An Onboard Virtual Rumble-Strip Based Operation for Road Departure Warning

Principal Investigator

Name: Jiann-Shiou Yang  
Department: Electrical and Computer Engineering  
Position Title: Professor  
Address: 271 MWAH, 1023 University Drive, Duluth, MN 55811  
Phone: (218) 726-6290  
FAX: (218) 726-7267  
E-Mail: jyang@d.umn.edu

Project Abstract

The use of rumble strips on roads has proven to be an effective means of providing drivers road departure warning (RDW). However, rumble strips require an infrastructure and do not exist on a majority of roadways. Furthermore, rumble strips presents a difficult issue of where to establish the rumble-strip distance threshold. The research proposed will explore the development of an onboard electronic variable rumble strip based technique for RDW systems where the rumble-strip threshold is allowed to vary according to the risk of the vehicle departing the road. Unlike the “time-to-lane-crossing” (TLC)-based approach which requires a substantial amount of input information such as the vehicle state, vehicle parameters, current orientation and the information about the road ahead, our approach will only need the minimal set of information to characterize the vehicle and its current orientation and, therefore, making it more feasible in a vehicle application. In this study, the vehicle’s relative lateral characteristics on highway driving will be used to develop our decision-making mechanism and operation algorithm to adjust the warning threshold. The linguistic “IF-THEN” rule-based approach with a hierarchical structure will be our focus. This new threshold variation approach will seek to capitalize on the simplicity of the rumble-strip warning, while at the same time improving the system by allowing variability in threshold selection. Performance evaluations via driving simulator experiments to safely generate road departure events will also be conducted.

Anticipated Duration of Project: 18 months