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Intelligent Parking and AR Vehicle Searching System in Parking Lot

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Abstract

With the development of the times, the per capita car ownership is soaring rapidly, which corresponds to the unreasonable planning of parking lots all over the country. The issue of "difficult parking" has come out. Moreover, in strange parking lots, it is difficult for the public to quickly find their favorite car. In view of such social issues as how to quickly find parking spaces and love cars, reduce those undue waste of time and set aside costs, this paper will design a set of intelligent scanners that can identify parking spaces and license plate information, the terminal display that can display the overall condition of parking lot, and an intelligent system of software.

Keywords

Parking Lot; Intelligence;AR Technology.

1. Introduction

Since entering the 21st century, the automobile industry has developed rapidly, and folks' quality of life is also improving. With folks' demand for travel, the number of private cars has also sharply increased. According to relevant statistics, by 2020, the number of motor vehicles in China alone has reached 260 million. Nevertheless, with the rapid increase of private cars, the construction of parking lots in some cities is extremely unreasonable for due to various reasons such as economy and policy, resulting in the embarrassing situation that it is difficult to find a parking space otherwise where the car is when the car is parked. A study by a traffic information data company in the United States found that American drivers spent an average of 17 hours looking for parking spaces every year, while drivers in New York spent an average of 107 hours looking for parking spaces every year, resulting in a waste of up to $4.3 billion. This situation is not limited to the United States. Minor difficulties in finding cars will occur all over the world, large otherwise minor. Additionally, for the unfamiliar parking lot, it takes an average of about 15 minutes for a car owner to find his car, which seriously affects his personal journey and the travel mood. In view of the above two issues, different scholars at home and abroad have put forward ideas, some put forward the redesign and construction of a reasonable parking lot, some put forward the reasonable planning of parking spaces in the parking lot, and others put forward the detailed solutions to the issue of finding cars. At the same time, this issue, the state and society had also issued corresponding policies and regulations for quite a few times, strongly advocating civilized parking and seeking the best car search scheme. Based on this background, this paper will design an intelligent system composed of intelligent scanner, terminal display and Wechat applet, which aims at facilitate car owners' car search and car search.

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2. Composition of Intelligent System

2.1 Wechat Applet

2.1.1 Interface

It is composed of individual and home pages. The personal interface is used to bind their own identity information and license plate information. There is AR navigation system and the surrounding car park on the front page.

2.1.2 Composition Principle

1) Parking lot information entry: All kinds of large parking lots are required to input the information of each partition and parking space in the parking lot into the software.

2) Positioning system: Beidou Positioning System is adopted.

3) Car search: Accurate navigation is achieved through AR navigation technology.

2.1.3 Use Process

After the user enters the small program, the license plate number is bound, and the small program connects users with the Internet, and quickly locate the car through Beidou Positioning System and AR navigation technology, and conveniently find the car.

2.2 Intelligent Scanner

2.2.1 Placement

According to the investigation and actual tests, the current camera with a 1/3" CCD lens is in the standard parking lot environment, and the height is about 3 meters, and the width that can be radiated is about 26 meters, which is equivalent to about 8 parking spaces, which is in line with the number of parking spaces in a row of parking spaces in a small parking partition.

Fig. 1 Sketch Map

2.2.2 Workflow

When a vehicle is parked in a parking space, the intelligent scanner will identify the vehicle, extract its license plate information, and identify the number of the parking space where it is located through the positioning system. Finally, upload the license plate information, the partition and the parking space number to the database.

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2.3 Terminal Display

2.3.1 Function

The display is equipped with LED display, which can display the overall layout of the parking lot, after the intelligent scanner uploads the parking status of each partition to the database, it can divide the partitions into idle areas (0% to 30%), ordinary areas (30% to 60%) and crowded areas (60% +) through the parking conditions of each partition in the database, which is convenient for car owners to choose a better parking area when entering the parking lot.

2.3.2 Placement

At the various entrances of the car park.

