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Analysis and study on an intelligent auxiliary control system for car comity pedestrians

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Abstract. An automobile intelligent auxiliary control system performance for comity pedestrians is analysed. For safety reasons, a car safety distance model which can distinguish pedestrians at the front zebra crossing line is proposed. The important features of the active protective comity pedestrian integrated control system are derived, which can accurately identify pedestrians or cyclists in front of you and distinguish safety behaviour characteristics. According to the system feedback, active protection measures are adopted. A control system based on the combination of infrared radar probe ranging system and image processing recognition system is studied. The innovative research on car avoiding pedestrians focuses on both the behaviour characteristics of the driver and the pedestrian. Dual protection of longitudinal anti-collision comity pedestrians and horizontal pedestrian protection early warning protection can be carried out through the system. The intelligent auxiliary control system is a control system that can ensure the safety of pedestrians at non-traffic signal intersections. The system embodies more intelligent and humane, and also provides innovative ideas for the research and development of new products.

1 Introduction

In recent years, the rapid development of our country's economy, the continuous advancement of the urbanization, and the rapid increase in the number of motor vehicles and trip rates, have intensified urban congestion and traffic conflicts. Especially at non-signalized intersections, due to the unclear distribution of rights of way and the low awareness of pedestrian traffic, the conflict between pedestrians and vehicles is more serious, and related problems need to be resolved urgently [1]. In order to effectively reduce human-vehicle conflicts, since May 2017, according to the unified deployment of the Traffic Management Bureau of the Ministry of Public Security, local traffic control departments have launched a special rectification action for the "motor vehicle comity zebra crossing" [2]. However, from an overall point of view, the driver is the main reason for this. Compared with pedestrians and cyclists, car drivers are the main traffic responsible person, and pedestrians and cyclists are the traffic weak person [3]. In order to ensure the safety of pedestrians at non-traffic signal intersections and avoid traffic accidents caused by the above-mentioned reasons, an intelligent auxiliary control system for car comity pedestrians is designed [4-6].

2 Principles of Pedestrian Intelligent Control System

The system mainly includes infrared radar ranging probe, camera, image processor, microprocessor control unit, vehicle speed sensor, alarm indicator, accelerator pedal position sensor, throttle rocker sensor, cruise control unit, throttle servo motor, throttle. Figure 1 shows the principle diagram of the comity pedestrian intelligent control system.

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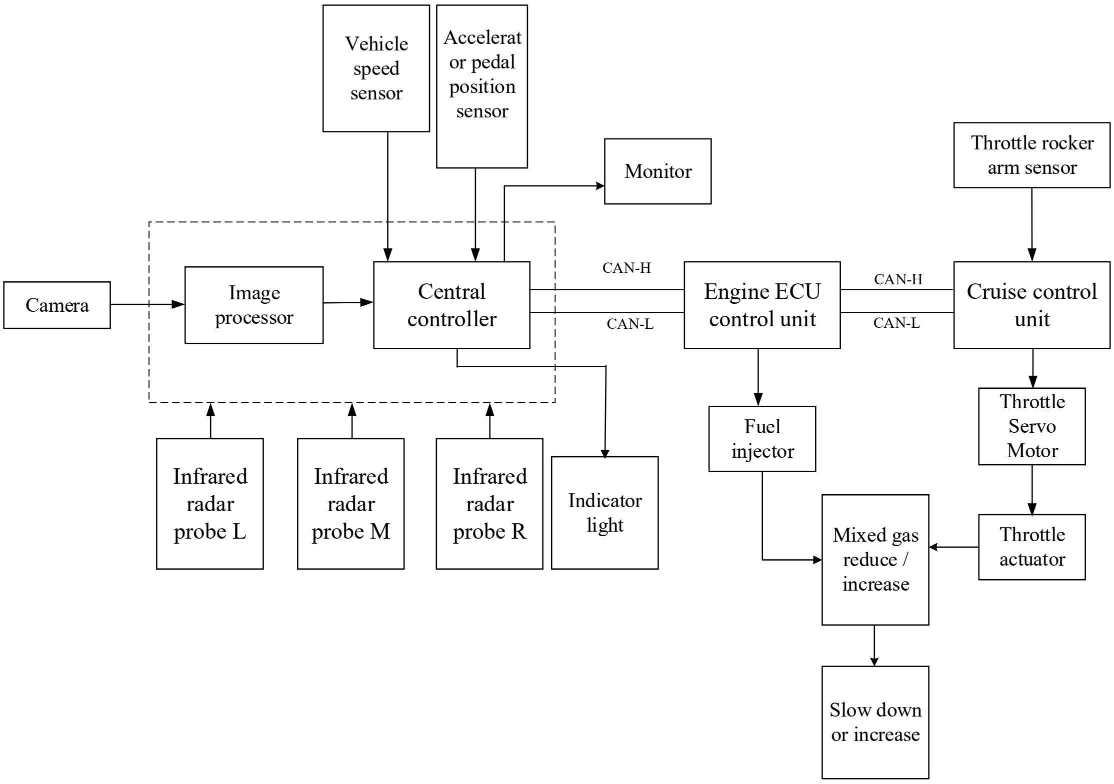

