



An IOT Based Intelligent Parking Guidance System for Smart City

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ABSTRACT

This paper is a trial to automate major processes of manual Car Parking System including availability checking of a car through sensor signal output. This technique is meant for Multiple Dwelling Units, offices, colleges, Malls, Cinema theaters, Airports, train depot and plenty of more where there's a requirement of a systematic parking reservation of vehicles. In India administrators, users, and government authorities face many difficulties due to the lack of a proper car parking system. In this project, solutions have been provided to the problems encountered during parking a vehicle at commercial parking lots. This problem has been resolved using Smart Parking System. This Parking Reservation System is an access control and automatic Reservation system that gives an ID-based parking slot system using a web based application.

Key words: Smart Parking, Online car slot booking system, Automatic car entries in database by image processing.

INTRODUCTION

The ideal of creating Smart City is now becoming possible with the emergence of the Internet of Things. One of the key issues that smart cities relate to car parking facilities and traffic management systems. Now a days cities finding an available parking spot is usually difficult for drivers, and it tends to become harder with ever increasing number of private cars & the limited availability of parking results in traffic congestion, air pollution and driver frustration. The case is seen as an opportunity for smart cities to do something to improve the efficiency of their parking facilities thus result in reducing search times, traffic congestion and road accidents. Problems with parking and traffic congestion can be solved if drivers are notified in advance about the availability of parking spaces for their intended destination.

Recent advances in creating low-cost, low-power embedded systems are helping developers to create a new applications for Internet of Things. Followed by developments in sensor technology, many modern cities have opted for deploying various IOT based systems in and around the cities for the aim of monitoring.



Fig. 1 System Overview

A recent survey performed by the International Parking Institute reflects a rise in number of innovative ideas associated with parking system. At present time there are certain parking systems that claim to citizens of delivering real time information about available parking spaces. Such systems require efficient sensors to be deployed within the parking areas for monitoring the occupancy and for 3 quick data processing units to gain practical insights from data collected over various sources.

The smart parking system that we propose is implemented using a web application that is connected to the cloud. The system helps a user know the availability of parking spaces on a real time basis.

EXISTING SYSTEM

Over the years, car parking systems and accompanying technologies have increased and diversified. In any area where there's a big amount of traffic, there is a car parking systems. Car Parking systems were developed in early 20th century in response to the requirement for storage space for vehicles. Looking at the current situation in India the problem is simple the number of vehicles has increased but the parking spaces in Indian cities have not changed or decreased due to population growth. Especially when land is limited and expensive in a metropolitan area, increasing the demand for parking spaces puts a lot of pressure on it.

Due to rapid economic growth and population growth, India's major metropolitan areas are facing a crisis of mobility. Today, urban areas are under tremendous pressure in parking lots, outcome problems such as traffic congestion, demand and equity, and environmental hazards. Due to poor parking management policy, India is struggling with turbulent situations such as overcrowded roads, illegal parking, and criminal activities due to improper surveillance.

Let's take a look at some of the major parking problems facing major cities in India today.

1. Saturated parking spaces:

One of the most common problems today is overcrowding. Cars continue to outpace existing parking lots, thus blocking roads. Incidents of residential violence, vehicles paralyzed due to lack of space, and over-charge of parking space are some of the resulting problems.

2. On-Street Vs Off-Street Parking:

Another problem in major cities in India is the distorted demand for street parking as it is cheaper than off-road parking. Road parking problems often cause delays, especially on congested roads. Balance in the tariff is required for both types of spaces to be fully utilized. For example, the Sfpark Garage policy in San Francisco changed hourly prices based on the demand and offered very high discounts to reduce congestion in and around garages during rush hour.

3. Parking in residential areas:

The residential apartments in the Indian metro are probably always experiencing the construction of parking lots due to the idea of apartments plans without them will not attract buyers. This increases the cost of construction which becomes worse when the parking lots are empty. Because the cost of building parking spaces is the same whether the building is luxurious or modest, low-income residents, who may be less likely to own a car, end up heavily burdened with parking costs, subsidizing other people's parking spaces. Residents also often suffer from parking problems due to commercial visitors and excessive car ownership.

