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IOT BASE CAR PARKING SYSTEM

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Abstract - The IoT-based car parking system is a smart solution that uses connected devices and data exchange to optimize parking. It integrates sensors in parking spaces to detect vehicle presence and provides real-time availability information. Users can access this information through mobile apps or displays, reducing search time and congestion. Additional features include automated payments and data analysis for efficient resource management. Overall, it improves the parking experience and offers benefits to drivers and operators.

Key Words: ESP8266, Wi-Fi, IR sensor, Blynk App

1. INTRODUCTION

Car parking is a major issues in modern congested cities of today. There simply are too many vehicles on the road and not enough parking space. This has led to the need for efficient parking management systems. Thus we demonstrate the use of IOT based parking management system that allows for efficient parking space utilization using IOT technology. To demonstrate the concept we use IR sensors for sensing parking slot occupancy along with a dc motors to simulate as gate opener motors. We now use a wifi modem for internet connectivity and an AVR microcontroller for operating the system. We use IOTGecko for online connectivity and IOT management GUI design. The system detects if parking slots are occupied using IR sensors. Also it uses IR technology to sense if a vehicle has arrived on gate for automated gate opening. The system reads the number of parking slots available and updates data with the cloud server to allow for checking parking slot availability online. This allows users to check for available parking spaces online from anywhere and avail hassle free parking. Thus the system solves the parking issue for cities and get users an efficient IOT based parking management system.

Parking systems are installed on the outside of buildings or inside of buildings. When a vehicle enters the space, sensors detect its presence and calculate available parking slots. This information is then sent to the driver's phone via an app.

The smart parking system also has real-time data on occupancy rates, which can be found on the app. This data is collected from each sensor and is updated every five minutes.

One major drawback of automated parking system is that it has increased competition for parking spaces in urban areas with limited space nearby. However, even though these systems are helpful for drivers, there are some drawbacks to this type of initiative.

Drivers who rely on public transportation may not have the ability to use this app because they don't own a car or drive their own vehicle. These systems also require a lot of maintenance because many sensors need to be replaced often due to wear and tear or vandalism.

The demand for parking is ever-growing, and with cars becoming more fuel-efficient, the number of vehicles will continue to increase. As a result, there are fewer available parking spaces. Smart parking systems solve the problem of finding an available spot by providing drivers with information about available spots near them. Drivers can also use the system remotely via their smartphone to find a space before arriving at the parking lot. These systems help drivers to find an available spot faster and more easily than traditional methods like circling around or waiting for someone to leave. By leveraging this technology, drivers can avoid wasting time looking for a space.

2. BLOCK DIAGRAM

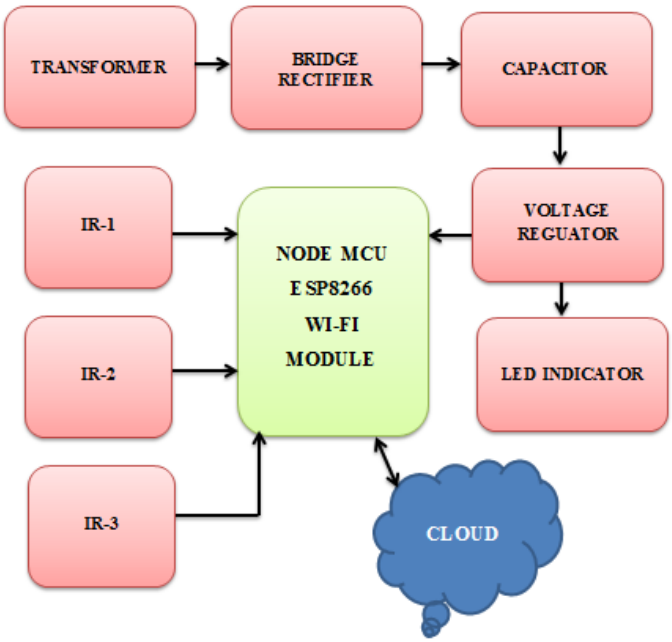

Fig.1: Block diagram

3. TECHNICAL SPECIFICATION

I. Node MCU ESP8266

The Node MCU ESP8266 is a popular development board based on the ESP8266 microcontroller. It is important to note that the Node MCU ESP8266 operates at 3.3V. The Node MCU ESP8266 offers a total of 11 GPIO (General Purpose Input/Output) pins that can be used for digital input or output, PWM (Pulse Width Modulation), I2C (Inter-Integrated Circuit), and more. The Node MCU ESP8266 has one analog input pin, usually referred to as A0.

