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SAFE AND SECURE PARKING SYSTEM BASED ON IOT

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Abstract

In recent times the concept of smart cities has gained great popularity. Thanks to the evolution of the Internet of things the idea of smart city now seems to be achievable. To optimize the efficiency and reliability of urban infrastructure, consistent efforts are being made in the field of IoT. The IoT tackles issues such as traffic congestion, insufficient car parking facilities, and road safety. This paper present a cloud-based IoT integrated smart parking system. The proposed Smart Parking system consists of an on-site IoT module implementation that is used to track and report the availability status of each single parking space. A mobile application is also provided that allows an end user to check the parking space availability and book a parking space accordingly. The paper also describes a high-level view of the system architecture. Towards the end, the paper discusses the working of the system in form of a use case that proves the correctness of the proposed model.

Keywords: *IoT, Parking, Space, Sensor, Vehicles.*

I. INTRODUCTION

With the rapidly increasing urban population and improvements in living standards, the number of vehicles has increased dramatically. Not only does the exponential rise in urban car ownership raise the pressure of urban traffic, but the issue of inadequate parking spaces is also aggravated. In the parking process, the increased driving distance increases energy consumption and exacerbates parking difficulties, increasing the number of minor incidents, such as scuffing and collisions. Smart vehicles are currently the automotive industry's main growth trend and are the research focus of major domestic and international automotive manufacturers and research institutions[1]. Automatic parking technology has become a common research subject as a key component of intelligent vehicle technology. Automatic parking technology completes parking operations safely and quickly without a driver and can effectively improve driving comfort while greatly reducing the probability of accidents during parking. In addition, the popularization of automatic parking technology can promote the development of automatic and intelligent vehicles[2].

At present, there are two main research methods for studying automatic parking systems: the research methods based on ultrasonic sensors and those based on visual sensors. Relatively early research was developed on automatic parking systems based on ultrasonic sensors. At present, in the production of automatic parking systems, ultrasonic sensors also play a vital role. Derrick and Bernard started to study parking technology in early 1989 and published their research findings in the field of parking. Seong Gon and Bart Kosko subsequently performed a review on methods of parking management based on the principle of fuzzy control. Holve et al., based on the fuzzy rule control system, achieved the automatic parking feature of a model car[3]. Takuya developed an automated algorithm for parking motion control based on parking space constraints and vehicle kinematics. Some parking experts have started to apply image processing technology to automated parking systems, with the rapid advancement of image processing technology. In 2008, a fuzzy control automatic parking assist device based on visual information was studied by Ozkul T et al. The Lexus LS460L, fitted with an intelligent parking assistance system, was launched by Toyota; this vehicle model uses a camera to gather spatial information from behind the vehicle and has an auxiliary feature of the trend line. A new generation automated parking system called Valet Park4U was launched by the Valeo Company.

The intelligent recognition of parking spaces is also related to machine vision and target detection and recognition technology. Vehicle detection and recognition technology has become a common research subject with the rapid growth of intelligent transportation technology that has been applied unprecedentedly in the field of vehicle detection and recognition. The majority of current approaches are focused on characteristics of vehicle appearance. J. A three-dimensional vehicle model was used by Ferryman to fit a picture of the input vehicle. The product of the recognition and vehicle orientation is the performance of the algorithm[4]. V. Petrovic suggested a method of recognition involving the normalization of the respective vehicle regions and the matching of the regional eigenvalues removed. There are two big issues with modern automated parking systems. First, the methods of identification of the parking scene are less intelligent, and the parking spaces have more criteria and limitations. Second, there is a low degree of automation of vehicle control. In addition to steering, current parking systems require speed, gear, and brake control by the driver. The benefits of ultrasonic sensor ranging and machine vision aim detection and identification are combined in this paper to enhance both the recognition of automated parking systems in the parking scene and the utilization rate of parking spaces.

Moreover, electric vehicle speed can be controlled by a voltage signal to automatically control parking speed and to coordinate vehicle speed and steering speed. This advantage is used to improve the effect of path following, to increase the intelligence of automatic parking technology and to enhance parking convenience. Next, the techniques of identification of the parking scene are discussed. Several samples are used to train the AdaBoost vehicle detector to begin with, and a transplant test is carried out. Then, by the color model algorithm, red taillights are detected. Finally, the vehicle's parking orientation is collected. Second, a parking scene model is set up by evaluating the working theory of the automatic parking system. The parking movement model and parking movement limitations are thoroughly analyzed in order to achieve realistic implementation of vertical parking, and a rational and feasible vertical parking route planning programmer is proposed. This software provides the basis for the following monitoring of the steering wheel and parking path change. Third, a route monitoring

controller for automatic parking based on the vehicle dynamics model is designed to correctly and accurately represent vehicle movement to monitor the planning path and increase parking accuracy[5].

