Application Technology of Wireless Computer Network in Intelligent Driving

Xinghua Song*
Liaoning Jianzhu Vocational College, Liaoyang111000, China

*Corresponding author e-mail:15941959231@163.com

Abstract. With the continuous development of wireless network and Internet technologies, research on the application technology of wireless computer networks in intelligent driving has also entered the blowout development stage. The purpose of this paper is to study the application technology of wireless computer networks in intelligent driving. This paper also proposes an optimization solution for wireless vehicle networking in view of the many disadvantages of the traditional traffic law enforcement management system. This article first briefly introduces the concepts of the Internet of Things, the Internet of Vehicles, and wireless systems, analyzes the necessity and feasibility of the fusion of the two technologies, and then proposes a framework for the integration of wireless computer network technology and Internet of Things technology. Various innovative applications of the Internet of Vehicles based on this architecture in intelligent transportation are analyzed and demonstrated. Wireless networked car networking has demonstrated its superiority to a certain extent in the application of several special scenarios, alternative analysis of ETC systems, and optimization of traditional traffic law enforcement management. At the end of this paper, a GA algorithm based on wireless networked vehicle networking applications is proposed. Through the results of the algorithm, it is concluded that the system performance and economic performance of wireless vehicle networking are superior. According to the experimental results, the system developed in this paper can not only solve the vehicle congestion situation, but also reduce the occurrence of traffic accidents.

Keywords: Wireless Computer, Intelligent Driving, Genetic Algorithm, Connected Car

1. Introduction
With the acceleration of urbanization and the rapid development of the automobile industry, automobiles have become the most important part of the urban transportation system [1]. As a result, traffic congestion and environmental pollution have become one of the most urgent problems in the urban transportation system, which has greatly restricted China's economic development [2]. The current management model has clearly lagged behind the urbanization process, especially the management system of the urban transportation system has been severely decoupled from the rapid
growth of vehicles and urbanization facilities. As a special model of the Internet of Things, the Internet of Vehicles emerged at the historic moment. The application of the Internet of Vehicles management system in intelligent transportation can effectively solve the problem of traffic management, which is of great significance to vigorously promote China's economic construction [3]. The Internet of Vehicles refers to the information exchange between people and cars, cars and roads, and cars and roads, and realizes a multi-level connection between vehicles and public network communications. It not only can effectively navigate and supervise vehicles according to different functional requirements, but also provides multimedia A network with mobile Internet application services, which belongs to the category of the Internet of Things [4-5].

The traditional Internet of Vehicles is the Internet of Things based on electronic product codes. It is based on the computer Internet and uses wireless communication technologies such as unified coding and radio frequency identification. It can only track and trace items, which has little significance for intelligent transportation. On the other hand, the LTE-based telematics can achieve a strong combination of complementary advantages. The LTE network is a new generation mobile communication network that is currently being vigorously developed by three mobile communication operators. The LTE network uses many cutting-edge technologies such as OFDM and MIMO. In terms of network structure, wireless networks have an IP-based and flat structure. Not only that, LTE also uses two positioning technologies, terminal positioning and Beidou satellite positioning, in the positioning technology, which has a qualitative leap over 2G / 3G wireless networks [6-7].

Intelligent transportation is a transportation-oriented service system based on modern electronic information technology. Through the collection, arrangement, exchange, analysis, and release of information, it achieves the purpose of providing diversified services for all parties involved in transportation. In this dissertation, after comparing and selecting multiple schemes, it was finally determined that the network architecture adopts the vehicle gateway + NVS cloud platform model as the network architecture research scheme for the application of the Internet of Vehicles in intelligent transportation [8-10]. This article mainly studies the optimization of LTE-based IoV systems in intelligent traffic management. Based on the vehicle gateway + NVS cloud platform, several new applications are analyzed and studied. The comparative analysis method is used to analyze the Superiority. Commercial vehicles loaded with vehicle-mounted gateways can convert LTE signals to WIFI signals by transferring, and the 100MHz downlink rate is sufficient to support 60 passengers in the car at the rate of several hundred KbpsWIFI in the concurrent industrial network.

