A STUDY ON SMART CAR PARKING USING INTERNET OF THINGS (IOT)

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ABSTRACT

The technology is improving day by day as a result there are many inventions which makes our work simple and easier, one such invention is smart car parking using IoT (Internet of Things). IoT is a technology which is being used now a days. As the population is increasing day by day vehicle count is also increasing.

There are no proper parking lots for the vehicles due to which we can see many people parking their vehicles beside the roads which will lead to unnecessary traffic and also there are chances of getting accidents. We can see people searching for parking lots by this their time will be wasted. To overcome such situations we will be using smart car parking using IoT which will be discussed in this paper. So by using smart parking using IoT time can be saved and the work will be easier.

Keywords: IoT, RFID

1. Introduction

IoT is the new technology which is more widely and frequently used, IoT came in the year 1999 and its first work was on the RFID (Radio Frequency Identification). Sensors, actuators and many other micro-controllers have been embedded with the physical objects and are connected through wired or wireless networks. And all these objects are connected to the Internet using the IP (Internet Protocol) address.

Each object which is connected to the internet is uniquely being identified by its embedded computing system and then it performs its function with the existing internet infrastructure. The "Things" in the IoT is the combination of hardware, software, services and the data.

All the devices which are connected to the internet fetches the data using the technology and then the data which has been received will be transferred between other devices. IoT is used in many fields like smart home, wearable, connected cars, industrial internet, smart cities, agriculture, healthcare and many more.

There are many applications and software for managing the car parking but still we can see some drawbacks of them, smart car parking using IoT is the another application or the concept of the IoT which we will be discussing. In this concept it uses many methods to overcome the existing system.

As there is rapid growth in population the vehicles are increasing day by day and there are no proper places for the parking of vehicles. One should search for the parking place for his/her vehicle this will take more time, if there is no parking lot available then the time will be wasted and the work is more. Now a days we can see people if they won't find any parking lots they will park their vehicles where the places are available this will impact on the traffic.

To overcome these problems, smart car parking using IoT was introduced. This system uses different types of methods like Raspberry Pi, Arduino, E-parking application, Computer Vision, Cloud, RFID and Sensors.

2. Related Works

[1] Smart Parking System for Commercial Stretch in Cities: In this paper author proposes a system where the user must first get registered then the details of the registered user will be stored in the cloud. The number plate of the vehicle will be detected using the IP (Internet Protocol) cameras. All the sensors which are placed around the parking lots are connected to the Raspberry Pi. Whenever the user enters the parking slot based on the vehicle number and the details present in the database the parking slot will be allocated to the vehicle which will

be send through the mobile. After the vehicle is parked it is detected by the PIR (Passive Infrared) Sensors and the time gets started and after the vehicle leaves the slot time gets stopped and according to entry and exit time the user will charged money which will be deducted from the E-wallet.

[2] Automatic Car parking system with Visual Indicator along with IoT:In this paper author proposes a system in which a user can come to know about which parking slots are empty or occupied and they can choose the slots for parking using the App. In this system the author makes use of the Aurdino micro-controller for controlling all other components of the system. Ultrasonic sensors are used because of their higher frequency which gives the perfect output. These sensors are placed in front and above the car so that if the car is parked in the slot correctly a red light will be tuned on which indicates that slot is occupied if the slot is not occupied a green light will be turned on which indicates the slot is free. The information is send to the internet by using Wi-Fi module.

[3] IoT Based Sensor Enabled Smart car parking for Advanced Drivers Assistance System:In this paper author proposes a system, in which a android application is developed so that user can check the status of parking and the parking lot can be booked if the parking lot is free. Aadhar card numbers are collected during the android application registration process for the unique identification and authentication.
The sensors placed in the parking lot will give the information to the embedded system in this system Raspberry pi is used as the embedded controller. The data provided by sensors will be updated in the database, by using this information DC motor can be controlled.Database contains the information such as status of parking lot and parking time of vehicles. The availability of the parking lot will be displayed on mobile application.
If the user books a particular parking lot then it will be locked for others, the user can book the parking lot by using the unique user ID. Here the IR (Infrared) sensors are used for collecting the information about the status of the parking, because they have the advantage like sensing the object in dust and it has accurate detection of object. After the car vacates from the parking lot the user will be charged by considering the parking time which will be updated in the server.

[4] A cloud based intelligent car parking services for smart cities:In this paper author proposes a system which follows the top down design pattern which consist of persistence tier, web tier and presentation tier. In the presentation layer the cloud is used for the information service and the smart cities are administrated by the IoT management. In the bottom layer sensors are interfaced with business service this includes all the type of car service information like GPS service, parking information service and tracking service.
Many wireless technologies are used for the communication purpose between application and sensor layer. In sensor layer many sensing technologies are used like RFID (Radio frequency identification), ultrasonic sensors to detect the vehicles or the license plate. The cloud stores the information about the car parking like cars location, available parking lots and the parking time of vehicle.
The OSGI (Open Service Gateway Initiative) web servers tier is used as the communication between the mobile application and the cloud. Whenever the user enters the campus the mobile application which is installed on the user mobile will automatically request for the available parking lot. If the mobile has GPS (Global Positioning System) service then it provides the location of the available parking lot. The main aim of this system is to find the available parking and reserving the parking lot for the user.

[5] The development and simulation of a smart parking guidance system:In this paper author proposes a system which serves as a parking guidance system. This system includes many designs like lane positioning of the vehicle and guidance through display. To locate the vehicle, a vehicle positioning system is used in this method the sensors are placed on the road to detect the vehicle and where the car has been parked and this information is transmitted to the Wi-Fi controller system which is used to determine the location the car here the ultrasonic sensors are used.
To check whether the car is correctly parked in the parking space is determined by using the magnetic sensors which are placed on the park-

ing floors. The driver is guided through the guidance display system the main aim of this system is to provide the direction and back control system to provide voice.

The parking indicator light is used because to show the status of the parking usually the light will be off whenever the car is parked then the lights will be on. The Wi-Fi wireless networks are used for communication, the information will be in the JSON (JavaScript Object Notation) format. The JSON is used because it is light weight data exchange format which has high compatibility.

3. Conclusion

In this paper we have discussed different methods of smart parking. There are many solutions to smart parking like sensing the vehicles in the parking lot using sensors, storing the information in the cloud, Wi-Fi controller system for communication, RFID, android application for user interface, Aurdino micro-controller for controlling the other components of system. Each method has its own advantage and disadvantage. By combining advantages of many systems we can find a new affordable and adoptable solution which makes our work even simpler and easier.

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