When using an automatic parking system to find a parking space, the most common method is to detect the width and depth of a parking space using ultrasonic sensors. The device usually sets the width of the target parking space to be at least 70~80 cm wider than the width of the car body to ensure that the doors on both sides of a vehicle can be opened normally. The device will realize that the parking space is not appropriate when a relatively small open parking space is found, resulting in wasted parking space. In this situation, as long as the width of the parking space is greater than the minimum width of the parking space requested, it is still possible to use a narrow parking space by understanding vertical parking scenes, by logically designing the parking route and by changing the final parking location[6]. The required criteria are that the limited space will not affect the car doors and that the driver side door of all vehicles involved can be opened normally. The object of this chapter is to recognize vertical parking scenes, including by means of ultrasonic radar sensors, the measurement of the parking space and by means of a visual sensor, the identification of the parking orientations of the vehicles on both sides of the idle parking space. The most popular automatic parking technique at present is the use of ultrasonic sensors, which we will not discuss in this article. This chapter focuses on identifying by a visual sensor the orientation of parked vehicles. The basic technique recognizes cars and in pictures distinguishes red taillights. First, in the image taken by the visual sensor, the device senses if a vehicle exists. Second, the system identifies red taillights in the pictures that contain a vehicle. Finally, the system determines the vehicle orientations in the vertical parking spaces on both sides of the target parking space[7].

The IoT is a mostly used verdict for an art and adjunct of technologies, systems, and study principles associated with mutually emerging whirl of internet-connected machinery that is based on the worldly environment. IoT further refers to the relationship of systems and sensors to the broader Internet, as well as the service of commander Internet technologies. With individuality package devices, the Internet of Things (IoT) role of virtuoso began mutually content. The strategy can be adamant, reticent or controlled through individual automation that can be noticed by computers on the Internet. IoT expands the consideration of mutual assessment to the Internet supplying the kit, and to the inter-network of devices and traditional objects, or 'Stuff' by a bully of thumb. In IoT, the two relevant terms are "internet" and "things." Big international Internet solutions involve wired servers, laptops, science understanding at which point, and mobiles for me down protocols and connection for the international members of the working class. IoT involves the inter-network of strategy and terrestrial objects, object residence given a pink slip stash at individual locations, and units collecting, organizing, handling and reviewing the argument in the process and services often acquire one leg aside. It helps to provide a departure from the imagination where material (wearable, investigate, apprenticeship clock, house techniques, items surrounding) often adopts an effective approach. Involved during the form of meaning, computation and connectivity with inserted achievement to the am a coal and ice for devices that communicate with each other from the beaten concatenate items or completely connecting individuals[3].

IoT performs a consistent part in joining our bounding substantial conditions through the web, also built trivial toward attain the particular conditions against a part of an isolated area. IoT is a production of connecting devices to the internet. IoT is a no end in sight network accessible by computer things and people-which the way one sees it and sympathizes with data. This project is based on IoT and the project is a success to the people and more everywhere nowadays people are facing problems to park their vehicles in cities, so to revive that they are implemented. This makes the end-user directed toward a nearby place trend to look-in parkland space in peculiar slots. So already stated we are especially focusing on at which point to minimize the time and furthermore how to play it close to the vest travelling over filled parking lots[6].

II. CONCLUSION & DISCUSSION

The automatic parking systems based on parking scene recognition elaborates the research method of an automatic parking control system and designs a parking controller. For mankind, the vision of smart cities has always been a fantasy. Significant strides have been made in making smart cities a reality over the past couple of years. In terms of smart cities, the advancement of the Internet of Things and cloud technology has given rise to new possibilities. Intelligent parking facilities and traffic management systems have always been at the center of smart city design. In this paper, we discuss the parking problem and propose an integrated smart parking solution based on the IoT cloud. The scheme that we suggest offers information in real time about the availability of parking spaces in a parking area. Users from remote locations could book a parking slot for them by the use of our mobile application. The efforts made in this paper are intended to improve the parking facilities of a city and thereby aiming to enhance the quality of life of its people.

III. REFERENCES

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