Figure 1. Principle diagram of comity pedestrian intelligent control system

The control principle is as follows. The vehicle speed sensor and the accelerator position pedal sensor respectively detect the vehicle speed and accelerator speed, and transmit the signal to the central processing unit. The controller sends the collected signal to the servo motor for processing, and at the same time the control work indicator lights up. The image processing unit has a high-definition camera to take a zebra crossing image, which is recognized and processed by the image processor. The system feeds back this signal to the central processing unit to realize data share and transmission. The controller can exchange data with the engine ECU control unit and the cruise control unit through CAN-H, CAN-L, etc. The central processor compares the data returned by the sensor with the set threshold to make corresponding calculations response. By data transmission, the controller guides the throttle actuator through comprehensive analysis of the stored data and current situation data. Through data transmission, the controller guides the throttle actuator through comprehensive analysis of the stored data and current situation data. The function of the sensor is to transmit the data of each sensor to the central processing unit, calculate the output signal from the obtained data, and transmit it to the system controller. The controller controls the speed of the vehicle, and the signal is finally transmitted to the display terminal, and at the same time, the control system working indicator lights up.

3 Results and Analysis

Figure 2 shows the system safe distance flow chart. The infrared radar probe detects pedestrians in the area, prompts the driver in time, and takes a series of comity measures. Automobile speed sensor, accelerator pedal position sensor, throttle rocker arm sensor and other sensors comprehensively sense the driving state of the driver, which can reduce the rate of false alarms and false alarms. The system only works within the detection range of the infrared radar probe, and it will automatically shut down as no pedestrian detection signal ahead.

The safety distance model is divided into three distance steps: safe driving distance Ss, warning alarm distance Sr and emergency auxiliary braking distance Se. Within the safe driving distance S, the car is driving normally, and the system display shows that there is no pedestrian in front of the vehicle, and it can drive safely. The system will remind the alarm distance Sr to give the driver sufficient reaction time and be able to perform correct habitual operations. After entering the warning alarm distance, the system's sound and light alarm device will give an alarm and remind the driver to pay attention to observation. This alarm will not stop until the driver takes corresponding measures to restore to a safe distance.

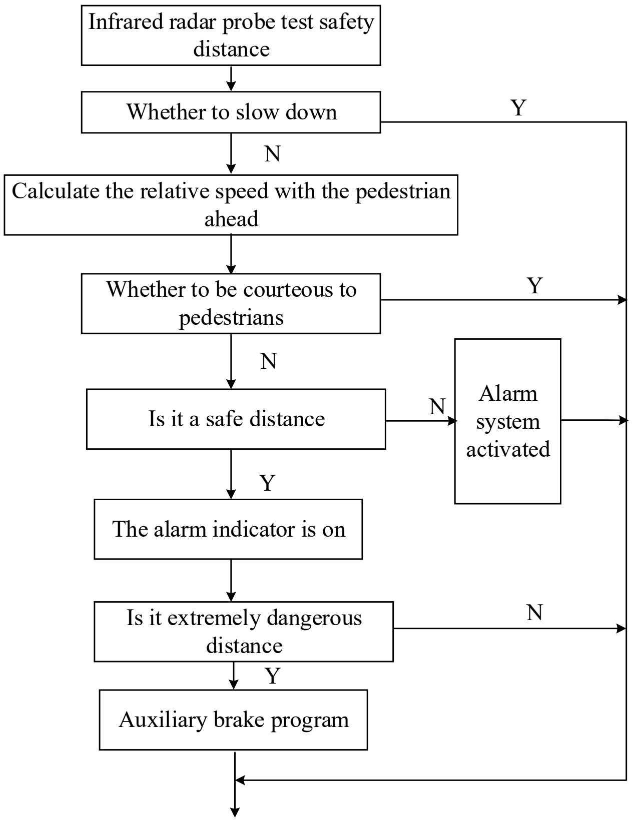

Figure 2. System safe distance comity flow chart

If the driver does not take corresponding measures, the system shows that there is a pedestrian in front of the vehicle who is about to pass. Taking into account the safety point of view, sound and light alarms are used for continuous alarms. As the distance decreases, the buzzer sounds sharp and the flashing frequency of the warning indicator lamp increases. After entering the emergency auxiliary braking distance Se, the system automatically controls the auxiliary braking system to brake the car. At the same time, the vehicle brakes completely at the shortest safety distance Sm from the pedestrian ahead.

4 Conclusion

The system can identify the position of pedestrians in front of the crossing zebra, and can determine the road conditions where pedestrians are located to establish a vehicle safety distance model. Starting with active protection, the system can be implemented from two aspects: longitudinal anti-collision and comity protection for pedestrians and lateral detection of pedestrian areas. This protection can reduce the probability of traffic accidents and ensure the health and safety of pedestrians. The integrated sensor used in the system can sense the driving state of the driver, and feed back to the central processor based on the image signal processing result, which can reduce the false alarm rate and false alarm rate in a timely manner. According to the judgment result of the auxiliary control system, the system can work within the detection range of the infrared radar probe. If there is no pedestrian in front of the zebra crossing line, the detection signal will be automatically turned off, which reduces signal interference to some certain extent, thereby ensuring the passing performance of the vehicle.

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