

Original Research Article

Design and Study of Safety Control System for Logistics Vehicles

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Abstract: With the development of the Internet, commercial circulation has become an important part of the national socio-economic development. The prosperous commercial circulation industry can not be separated from the support of transportation, but also promotes the rapid growth of logistics vehicles, which also brings security problems to logistics vehicles. This article is based on the strong development of the Internet of Vehicles by the country, with logistics vehicles as the research object. It establishes a functional module architecture system for logistics vehicle safety control system, designs a stable temperature measurement and control device, accelerates real-time monitoring of important parts of logistics vehicles, effectively forms warning information, prevents accidents, and effectively guarantees the safety of people's lives and property.

Keywords: Logistics vehicles; Safety; Control system; System design

The state has vigorously promoted the high-quality development of the automobile industry, proposed to vigorously develop intelligent and connected new energy vehicles, adhere to leading industrial innovation through scientific and technological innovation, deepen opening and expand cooperation, and promote the high-end, intelligent and green upgrading of the automobile industry, so as to better meet and create market demand. At present, the industrial ecology of the global Internet of Vehicles is constantly enriched and improved, and the penetration of automobile networking is constantly strengthened. The penetration rate of new cars with intelligent network function in the global market is over 45%, and it is expected to reach a market size of nearly 60% by 2025^[1]. According to statistics, the number of trucks in China accounts for less than 10% of the total motor vehicle ownership, but the accidents accounted for 1 / 4, resulting in a death of more than 3 people accounting for about 1 / 3, resulting in a death of more than 10 people accounting for 40%^[2]. Therefore, how to establish an effective logistics vehicle safety control system, timely formation of early warning, effectively prevent accidents, reduce the truck accident rate, will greatly protect the safety of people's lives and property. The logistics vehicle safety control system takes the brake failure as the research scenario, make effective warning for the braking of the logistics vehicle, and avoid accidents in time, which will play an important role in the safe transportation of logistics.

1. Introduction of the Logistics Vehicle Safety Control System

Logistics vehicle safety control system is an intelligent safety management system applied in the logistics industry. Through the integration of advanced fuzzy logic and PID control algorithm, can monitor the key parameters of logistics vehicles, and according to the corresponding safety regulation and control of the actual situation, with goods management, vehicle stability control, skid control and fuel management and fleet management five main function modules, can improve the safety and stability of logistics vehicles in the process of transportation, reduce the occurrence of traffic accidents, improve the efficiency of logistics transportation

and service quality.

Logistics vehicle safety control system has the following technical characteristics: ① Intelligent control: the use of fuzzy logic and PID control algorithm, can optimize the vehicle suspension system, tire grip, torque distribution, brake pressure, engine output and other intelligent adjustment, so that the vehicle in different road conditions to maintain the best driving state. ② Multiple function menus: The system provides multiple function menus, including cargo information entry, cargo tracking and query, vehicle scheduling, team member management, etc. ③ Real-time monitoring and feedback: the system can monitor the key parameters of the vehicle in real time, and provide corresponding adjustment and optimization suggestions according to the actual situation. ④ User-friendly interface: The interface of the system is simple and clear, easy to operate. ⑤ Safety and reliability: The system adopts advanced safety technology and algorithm to ensure the safety and stability of the vehicle in high-speed driving and complex road conditions, and reduce the probability of accidents.

Logistics vehicle safety control system, through intelligent control and management means, improve the operation safety and efficiency of logistics vehicles, reduce the occurrence of traffic accidents, optimize the service quality of logistics transportation^[3]. It will become an important tool and support for the logistics industry, and greatly enhance the competitiveness and image of logistics enterprises.

2. Design and Implementation of Logistics Vehicle Safety Control System

The logistics vehicle safety control system mainly solves the problems that cannot timely monitor and feedback the vehicle condition fault information and affect its safety.

2.1. System Functions

Logistics vehicle safety control system, including vehicle data acquisition platform, data transmission terminal, cloud platform and mobile terminal, are as follows:

(1) Vehicle data acquisition platform: including the data acquisition terminal and vehicle information module installed on multiple vehicles, the vehicle information module is used to obtain the corresponding vehicle information, the data acquisition terminal is used to collect the temperature data of each part of multiple vehicles in multiple fleets, and transmit the vehicle information and temperature data of the corresponding vehicle to the data transmission terminal.

(2) Data transmission terminal: including a plurality of wireless data receiving modules, GPRS module and wireless data transmission module for receiving corresponding vehicle information and temperature data, each wireless data receiving module, GPRS module and wireless data transmission module are installed on the corresponding vehicle, GPRS module for obtaining vehicle positioning information, and wireless data transmission module for transmitting the received vehicle information, temperature data and vehicle positioning information to the cloud platform.

(3) Cloud platform: including data analysis and processing module, map processing module, system parameter configuration module, and vehicle information database^[4].

(4) Mobile terminal: including data display interface module and user management module, data display interface module is used to display the cloud platform of vehicle information, vehicle situation and vehicle positioning information, user management module for user registration and login, to manage vehicle information, vehicle information and vehicle positioning information through the user management module.