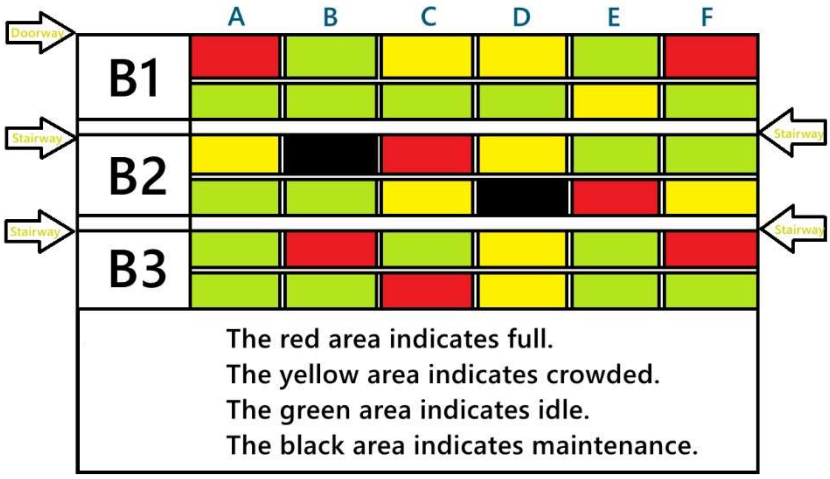

Fig. 2 Sketch Map

3. Technical Principle

3.1 AR Navigation

Based on the large scale car park, which is made up of multi-storey buildings, the navigation system has abandoned the traditional two-dimensional navigation system, and adopts the latest AR navigation system. The advantage of the navigation system is that it can display the location of the car owner and the location of the car in the three dimensions, and has high sensitivity, so that the car owner can find the car more quickly and conveniently.

3.2 The Principle of Intelligent Scanner Acquisition Information

1) The camera can be equipped with the license plate recognition system developed by Jiuding Intelligent Technology Co., Ltd, its system can have a good recognition effect within 10 ° tilt. At the same time, it can identify a variety of license plates, including Chinese characters, letters and numbers of military vehicles, police cars, consulate foreign cars, government cars and other special license plates. And based on its own powerful computer vision and image processing technology, it can achieve good recognition effects in various harsh environments.

2) The camera also requires digital image processing technology and machine learning technology, so that it can accurately identify the number of the parking space when the vehicle is parked in the parking space.

4. The Overall Operation Process

1) The owner downloads the application and binds its license plate number.

2) The owner enters the garage to park the vehicle, and the smart scanner scans the license plate and parking space. At the same time, it can uploads data to the database.

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3) The application and the terminal display read the information of the corresponding license plate number in the database and complete the corresponding changes.

4) The owner finds his car through the VR navigation system in the application.

5) The owner drives the car out of the parking lot, and the smart scanner scans the parking space and passes the information to the terminal display.

Fig. 3 Sketch Map

5. Analysis and Summary

5.1 Application Prospects

This system adopts the mode of WeChat Mini Program, Intelligent Scanner and Terminal Display which provides a more convenient way for people to park and find cars. Among them, the existence of terminal displays greatly reduces the time for people to find parking spaces, and secondly, AR navigation is more adapted to unfamiliar and complex parking environments than traditional navigation, and the 1/3" CCD lens and intelligent identification license plate system equipped by smart scanners can also provide more accurate information. The number of domestic parking lots is growing rapidly, and this system combines the scientific and technological products of the times to

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solve the social problems that contemporary people care about, and has broad prospects for development.

5.2 Social Benefits

This system solves the problem of people's "parking difficulties" and "difficulty in finding cars", and saves an average of about 10 minutes per person in terms of time efficiency, which is converted into economic benefits, and can save about 5 billion waste a year. At the same time, it facilitates the management of parking lot owners and saves management costs. Secondly, people's satisfaction with the parking lot has increased, avoiding the mood affected by the delay due to parking lot problems, and the happiness index of social groups has risen.

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