A Study on Machine Vision-based Emergency Collision Avoidance Method for Longitudinal Rear-end Collision of Intelligent Vehicles

Jiren Gu[1], Dr. Joan P. Lazaro[2]
gujirennclg@126.com[1], joan.lazaro@ue.edu.ph[2]
https://orcid.org/0009-0002-1814-5390[1], https://orcid.org/0009-0007-0095-6351[2]
University of the East, Sampaloc, Manila, Philippines[1-2]
Jiangxi New Energy Technology Institute, Xinyu, Jiangxi, China[1]

Abstract

In modern intelligent transportation systems, vehicle safety has always been concern. Rear-end collisions, as one of the common traffic accidents, pose a serious threat to the safety of vehicles and occupants. Because rear-end collision will change the original running state of the car, the braking distance in the emergency collision avoidance stage becomes difficult to control. To solve this problem, an intelligent vehicle longitudinal rear-end collision avoidance method based on machine vision is proposed. The core of this method is to use machine vision technology and use CXZK-SM binocular camera as a specific visual device to sense the environment around the vehicle in real-time, and accurately measure the distance between the vehicle and the obstacles ahead. The binocular camera can capture rich three-dimensional spatial information, which makes the distance measurement more accurate and reliable. In addition, we also combined the current driving state of the vehicle and the impact of the rear-end vehicle on its state and formulated a set of targeted collision avoidance execution strategies. The research of emergency collision avoidance method of longitudinal rear-end collision of intelligent vehicles based on machine vision has important practical significance and application value. Through continuous optimization and improvement of this method, it is expected to provide safer and more efficient safeguards for future intelligent transportation systems and promote the sustainable development of the automotive industry.

Keywords: Machine vision; Longitudinal rear end collision; Emergency collision avoidance; CXZK-SM binocular camera; Driving status; Collision avoidance execution strategy; Adaptive control