

IOT BASED SMART PARKING SYSTEM

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PROBLEM DEFINITION

Parking slots have become a widespread problem in urban development .This issue can be mitigated by the introduction of smart parking management for the smart environment which targets to assist individually match drivers to vacant parking slots, saving time, enhance parking space utilization, decrease management costs, and alleviate traffic congestion. This paper develops an IoT Raspberry Pi-based parking management system (IoT-PiPMS) to help users to easily find available parking spots with real-time vision and GPS coordinates, all by means of a smartphone application. Our system composes of Raspberry Pi 4 B+ (RPI) embedded computer, Pi camera module, GPS sensor, and ultrasonic sensors. In the IoT-PiPMS, RPi 4 B+ is used to gather and process data input from the sensors/camera, and the data is uploaded via Wi-Fi to the App IoT server. Ultrasonic sensors and LEDs are exploited to detect the occupancy of the parking spots with the support of the Pi camera to ensure data accuracy. Besides, the GPS module is installed in the system to guide drivers to locate parking areas through the App. that discovers parking spaces availability over the Internet. The system prototype is fabricated and tested practically to prove its functionality and applicability. According to the results, the IoT-PiPMS can effectively monitor the occupancy of outdoor parking spaces in the smart campus environment, and its potency in terms of updating the data to the IoT server in real-time is also validated.

Design Thinking



PROJECT OBJECTIVES

Real time parking space monitoring:

A smart parking system uses IoT devices and sensors to collect real-time data on parking lot occupancy and transmits this information to the cloud or local network. It also involves building IoT apps for end-users, like parking administrators and drivers.

Mobile app integration:

A mobile app connects the system with the users so drivers can find a vacant space quickly and easily using clear and simple directions. Generally, such an application shows the driver a real-time view of available and taken parking spots via a simple and comprehensive interface, allowing a parking space reservation and automatically tracking billing based on when the

Real-Time Transit Information Platform



Cameras are installed on every level of the parking structure to track where vehicles are located . In this case, specialised software is needed to identify the number of vacant and occupied spots. Cameras can also be mounted on light poles or buildings structures fo on-street parking systems.

This proposed smart parking system consists of the onsite deployed Interet of Things(IoT) module which delivers real-time output and monitors the flow of the parking of vehicles in and out of that particular parking lot.

Integration Approach



RASPBERRY PI:

For an automatic smart parking system using IoT. The system is Raspberry Pi-based and contains a Pi camera for sensing the parking lot. The administrator can add/remove the number of parking slots on the central server.

ULTRASONIC SENSOR:

Using Ultrasonic Technology for Smart Parking Systems, Automated parking guidance systems help drivers detect whether a parking spot is occupied or vacant, which can save the driver unnecessary search time to find an available spot . An ultrasonic sensor is an electronic device that emits in order to sense some aspects of the surroundings . An sensor can measure the sound frequency of an object as well as detects the motion. Usually in the ultrasonic spectrum, all the object.

CLOUD PLATFORM:

Choose a cloud platform for data storage and analysis. Options like Amazon Web Services (AWS), Google Cloud Platform (GCP), and Microsoft Azure are popular choices.

EXISTING SOLUTIONS

At present some countries have portals which users can gain information about parking areas via the internet. This system can give user the information about parking space, but it won't be able to give which parking slot is vacant and occupied. Hence, such system cannot smartly handle the issue. Car lifts along with automated robotic system, which automatically takes car to a particular parking spot as soon as the car enters on a platform. This system cannot be installed by medium scale shopping malls, movie theatres as it can cost them a huge amount. At many public places, the system only shows the availability but it cannot show the exact slot and path to the slot available. Hence, there is the need to smartly find the path to the vacant spot.

CONCLUSION:

Conclusion An IoT-based smart parking system using Raspberry Pi 4 B+ has been designed and fabricated by utilizing ultrasonic sensors, Pi camera, LEDs, and the developed app for IoT platform. The developed system has been tested and validated to be used in the smart campus environment or similar outdoor parking

lot.