SMART PARKING

Introduction

One of the most critical problems in urban cities is car parking and traffic control systems. Finding parking space is often difficult for drivers in modern cities, thanks to the growing number of private car users.

The rapid development of sensory technology, many modern cities have chosen to deploy various IoT-based systems for monitoring purposes. For example, some parking programs claim that citizens get real-time information about available parking spaces with IoT smart parking systems.

City planners can see this situation as an opportunity for IoT-based smart parking in a busy city environment to ramp up the efficiency of their parking facilities and lead to reduced search times, traffic congestion, and road accidents.

Smart Parking

An IoT based smart parking system, also known as a connected parking system, is a centralized management system that allows drivers to use a smartphone app to search for and reserve a parking spot.

Smart car parking systems using IoT, which include sensors and microcontrollers, can be available in each parking slot. The user will then be able to track the availability of all parking spaces and can choose the best one. Alternatively, the user can also view the duration of the parking usage from the application, and costs can be calculated and sent to the user with the help of smart parking meters.

Another task that an IoT Smart parking management system solves is monitoring the movement of people and cars in a parking lot.

Ideology

IoT-based smart parking system transmits available and occupied parking spaces via a web/mobile application.Each parking space has an IoT gadget, which includes sensors and microcontrollers. The user gets real-time updates on the availability of all parking spaces and, therefore, an option to choose the best one. This solution alone initiates a chain reaction of benefits, from lesser traffic congestion to reduced fuel efficiency, in urban areas where parking is often painstaking.

These IoT-based solutions help reduce traffic congestion by allowing drivers to park remotely without having to worry about finding the right space on the street themselves. It's also more environmentally friendly because people don't have to waste gas driving around looking for an elusive parking spaces.

Methodology

Two IR sensors are used at the entry and exit gates to detect vehicle entry and exit in the parking area. And other four IR sensors are used to detect the parking slot availability. The servo motor is placed at the entry and exit gate that is used to open and close the gates. Also, an LCD display is placed at the entrance, which is used to show the availability of parking slots in the parking area.

When a vehicle arrives at the gate of the parking area, the display continuously shows the number of empty slots. If there have any empty slots then the system opens the entry gate by the servo motor. After entering the car into the parking area, when it will occupy a slot, then the display shows this slot is full.

If there is no empty parking slot then the system displays all slots are full and does not open the gate.

Components Required

IR Sensor : IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.

Node MCU : The NodeMCU (Node MicroController Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266.

LCD Display : LCD is a flat-panel display system that is primarily seen in Television and computer screens, which is also used by cell phones presently. It is used to monitor the parking space and display the details of parking space by using IR sensor.

Servo Motor : A servo motor is defined as an electric motor that allows for precise control of angular or linear position, speed, and torque. It is placed at entry and exit gates of smart parking system that is used to open and close the gates.

USB Cable : USB cables are designed specifically to connect devices that use the universal serial bus (USB) protocol. It is used to powering up the Arduino.

Wires : Wires are pieces of metal that transport electricity. They are usually flexible which makes them easier to use.

Breadboard : The breadboard is a white rectangular board with small embedded holes to insert electronic components. It is commonly used in electronics projects.

Benefits

- Optimized parking
- Reduced traffic
- Reduced pollution
- Enhanced User Experience
- Integrated Payments and POS
- Increased Safety
- Real-Time Data and Trend Insight
- Decreased Management Costs

Conclusion

The development of the Internet of Things and cloud technology opens up new opportunities for smart cities. Smart parking has always been the backbone of building smart cities. IoT-based smart parking system offers real-time slots, parking procedures, information and improves users' ability to save time on proper parking. It helps to solve growing traffic congestion concerns. As for future work, users can book parking in a remote location. GPS, reservations, and license plate scanners can be included in the future.