The system has obvious functional advantages, When a temperature acquisition of the vehicle is required, Due to the dynamic monitoring and acquisition system of vehicle fault information, Collect the vehicle temperature and obtain the vehicle information for each part of the vehicle through the data acquisition terminal and the vehicle information module of the vehicle data acquisition platform, And is delivered to the data transmission terminal, By receiving the vehicle information and temperature data of the corresponding vehicle through the wireless data receiving module and GPRS module of the transmission terminal and obtaining the vehicle location information, Transfer the vehicle information and temperature data and obtain the vehicle location information to the cloud platform, Through the data analysis and processing module, map processing module, system parameter configuration module and vehicle information database of the cloud platform, Process the vehicle information and temperature data of the vehicle and obtain the vehicle location information and alert the corresponding vehicle temperature, And through the user management module can manage the vehicle information and temperature data of the corresponding vehicle and obtain the vehicle location information, In order to observe the corresponding vehicle temperature warning and vehicle data display, Thus, it is convenient to take corresponding measures or repair according to the corresponding vehicle temperature warning and vehicle data displayed on the mobile terminal, Avoid reducing vehicle failure and safety accidents caused by high temperature.

2.2. System Implementation

The implementation steps of the logistics vehicle safety control system are described as follows:

(1) Data collection of vehicle temperature, temperature data of the temperature of the corresponding vehicle through the wireless temperature sensors in the data acquisition terminal of the vehicle data acquisition platform, and the corresponding temperature data is transmitted to the data transmission terminal.

(2) Data collection and binding of the vehicle information, input the vehicle information to the vehicle information module, and bind the vehicle information, device ID and the temperature data of the corresponding vehicle together through the vehicle information module.

(3) The matching and transmission of vehicle information, the wireless data receiving module of the data transmission terminal receives the temperature data of the wireless temperature sensor, obtains the corresponding vehicle positioning information through the GPRS module, and transmits the corresponding vehicle information, the vehicle positioning information and the vehicle temperature data together through the wireless data transmission module.

(4) Data processing receives the vehicle positioning information through the map processing module of the cloud platform and displays the corresponding vehicle information, vehicle situation and vehicle positioning information on the map in real time. The rules set in the system parameter configuration module are the rules representing different vehicle temperatures through four different colors, with the first temperature interval, the second temperature interval, third temperature interval and fourth temperature interval, the first temperature interval is less than 80 °C white, the second temperature interval is 80-90 °C orange, the third temperature interval is 90-100 °C red, and the fourth temperature interval is the dark red rule greater than or equal to 100 °C^[5].

(5) According to the vehicle temperature data display, the vehicle information and the vehicle positioning information of the cloud platform. When the vehicle temperature reaches the rules set in the system parameter configuration module, the corresponding temperature interval color is displayed in the display interface module

of the mobile terminal.

Under the steps of data collection of vehicle temperature, data collection and binding of vehicle information, matching and transmission of vehicle information, display of vehicle data and management of user information, the temperature of the wheel hub, gearbox, and engine can be detected in real time. After the wireless temperature sensor collects the temperature data, it is wirelessly sent to the data transmission terminal, received and processed by the data transmission terminal and then transmitted to the cloud platform for processing, and then displayed on the mobile terminal. When the temperature is higher than the preset second temperature interval, third temperature interval and fourth temperature interval, the cloud platform and mobile terminal will automatically complete the corresponding alarm to remind the driver to check the temperature or fault condition of the alarm position; and take measures or repair. It can avoid and reduce vehicle faults and potential safety accidents caused by high temperature, and improve driving safety.

3. Core Device Design

The existing vehicle wheel hub temperature monitoring device cannot always ensure that the wheel hub temperature is kept suitable, and the new vehicle wheel hub temperature monitoring device needs to be designed. The new vehicle hub temperature monitoring device, including the hub, the wheel external side set finite box, the interior of the limit box set finite device, the limit device includes the limit gear plate, the gear roller, the gear rod in the vertical direction, the tooth rod up and down to drive the tooth roll rotation, the tooth roll rotation control limit gear plate up and down the straight line movement.

The new vehicle wheel hub temperature monitoring device has a strong innovation, By setting up the limiting device, To monitor the hub temperature with a temperature sensor, The limit box turns at the inside of the fixed ring, The temperature sensor will stick close to the hub surface, When removing the temperature sensor, Press the plate down, At this point, the sliding bar and the tooth bar move down simultaneously, Turn the tooth roll clockwise, The tooth roller then drives the limit tooth plate to move upward, Without any external forces, The spring will push the press plate up, Keep the limit tooth plate always stuck in the limit box, And as the wheel hub rotates, The press plate has a centrifugal force, Let the pressing plate have a trend away from the fixed box, Thus, make the limit tooth plate more tightly stuck in the limit box, Temperature sensor senses the hub temperature, But when the temperature is too high, The information processing module will process the information signal after receiving the electrical signal of the temperature sensor, And then pass it to the messenger, The sender wirelessly spreads the information to the background, Further to the monitoring, To achieve the convenient real-time monitoring of the car wheel hub, Ensure that the hub temperature is always appropriate effect.

4. Conclusion

Logistics vehicle safety control system design and implementation, as well as the core device, will bring important guarantee to logistics vehicle security, the core device of stable and accurate temperature data acquisition, through the system intelligent and efficient warning, timely supervise the driver for vehicle safety inspection, effectively prevent logistics vehicle accidents, effectively reduce the logistics vehicle harmfulness, comprehensive power to ensure the safety of people's life and property.

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