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Research on Precise Positioning of Shared Bicycle Navigation System

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Abstract

With the birth of the new concept of "low carbon travel, green environmental protection" at home and abroad, bicycle sharing, a new project, has been developing vigorously and has become one of the most popular representatives of sharing economy. Through the analysis of shared bicycle positioning technology, this paper puts forward three feasible schemes to improve navigation accuracy, including multi-mode positioning technology based on GPS + GPRS + electronic fence technology, based on inertial navigation positioning technology, and based on cellular grid positioning technology, as a solution to the use and management problems caused by inaccurate positioning of shared bicycles.

Keywords

Bike sharing, positioning technology, precision.

1. Research Background

With the rapid development of Chinese economy and the improvement of people's consumption level, people have higher and higher requirements for their own health and environmental protection, thus giving birth to the bicycle sharing industry.

Bicycle sharing is a new type of vehicle rental business bicycle rental business, which mainly depends on the carrier (bicycle) bicycle. It can make full use of the sluggish situation of bicycle travel caused by the rapid economic development of the city, and maximize the utilization of public road passing rate. Bike sharing has attracted more and more people's attention. As it is in line with the concept of low-carbon travel, the government is also in a period of goodwill observation on this new thing.

2. Existing Phenomena and Problems

Bike sharing is a low-carbon, environmental protection, aerobic fitness, convenient, comfortable, most people can use a kind of transportation. Compared with traditional bicycles, shared bicycles have obvious advantages in user experience. However, due to the promotion of a nest of venture capital, shared bicycles have excessive investment, too many cars and few people. In addition, there are some phenomena such as poor operation management and disorderly parking of bicycles, which seriously affect the urban environment and traffic order. On the other hand, when we ride a shared bicycle to a strange road, we rely on the navigation service of mobile phone. However, the inaccuracy of navigation is not convenient and will bring great security problems. Although sharing bicycles have added new technology, the operation mode adopts "pile-free" management, and the nearest bicycle can be found through app. Due to its poor positioning accuracy, there are cars on the map, but in fact, there are no cars in this place. All major shared bicycles have such a situation. In view of the phenomenon of this problem, this topic conducted research and technical research. It aims to improve people's use experience and make people more willing to choose healthy and environmentally friendly travel mode.

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3. Technical Proposal

Through investigation and technical research, three feasible technical schemes are provided.

3.1. Precise Positioning of Shared Bicycle based on GPS + GPRS + Electronic Fence Technology

The working principle of the system is as follows: through the system scheme, the problem of accurate positioning of the current shared bicycle can be realized. The power supply of the system is provided by the solar charging panel and the built-in charging battery. The control system manages the GPS module, electronic lock module and GPRS module. The navigation system first uses GPS module to locate, and then transmits the received signal to the controller for processing through the satellite, and then feeds back to the cloud database through GPRS network, and the cloud database transmits data to the mobile app, and displays the specific location of the vehicle on the map, so as to realize the vehicle positioning; However, when the vehicle is in the indoor or outdoor GPS signal is weak, the location information can not be updated, so it is necessary to use GPRS module and base station signal for positioning, so as to solve the problem of positioning inaccuracy caused by GPS signal problem indoor and outdoor; secondly, through the application of electronic fence, it virtual delimits a shared bicycle parking area and use area on the mobile phone map, Let the vehicle park in the designated area. When the parking bicycle exceeds the specified area of the electronic fence, the mobile phone will send a message to ask the user to return the bicycle to the designated area. Otherwise, the shared bicycle will not be locked and the system will continue to charge. The purpose of setting "electronic fence" is to limit the parking position, Sharing bicycles can identify whether users park their cars in the designated area through positioning technology, and ultimately reward or punish users. Meanwhile, they can master the number, online status, location information and traffic information of each section in the electronic fence and parking area in real time, so as to provide intelligent guidance for the operation and maintenance, scheduling and release of shared bicycles.

3.2. Internet of Things Positioning based on Inertial Navigation Technology

Inertial navigation electronic chip is an important achievement in recent years. Through electronic sensors, inertial navigation electronic chip, however, in the long-term use process, it is easy to achieve cumulative error, resulting in low positioning accuracy, which makes the inertial navigation electronic chip need to be calibrated after a period of time to meet the requirements. The higher the accuracy, the more expensive the price. Therefore, when choosing inertial electronic chips, the government should control and share the cyclic positioning ACC, so as to consider the cost and achieve the optimal input-output ratio.

3.3. Location of Internet of Things based on Cellular Network

In the communication base station, there is a big error in the location of cellular network. However, with the increase of the number of base stations in telecommunication network, it can meet the requirements to share multiple base stations in a certain range by using cellular network technology. The government's positioning of bike sharing is accurate. The base station can calculate the sharing period distance of the base station according to the power of the shared cycle signal. Generally, about three base stations arrive at the radius circle of the distance at the same time. The radius and area of the circle are the common position. The smaller the area, the higher the positioning accuracy.

4. Conclusion

At the same time, bike sharing is a part of transportation infrastructure. The majority of citizens can deeply understand the scenery and culture of the city by cycling. It can be said that bike

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sharing has become a beautiful landscape of the city. However, due to the difference of positioning accuracy, the market share of different operators is significantly different. Accurate positioning technology can reduce the management cost of bike sharing operators, thus breaking the fierce competition in the bike sharing market. However, in addition to the deep operation of the enterprise itself, users of bicycle sharing must put rules and civilization into their hearts to ensure that every use and sharing is civilized and legal. Reasonable parking, active care, timely repair, improve their own moral and legal literacy, so that sharing bicycles become a real "civilized bicycle". With the further development of technology, bike sharing will be better developed, and the traffic congestion in the city can be significantly improved.

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