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SIMULATION AND IMPLEMENTATION OF HIGH-PERFORMANCE COLLISION WARNING SYSTEM FOR MOTOR VEHICLE SAFETY USING EMBEDDED ANFIS PREDICTION

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Abstract. *This study introduces an intelligent collision warning prediction (ICWP) to overcome two crucial problems: the danger in driving drowsy and the imprecise collision warning level resulted from the perturbed input signals. Drowsy driving was considered and has approximately reasoned to an extra reaction time to modify NHTSA algorithm. Fuzzy approach to pre-crash warning was employed to design a fault-tolerant mechanism for accommodating the perturbed input signal. Analyzing four types of collision warning demonstrated that collision warning distance with drowsy driving will be prolonged to be a longer distance comparing with the one with normal driving and collision warning level raise to a higher level for those associated with the middle level of collision warning. Several tests have verified system's reliability and validity based on statistics. Experimental results show that our proposed approach outperforms two current well-known collision warning systems (AWS-Mobileye and ACWS-Delphi) due to short detection time (less than 0.6 seconds) and the best reduced accident rate (above 70%).*
Keywords: Intelligent collision warning prediction, Driving drowsy, Fault-tolerant mechanism, Collision warning system, Motor vehicle event data recorder

1. **Introduction.** Vision difference or inattention to the traffic condition often causes the unnecessary traffic accidents while driving. So people would like to establish a system for a rapid detection of the neighboring vehicles and a fast recognition of the lane marking, so as to improve the long-standing traffic problems such as road traffic monitoring and vehicle location and so on. Nowadays automobile manufacturers have highly concerned the relevant problems of motor vehicle safety and made more efforts on these aspects, for example, 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], and emergency automatic brake (EAB), etc. However, two crucial problems of the danger in driving drowsy and inaccurately nonlinear warning distance computation due to imprecise, uncertain, or vague input data (variables) are not considered in the aforementioned motor vehicle safety. In such a design, an uncertainty risk of imminent crash