VEHICLE COLLISION AVOIDANCE SYSTEM USING EMBEDDED HYBRID INTELLIGENT PREDICTION BASED ON VISION/GPS SENSING

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ABSTRACT. *Lane marking detection assists drivers to judge any unattended deviation on the roadway. Thus, instead of radar or laser sensor, vision/GPS sensing has been introduced not only to recognize lane marking ahead, but also to detect vehicle in front or around while driving, particularly enabling the collision warning or deviation alert. In this paper, a high-performance collision avoidance system (CAS) has realized vision/GPS sensing for active vehicle safety where GPS supplying the localization information to collaborate with vision scanning in a very short time, judges whether or not an impending crash may be caused. Besides, in order to retrieve the information from heterogeneous data collected by both out-of-vehicle and in-vehicle sensing, a two-layer embedded data fusion, which is a quantum-tuned back-propagation neural network (QT-BPNN) plus an adaptive network-based fuzzy inference system (ANFIS), has implemented in a distributed dual-platform DaVinci+XScale_NAV270 for achieving a fast response to collision warning and event data recording. Finally, based on performance evaluation the experiments showed that the proposed method outperforms two well-known alternative systems, AWS-Mobileye and ACWS-Delphi.*
Keywords: Collision avoidance system, Vision/GPS sensing, Embedded data fusion, Distributed dual-platform DaVinci+XScale_NAV270

1. **Introduction.** People have paid much attention on vehicle safety for years. Especially in automotive industry, manufacturers of motor vehicle have also introduced a lot of active safety mechanism like adaptive cruise control (ACC) [1], antilock brake system (ABS) [2,3], collision warning system (CWS), event data recorder (EDR) [4], on-board diagnostics (OBD) [5], emergency automatic brake (EAB), etc. Nowadays, the statistics of the injuries and fatalities in traffic accidents become more serious year by year. Therefore, the relevant problems of motor vehicle safety began to study, got worldwide notice, and made solution to this issue. In general, the causes of the traffic crash can be categorized into three parts: "people", "vehicle" and "environment" [6]. National Highway Traffic Safety Administration (NHTSA) in USA points out that there are about 80% – 90%