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Smart Vehicle Parking System Using Internet of Things

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Abstract

Now a day's internet of things is everywhere, it is used in agriculture, health, parking system etc… With increase in the number of the vehicles, road congestion is the major problem that is being faced. The aim of this paper is to resolve this problem. Searching of availability of free slot in parking space usually waste drivers valuable time. This paper proposes a design of smart vehicle parking system where it helps the users to see free space to park using their phone and it will help on optimizing time, reducing fuel consumption and reducing carbon dioxide emission. This system will use blynk software that will help the driver to use their phones. It will use different sensors. IR sensor to see if there is a vehicle in the parking slot or not and nodemcu Wi-Fi module that will send the information to the blynk through Wi-Fi.

Keywords: *IoT smart parking, NodeMCU, blynk 2021.*

1. Introduction

In large cities with heavy traffic, looking for parking with available slots is not only a waste of time and energy; the worst is, causes more traffic. People waste away liters of gas just trying to park. In an endeavor to solve the parking management issue, different technologies have been developed in various parts of the world and research was conducted to develop efficient parking technologies. While some parking solutions are deployed as stand-alone technologies in some situations, in other situations multiple technologies are combined to achieve the given goal. These technologies include Digital Image processing systems, Ultrasonic sensor's technology, and others.

Nowadays number of vehicles are increasing day by day and problem in finding parking slot is challenging. In order to help the drivers to find free parking slot IoT smart parking system is being used. In this system the IR sensors will sense whether the slot is empty or not. The sensed values from the sensors are displayed in a driver's smartphone by using Blynk application via Wi-Fi network. If the slot is occupied the driver will look for another place but if there is an empty slot the driver will use that slot. At that time the system will update by making the empty slot occupied.

2. Literature review

Locating parking space is a big problem now days that is why so many smart parking systems(SPSs) are developed. Through wireless networks of different sensor devices in real time an internet of things will help the drivers to know the status of parking slots in parking space. Studying SPSs compressively, compare and analyze by technological approach, how to utilize sensors used for the systems, networking technologies they used, user interface they have and what service they provided will fill the gap by giving a clear view about their advantage and disadvantages and how suitable are they in various environmental conditions.

Security mechanism using data capture and verification with the aid of using ECDSA gives the advantage of extreme reliability in IoT surroundings and may be carried out at low cost. The proposed approach makes use of the MIRACL crypto library to achieve this desired goal. Therefore, the paper proposes the enhancement to the existing mechanisms using ECDSA algorithm. [11]

3. Materials

3.1. Blynk platform

Blynk is a new platform from iOS and android device we can control and monitor hardware projects using this platform. We can create project dashboard after we download the Blynk app. In the widget box there are buttons, sliders, timer joystick controllers. Using the widgets, we can display data from any sensors or we can turn pins on and off using the button controller.

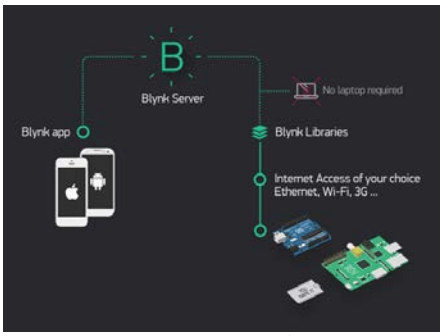

Figure 1 Blynk platform

3.2 IR sensor

It is a sensor that is used to detect objects in its surrounding environment. It has two parts light emitting diode and receiver. Infrared light will go out from the LED and if it reflects back from the object the receiver will detect it and pass an information that says there is an object detected and if the receiver didn't detect any thing it means there is no object in front, on our case there is no car parking on the slot.

Figure 2 IR sensor

3.3 NodeMCU Wi-Fi module

It is an open source development board and firmware based in the widely used ESP8266 -12E Wi-Fi module. It combines features of WIFI access point and station + microcontroller. These features make the NodeMCU extremely powerful tool for Wi-Fi networking.

Figure 3 NodeMCU Wi-Fi module

3.4 Arduino Uno

It is microcontroller board. It has 14 pins (6 of which can be used as PMW) and all can be used as input/output using software and they can interface with different boards (shields). Can be powered with USB or external power supply. They operate on 5v and have 6v to 20v input voltage limit.

Figure 4 Arduino Uno

4. Methodology

We will connect the Arduino with IR sensor and NodeMcu. We will short all the ground pin of all the infrared sensors to the ground of Arduino, then we will short all the Vcc part of the IR sensors to the +5v pin of Arduino. After this we will connect to the output pin of the IR sensors to the pins we choose on the Arduino. The NodeMcu Tx and Rx pin will be connected to the pins of Arduino and through those pins it will send and receive data from the IR sensors.

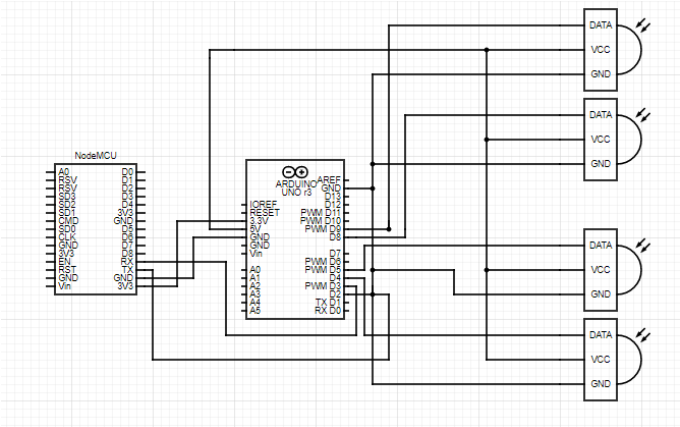

Figure 5 The connection

On phone we will download and login to blynk application. It will send us authentication token that we are going to use it on our code. We can modify it as much as we want on this case we have two parking slots so we will only have two widgets.
After we set up the blynk we will code for the Arduino board and NodeMcu Wi-Fi module to receive data from IR sensors whether the slot is occupied or not. The codes for Arduino and NodeMCU are shown below.

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Figure 6 code for Arduino

Figure 7 code for NodeMCU

Now we have all the connection, all the code for Arduino and nodeMCU we will connect them and upload the code on the boards. Then when IR sensor detects it will show the status of the parking slot on blynk application on the driver's phone.

4. Conclusions

This project will help drivers to find parking slots easily The blynk software that is on their phone will tell them which slot is empty or not. The system will use IR sensor rather than LDR because it is more efficient and it will help to detect if the parking slot is occupied or not. And that information using Arduino and Nodemcu Wi-Fi module will go to the driver's phone though blynk. This system will help to reduce road congestion, reduce the use of fuel, and time wastage of the drivers.

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