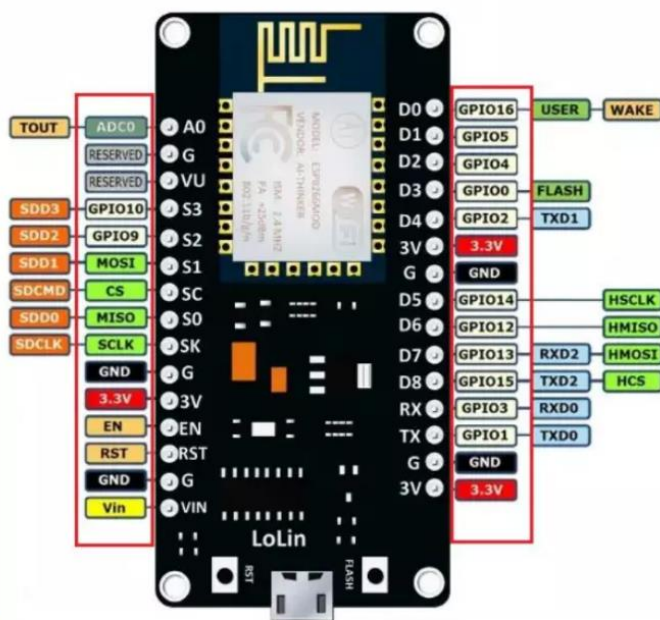
Adafruit IO is an open data platform that allows you to aggregate, visualize, and analyze live data on the cloud. Using Adafruit IO, you can upload, display, and monitor your data over the internet, and make the project IoT enabled. You can control motors, read sensor data, and make other types of applications with it.

3. Implementation

For this project I used the components mentioned above for the hardware part and as an online service I used the Adafruit IO. The components were displayed in the circuit diagram below:

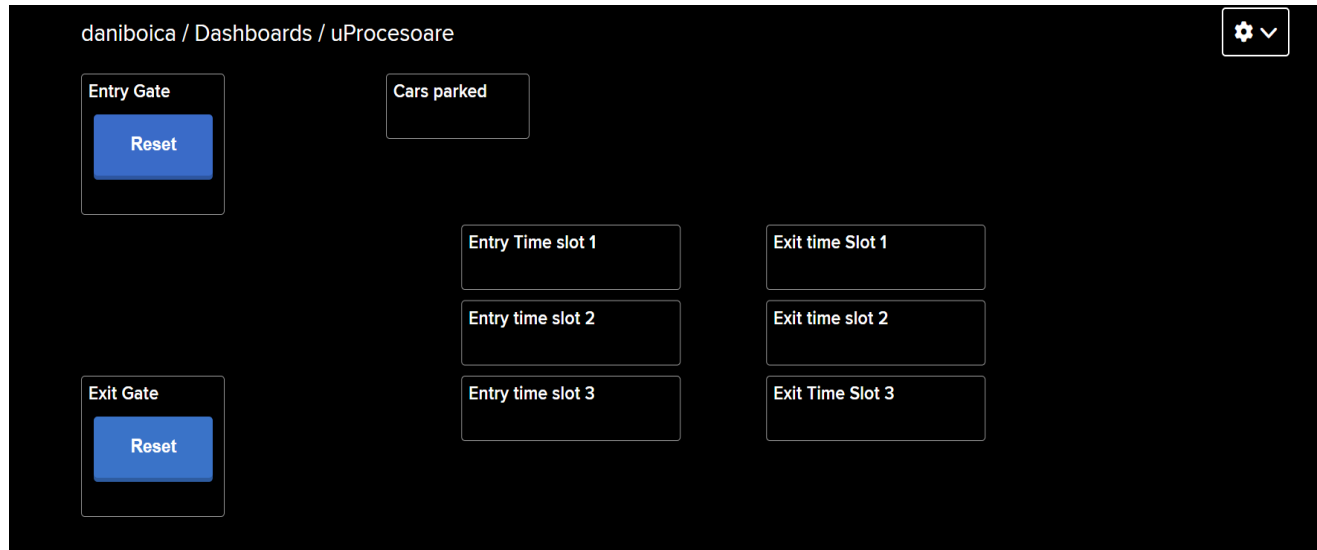


Here we have the NodeMcu pinout:



For this project, we created a total of nine feeds for exit gate, entry gate, slot 1 entry & exit, slot 2 entry & exit, and slot 3 entry & exit. After creating feeds, we're creating an Adafruit IO dashboard to show all of these feeds on a single page.

The Adafruit IO display of the project:



For programming the NodeMcu I used Arduino IDE. First, I installed all the required libraries needed for ESP8266 Wi-fi. Then I include the Wi-Fi and Adafruit IO credentials that copied from the Adafruit IO server. These will include the MQTT server, Port No, User Name and AIO Key.

```
const char *ssid = "Paul's Iphone";    // Enter your WiFi Name
const char *pass = "12345678"; // Enter your WiFi Password

#define MQTT_SERV "io.adafruit.com"
#define MQTT_PORT 1883
#define MQTT_NAME "daniboica"
#define MQTT_PASS "aio_XLKf97a9EemmmVBKtAEf00vLC1HDT"
WiFiUDP ntpUDP;
NTPClient timeClient(ntpUDP, "pool.ntp.org", 19800, 60000);
```

Further into our code we are connecting the Entry and Exit Servo Motor to the D4, D5 Pins of the NodeMCU, and select the out pins of IR sensor as Input. The function *timeClient.update()* function is used to update the date and time whenever we request to NTP servers. After getting the data, we store the hour, minute and second in three different integers. We are digitally reading the entry and exit IR sensor pins and check if these pins are high. If pins are high, then move the servo motor to open the entry and exit gate.

Then increase the count for entry gate and decrease the count for exit gate and publish the data to the Adafruit IO dashboard.

Also check the slot 1,2,3 IR sensors. If it is '1' and Boolean function is false, then get the entry time from the NTP server and save it in EntryTimeSlot1,2 or 3 variable. Publish the variable data to the Adafruit IO feed.

4. Conclusion

The implementation of the right parking management system is a great investment. It will save costs, time and energy. Adding a payment method and a real life use of this kind of project can be scaled into a good business opportunity, people being more tempted to use their phone and internet for controlling everything around them.

Bibliography

[NodeMcu pinout](#)

[Parking system benefits](#)

[Adafruit](#)

[Smart parking systems](#)