Different approaches have been suggested by different authors for different types of data collection in research to solve current urban parking problems. In recent works, most intelligent parking studies have focused entirely on technical positions, namely system architecture and design [10], performance algorithms and models [20], and prototype designs [15]. Many of them focus on solution rather than algorithms, software, programs, and a short situation of sensory technology. Such research has tested the merits and demerits, but is lacking in the process of overcoming the problems, as their motivation lies in the chosen path to develop a new IOT based parking system.

Pham et al. [4] incorporates the novel algorithm as a way to increase the efficiency of an intelligent cloud-based parking system and builds network architecture based on the IOT technology. Their offer in the system helps users to

automatically find free parking space at a lower cost based on new operating metrics in calculating user parking costs by considering the distance and total number of paid areas in each car park. Mainetti et al. [7] introduced an intelligent IOT-aware parking system on the basis of the integrated use of various technologies including RFID, WSN NFC, and Mobile. It is able to collect local boundaries and information on the living conditions of parking spaces in real time. As a way to reduce all system costs, it was assessed whether it was possible to use the solar RFID tag as a vehicle detection system. The system allows drivers to access nearby empty areas and make parking payments using the custom mobile app.

OBJECTIVE

The main objective of the parking system is to manage the details of Vehicles, Parking Slots, customers. The project is to totally built at administrative end and thus only the administrator is guaranteed to access. The purpose of the project is to built an application program to reduce the manual work for managing all the records of vehicles and Parking slots we can also book a parking slot using web application. These IoT technologies help to create a better environment in an urban area without pollution. So it will reduce carbon dioxide emissions that make human life better and more reliable.

PROPOSED SYSTEM

The smart parking system works with the simple goal of finding an obstacle and sending a visible response. Every parking slot is identified with a unique id (Parking id). The User registers using web application which prompts him to enter the Username and Password. Once he is registered he will book a slot with unique id. The available number of parking spaces in that area will be displayed. One constraint we consider is that once users book a slot they will give specific time to park a car. There are some cases on which this project works.

Case 1: In the case of empty parking space, the IR emitter emitting the rays will not bounce back an object (vehicle) is not detected & the ray will not strike on IR receiver so there will be no increase in potential difference. The feedback of this result makes changes in database as well as in web application which will show slot is empty.

Case 2: In the case of parking lot is full, the IR radiation emitted by the emitter is reversed as the vehicle's is there within the boundary range and the radiation strikes the receiver and these waves are converted into an electrical signal that creates a potential difference. The feedback of this result is indicated in display and in web application which will show particular parking is filled.

There is a continuous emission of IR waves so the response is continuous. So the database will continuously update.

METHDOLOGY

Parking is an old-fashioned service in the transportation industry and is thought to have evolved for different generations. The initial parking plan where there were not many cars, was defined by the annual rental model. However as the number of vehicles in major cities continued to rise, just as number of city dwellers, the need for city planning became evident. With this, another area that needed special attention, to ensure that cars entering cities do not cause congestion and increase the harmful effects they have on the environment. For this reason, the concept of controlled parking was carried out. First, before the advent of the smart parking system, cities relying on electronic parking services that included the use of parking meters were not completely automatic.

This creates loop-holes in the fund raising and research process. However, with the advancement of technology, there has been a remarkable conclusion flexibility, which has seen the emergence of clever parking systems. The current smart parking system automatically provides a variety of parking services, allowing customers to navigate the entire parking experience independently from the living space in the parking lot to the tickets, parking, and payment. This smart parking system uses a variety of technologies including RFID and Mobile. It is able to collect natural parameters and information about the living conditions of parking spaces in real time with the help of web application which will mainly programmed in .Net & C# & The RFID technology will help to give id to each parking slot. So it will help to navigate particular empty parking space.

CONCLUSION

This study has proposed a smart parking system that enhances the performance of saving users time to locate an appropriate parking space and reduces the general costs for moving to chosen parking space. The most obvious finding to emerge from this study is that we proposed a smart car parking system that will make ensure reduction of transmitted data through the network and saving the energy in the perception layer. While on the application layer side of the app saves user time, avoid traffic jams, find availability of parking spaces and reducing car gas emissions from drivers while searching for empty parking spaces.

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