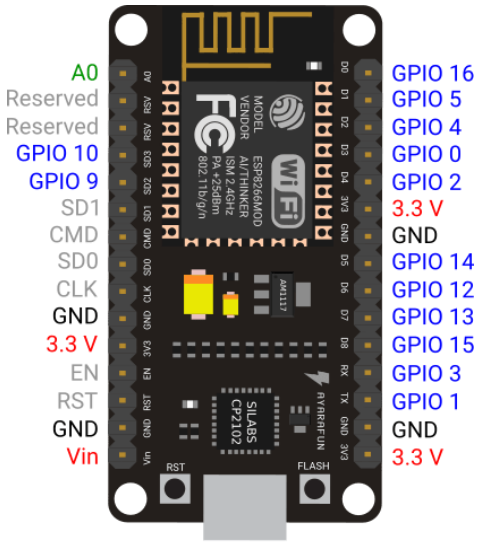

Fig.2: ESP8266

II. IR sensor

An IR (infrared) sensor detects and measures infrared radiation in its surroundings. It works by converting the infrared radiation into an electrical signal, which can be used for various purposes such as motion detection, proximity sensing, temperature measurement, and remote control communication. The operating voltage of an IR (infrared) sensor can vary depending on the specific sensor and its design. However, many IR sensors commonly used in electronic devices and applications operate at voltages between 3V and 5V.

Fig.3: IR sensor

III. Transformer

A step-down transformer is a type of transformer that reduces the voltage from the primary (input) side to the secondary (output) side. The higher voltage, often referred to as the primary voltage (Vprimary), is applied to the primary winding of the transformer. he secondary winding, which has fewer turns than the primary winding, is connected to the load or device that requires a lower voltage (Vsecondary).

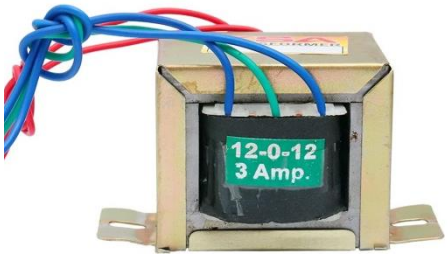

Fig.4: Transformer

IV. Bridge Rectifier

The rectifier circuit, often in the form of a bridge rectifier, converts the AC voltage from the transformer into a pulsating DC voltage. It uses diodes to allow current to flow in only one direction, effectively converting the alternating current to direct current.

V. Filter

To smooth out the pulsating DC voltage generated by the rectifier, a filter component such as a capacitor or an inductor is used. It reduces the ripple and noise in the output voltage, providing a more stable and clean DC power supply.

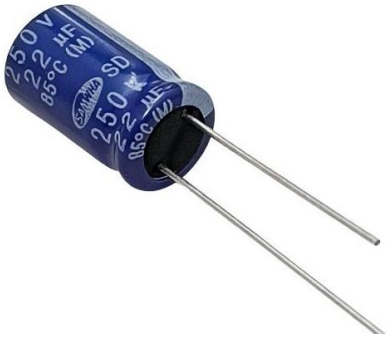

Fig.5: Capacitor

VI. Regulator

The regulator is responsible for maintaining a constant and precise output voltage, regardless of fluctuations in the input voltage or changes in the load. It ensures that the device receives a stable power supply within the required voltage range.

Fig.6: LM7805

WORKING

A power supply 230v to the transformer. A transformer is connected to bridge rectifier it gives pulsating dc voltage. Then capacitor is connected to the voltage regulator and led indicator to show power is present here. Lm 7805 v it converts in to 5V. 5V output from power supply module is directly connected to 5V pin of Node mcu (ESP8266) and GND of power supply is connected to GND of Node mcu.

If a car or any vehicle is parked, the IR sensor transmits data and hit the parked vehicle and receiver reflect and thus existence of a vehicle on a parking spot is detected. Then it will send to the Wi-Fi module and it update on Cloud. The IR sensor module has three pins, Vcc, GND and out. The Vcc is connected to 5V supply and GND is connected to GND of the supply. When we apply "HIGH" signal to trigger pin for 10 microseconds, the module transmits signal from one of the transducers, when the object wave hit back the other transducer, the receiver pin gets "HIGH" and this signal is detected by ESP8266 and similarly update on mobile app.

3. CONCLUSIONS

In conclusion, the main purpose of a smart vehicle parking system is to save time and reduce hassle for motorists to find a parking lot with a vacant parking spot; otherwise a driver may need to spend their time to find if there are any vacant parking spot left or should they move on to an another parking lot and this situation may put many motorists to mental stress especially those who are in an urgent circumstances.

5.2 Advantages

- Environmental Benefits
- Efficient Revenue Management
- Improved Safety and Security
- Enhanced User Experience
- Reduced Traffic Congestion
- Optimal Space Utilization
- Real-time Parking Availability

5.3 Future Scope

- Blockchain technology can be integrated into IoT-based parking systems to enhance security, transparency, and trust.
- Smart Navigation and Reservation
- Autonomous Vehicle Integration
- By leveraging advanced analytics and machine learning algorithms, IoT-based parking systems can analyze historical data to predict parking demand and availability.

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