
ABSTRACT

The goal of this project is to count the number of empty car parking areas and to display them in a Website. This system consists of sensors attached to several parking areas. These sensors located in different parking area's detects the presence of vehicle and sends information to Microcontroller, which calculates the number of available empty parking areas and uploads them in a website. This basically works on the principle of Internet of Things here the sensors are connected to internet.

KEYWORDS: Internet of Things, Smart parking system, Sensors on parking areas.

INTRODUCTION

Internet of things describes a scenario in which physical objects are connected to network through which they can share data. It allows user to collect the data and control the objects remotely connected to the same network. The object can be a sensor that collects physical data and when this sensor is connected to a network the collected data can be accessed remotely. Not only collecting of data user can also able to control the objects remotely like turning On and OFF.

Parking is the act of stopping the vehicle in a cleared area that is intended for parking vehicle.

Parking facilities include Indoor and Outdoor parking. Indoor parking involves parking in home, garage. Outdoor car parking involves parking in one or both sides of the road. In shopping malls and other big shops they provide a cleared area for parking the vehicles. There is lot of improvements in parking system to make it a efficient by parking more cars in lesser area. For this purpose several types of parking areas are designed which includes parking ramp, Multi storey car park, valet parking, automated car parking.

Even though there are lots of improvements to park more number of vehicles in smaller area and there are large number of parking areas, Travelers are unaware of these areas. Drivers spend most of the time and fuel in search of place to park their vehicle. Due to this there is possibility of increase in traffic, driver frustration and pollution. Smart parking uses group of sensors over parking area and these sensors are connected to internet so that user can find empty parking areas while driving itself. It saves fuel, reduces pollution and makes driving easier.

MATERIALS AND METHODS

Basic working part of this project consists of microcontroller, proximity sensor and Wi-Fi module.

Prototype consists of two main units

They are

- I. Hardware part
- II. Software part

Hardware development

Proximity sensor

Proximity sensor is a device used to detect the presence of nearby objects without any physical contact within a particular range. There are different types of proximity sensors but infrared proximity sensors are widely used. A proximity sensor emits infrared beams and monitors for reflections. When a sensor senses a reflection, it confirms the presence of a nearby object. This sensor is used to detect the presence of a car in the parking area.

Wi-Fi Module

The ESP8266 Wi-Fi Module is a self-contained SOC with an integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. It is used to connect the sensors to the network and also to upload the sensor data to the network.

Microcontroller

A microcontroller is a small CPU designed to perform a specific task. For this project, ATmega8 is used; it's an 8-bit RISC-based microcontroller. It gets the data from the proximity sensor and uploads it to the network with the help of the Wi-Fi module.

Software development

Embedded software

For programming the microcontroller, Arduino-based C language is used.

Analog to digital converter

An analog-to-digital converter of ATmega reads the analog value from the proximity sensor and converts it into a digital value. From this, the presence of a vehicle can be determined.

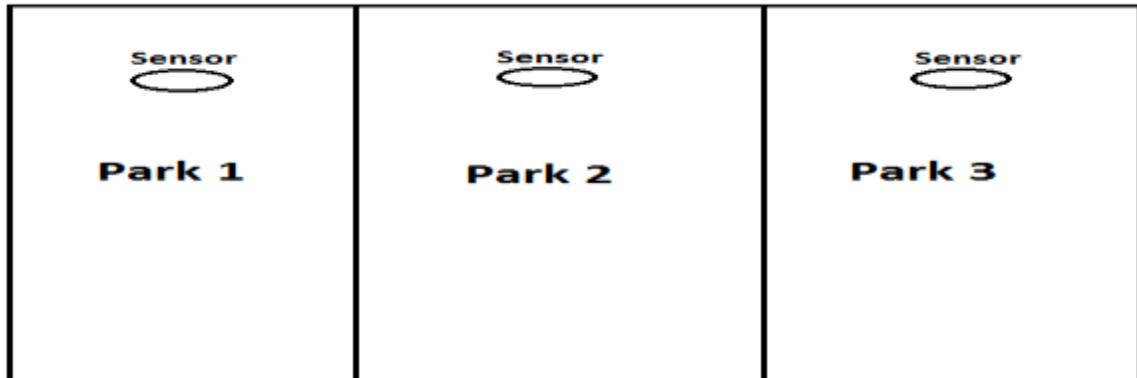
Communication

For communicating between the ATmega and Wi-Fi module, USART is used. The data is transmitted at 9600 baud rate.

End user interface

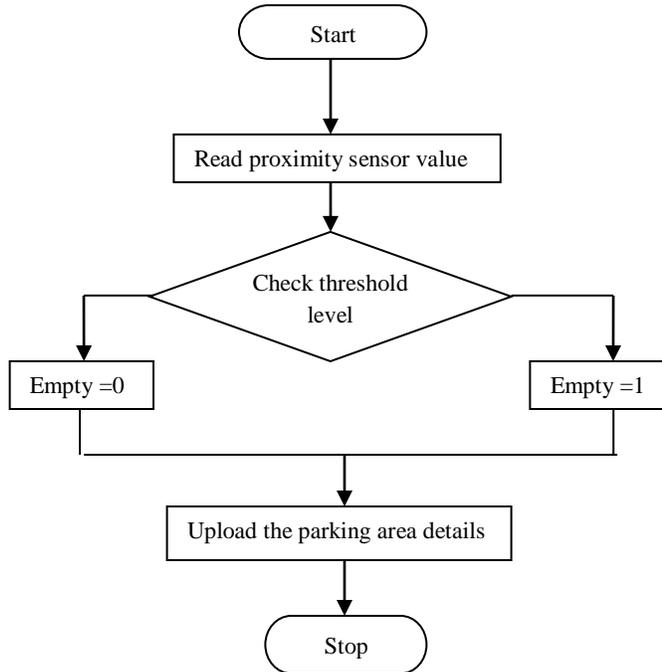
HTML and JavaScript are used to display the car parking's data in a webpage.

Figure 1:



Smart parking layout

Figure 2:



Flowchart shows working of smart parking

RESULTS AND DISCUSSION

From the sensor data presence of vehicle is determined by comparing it with the threshold value. Similarly sensor data from all the parking lot is gathered together and it is checked for presence of vehicle by comparing it with threshold value, this process is done by the microcontroller. Now the number of empty parking lots is found by using formulae

Formulae:

Empty parking lots = Total number of parking lots – Number of Filled parking lots

All these data is now uploaded to a website using Wi-Fi module, which is used to access the internet.

Figure 3:



Figure shows the data uploaded to ThingSpeak website

CONCLUSION

This can be easily implemented for domestic purpose in Apartments, Flats and Public buildings and also for commercial application in shopping malls. It reduces the fuel cost and time spend in parking. It also provides profit to shopping malls and reduces driver frustration. But the disadvantage in this method is that the initial investment is high.

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