



Cost-effective Real-time Lane Departure Warning System

IP Status: US Patent Issued #11,320,284

Alerts drivers of unintended lane drifting

A novel lane departure warning system (LDWS) alerts drivers of unintended lane drifting. The method uses standard global positioning system (GPS) receivers and low-resolution map references to detect lane departure based on the relative trajectory of the vehicle. In future phases, the Advanced Driver Assistance System (ADAS) will use Dedicated Short Range Communication (DSRC) vehicle-to-vehicle (V2V) communication along with the GPS to obtain the necessary reference. DSRC or its evolving form (5G-V2V) is a short-range wireless communication protocol developed specifically for V2V communication, allowing vehicles to communicate with other nearby vehicles. The new algorithm compares a vehicle's heading to a reference point and issues an audible warning via V2V communication to alert drivers of potential lane departure or of a sharp curve ahead. The new method works on both straight and curved roads and is compatible with most GPS-based navigational devices. It can be implemented as a standalone smartphone app, as an added feature to existing navigational systems, or integrated in an onboard DSRC unit.

Determines vehicle's relative trajectory

Vehicle lane departure, especially on curved roads, poses significant safety risks. Vision-based lane departure warning systems rely on images of road markings taken by cameras mounted on the vehicle. While these systems work when markings are clearly visible, adverse weather and poor lighting can limit their functionality. Other systems, which use centimeter-level accurate GPS receivers and high-resolution road maps, work in nearly all weather conditions but are cost prohibitive. This new lane departure warning technology uses simple GPS sensors and commonly available low-resolution mapping data, making it cost effective and easy to implement. The system identifies a vehicle's expected trajectory based on stored information for positions along a road, and uses the vehicle's GPS positions to determine its actual trajectory. When combined with V2V communication, the system determines a vehicle's trajectory relative to adjacent vehicles. The algorithm compares actual and expected trajectories to determine when to issue a lane departure warning.

Phase of Development

- Prototype developed

Benefits

- Cost effective
- Easy to implement
- Compatible with most GPS-based navigational devices
- Alerts drivers of unintended lane drifting or of a sharp curve ahead

Features

Technology ID

20180108

Category

Engineering & Physical
Sciences/Instrumentation,
Sensors & Controls
Engineering & Physical
Sciences/Transportation
Software & IT/Algorithms
Software & IT/Communications &
Networking
Software & IT/Transportation

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- Issues audible warning to alert drivers
- Acquires vehicle's relative trajectory
- Works on both straight and curved roads
- Standard GPS receivers and low-resolution map references
- Dedicated Short Range Communication (DSRC) vehicle-to-vehicle (V2V) communication
- Advanced Driver Assistance System (ADAS)

Applications

- Lane departure warning
- Existing navigational systems
- Standalone smartphone app
- Manufacturers of DSRC or 5G onboard units

Researchers

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[External Link](https://scse.d.umn.edu) (scse.d.umn.edu)

Publications

[*Real-Time Relative Lane and Position Identification of Surrounding Vehicles Using GPS and DSRC Based Vehicle-to-Vehicle Communication*](#)

2018 IEEE International Conference on Communications, Jul 27 2018

In the News

[*Affordable lane-departure warning system is on the road to market readiness*](#)

Interested in Licensing?

The University relies on industry partners to further develop and ultimately commercialize this technology. The license is for the sale, manufacture or use of products claimed by the patents. Please contact us to share your business needs and licensing and technical interests in this technology.