This paper proposes an architecture that integrates LTE technology with the Internet of Things technology. Based on this architecture, various innovative applications of Internet of Vehicles in intelligent transportation are analyzed and demonstrated. Wireless networked car networking has demonstrated its superiority to a certain extent in the application of several special scenarios, alternative analysis of ETC systems, and optimization of traditional traffic law enforcement management. This paper also proposes a GA algorithm based on the wireless network of car networking applications. Through the calculation results of the algorithm, it is concluded that the system performance and economic performance of the LTE car networking are better [11-12].

2. Method

2.1 Connected Car System

In the process of optimizing the original transportation system with a city's car networking system, it is planned to design and apply a wireless network to cover the area.

There are traffic nodes. It is known that the coverage radius of the wireless base station is 600 meters, and the area is 4.1 square kilometers.

At about 180 meters apart, they are basically evenly distributed in the area. Then there are 150 traffic nodes in this area. Using $D_{ij}$ Representing the distance between node i and node j, $D_{ij} = D_{ji}$ now requires a shortest path that traverses all 150 nodes without taking
repeated lines. This is a typical ordering problem and belongs to the NP-complete problem. There are many traditional solutions: pruning and bounding methods, minimum support tree algorithms, etc., which are not very effective, some are defective in operation speed, and some solutions are defective in quality. Below we try to solve this problem with GA algorithm. First use decimal coding, and use a sequence of 150 traffic nodes on each chromosome to represent a feasible path, where traffic nodes are represented by each gene. The length of the chromosome is 150 and the solution space is 149. The fitness is the distance corresponding to a feasible path. The longer the path, the lower the fitness of the chromosome, and vice versa. For example, take \( N = 10 \), and arrange the sequence numbers of traffic nodes as \( 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 \). Then the chromosome in the population: \( 2, 8, 4, 10, 5, 1, 7, 3, 6, 9 \); indicates a feasible path: \( 2, 8, 4, 10, 5, 1, 7, 3, 6, 9 \); total path length:

\[
\sum D_{ij} = D_{28} + D_{44} + D_{410} + D_{105} + D_{51} + D_{17} + D_{73}
\]

Non-negative transformations can be used here, defined:

\[
f(x) = c_{\text{max}} - \sum D_{ij}
\]

With the continuous deepening and improvement of genetic algorithm research, more and more people know and understand genetic algorithm and apply it to more and more extensive fields.

2.2 Intelligent Transportation

The intelligent transportation system is essentially a new type of informationized, automated, intelligent and socialized transportation system formed by using high-tech to transform traditional transportation systems. It is the comprehensive application of advanced electronics, information, sensing and detection, automatic control, system engineering and other technologies to ground transportation, and establishes a safe, real-time, accurate, and efficient ground transportation system. The intelligent transportation system can be roughly divided into five subsystems: Automatic highway system: The vehicle intelligent management system interacts with intelligent transportation facilities. The automatic highway system integrates the intelligent road system and the intelligent vehicle's own control system. Part of the vehicle-road integration is achieved under the management and control of the automatic highway system. In the not-too-distant future, it may even be possible to achieve unmanned driving on all sections of the road. Advanced traffic management system. Including ETC system, highway management system, emergency and demand management system, intelligent bus system, etc. Operating vehicle management system: It is mainly aimed at freight and long-distance passenger transportation enterprises, with the purpose of improving safety guarantee and operating efficiency; it uses a variety of communication technologies to perform dispatch management on operating vehicles. Advanced public transportation system: including passenger traffic dispatching and automatic monitoring, electronic ticketing, driving information push, vehicle location information service and other systems. Advanced travel information system: Provide public transport service information for travellers. It can also provide service demanders with the current real-time traffic conditions information and travel information for attractions. With the increase in the diversity of traffic data acquisition methods, traffic information users are increasingly demanding real-time traffic information, and their location accuracy requirements are becoming higher and higher, and the construction of automatic collection sensors for urban traffic cannot be comprehensive. Various development bottlenecks indicate that a new way of collecting traffic information is urgently needed to adapt to the rapid development of urban traffic. LTE Internet of Vehicles with its natural advantages emerges spontaneously, and it is logical to enter the field of intelligent transportation.

3. Experiment

Step1: The presentation layer contains the view part and the controller part. The controller part is responsible for the implementation of the system control logic. This part is based on the Struts Interceptor mechanism and Action. When a user's request comes, the Struts framework maps the user's
request to a specific Action object according to the mapping rules, and then the processing function in the Action calls the service interface provided by the business logic layer for business processing, and finally performs a page jump or Returns the corresponding result data to the view section.

Step2: The business logic layer is mainly responsible for the realization of business logic. The control part of the presentation layer passes the necessary data into the model and calls the service interface provided by the business logic layer. After performing certain data operations, the data is directly returned to the presentation layer or the data is persisted through the interface of the DAO layer. Each Service Object is a service class that implements some business logic interfaces. Service Manager is similar to the simple factory method, and provides an interface to get a specific Service Object, which relies on Spring's inversion control feature.

Step3: The data interface access layer (DAO layer) encapsulates commonly used database operations, such as adding, deleting, modifying, and checking database tables. After using the Hibernate framework, each database table corresponds to a Java Bean entity class, and each entity class has a mapping file to configure the mapping relationship between the attributes in the entity class and the attributes in the database table. Finally, the important data information is persisted to a physical storage device such as a hard disk for storage.

4. Discussion

4.1 Analysis of Experimental Results
In this paper, the intelligent control platform is used to change the display state of the induction node by sending commands to the coordinator, and then real-time induction of vehicles on the road is realized. To this end, it is necessary to collect the information of the inducing node. The induced node information collected by the control platform is shown in Table 1. It mainly includes the state information of the induced node and the display state information. The close command is used for the platform's remote control of the node. The driving direction attribute enables the platform to complete the control and management of vehicles in different driving directions at the same time.

The architecture of the intelligent driving guidance system is shown in Figure 1. It is mainly composed of 4 parts, from top to bottom: intelligent control platform, coordinator, induction beacon and transmission network. Among them, the transmission network can be subdivided into two parts, namely the communication network between the control platform and the coordinator and the communication network between the control platform and external applications.

| Typical mobile communication system | Maximum delay measurement error (microseconds) | Distance measurement error (m) |
|------------------------------------|-----------------------------------------------|-------------------------------|
| GSM                                | 1.965                                         | 564                           |
| CDMA                               | 0.875                                         | 365                           |
| WCDMA                              | 0.23                                          | 37                            |
| LTT                                | 0.12                                          | 9.5                           |
4.2 Analysis of Improving the Utilization Efficiency of Databases and Traffic Detectors
In the construction of intelligent transportation based on the big data artificial intelligence era, in order to increase the technical content of its transportation network operation, it is necessary to improve the utilization efficiency of databases and traffic detectors in the intelligent transportation network to provide optimization for its network performance. Stand by. (1) As the total amount of data in the era of big data and artificial intelligence gradually increases, higher requirements are imposed on data collection, analysis, and efficient processing in the operation of smart transportation networks. Therefore, technicians need to pay attention to the science of databases in the construction of smart transportation. Use, improve its utilization efficiency, and enhance the data processing effect in the operation of the intelligent transportation network under the cooperation of data function driving, superposition and centralized learning, and continuously improve the traffic conditions in the development of modern cities; (2) intelligent transportation Whether the construction can realize the real-time analysis of the traffic conditions on different road sections reflects the service level of the intelligent transportation network. Therefore, in order to reduce the incidence of road traffic safety accidents and comprehensively improve the operation level of smart transportation networks, it is necessary to improve the utilization efficiency of traffic detectors, that is, with the support of sensors, cameras, induction coils and other equipment, the vehicles in and out of the city and the city Effective monitoring of moving vehicles and non-driving vehicles is completed, and the detection of information is completed, so that the intelligent transportation network can operate in a stable and efficient state under the background of the era of big data artificial intelligence, reducing problems in urban traffic safety.

5. Conclusion
This article first talks about the research significance of this topic, the research content, and the status and dynamics of research at home and abroad. Then introduced the technology and development of connected car. Secondly, it briefly describes the key technologies and many advantages of wireless networks. Then the feasibility and necessity of the integration of IoV system and wireless network were analyzed and demonstrated. In summary, the popularization and application of computer wireless network systems is an inevitable trend in the development of today's society. The system faces a variety of security risks in practical applications, including software vulnerability risks and inadequate security regulations. To avoid these risks, we must strengthen network security prevention, build a comprehensive network security management system, implement training for relevant personnel, and actively use various modern encryption technologies.
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