



Anticipatory Lane Change Warning Using Dsrc

Tech ID: 32690 / UC Case 2018-556-0

CONTACT

Venkata S. Krishnamurty
venkata.krishnamurty@ucr.edu
 tel: .

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,027,736	06/08/2021	2018-556

FULL DESCRIPTION

Background

Anticipatory driving or adapting one's driving behavior in anticipation of movements of surrounding vehicles is important in the prevention of road accidents – which could be coded into the behavior of connected and automated vehicles. Anticipatory driving continues to be extensively researched. In a lane change scenario, the future situation of the target lane is also important. One limitation of existing lane change algorithms is that they tend to consider the traffic situation only in terms of the lane changing or Host Vehicle (HV). However, a normal lane change takes a few seconds to complete during which time the situation may change significantly.

Current Invention

The research team at the UCR Center for Environmental Research and Technology has developed a patented system called Anticipatory Lane Change (ALC) Warning. The algorithm combines connected vehicle technologies such as Dedicated Short Range Communications (DSRC) with a car-following model along with the kinematics to predict the motions of the ALC equipped vehicle and its surrounding vehicles over a short time window. In addition to recommending lane changes, the algorithm predicts unsafe conditions to prevent the lane change or abort the lane change maneuver. The team has tested the algorithm in simulation, for a hypothetical network as well as a real-world freeway network with rush hour traffic – with impressive results of 30% reduction in the number of potential roadway accidents.

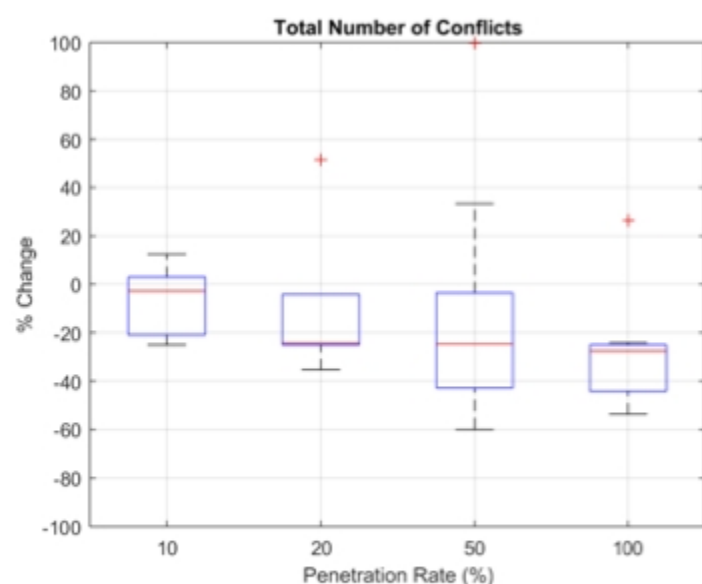


Fig. 5. Hypothetical network (7000 vph) results

Results from a hypothetical network of 7,000 vehicles per hour

OTHER INFORMATION

KEYWORDS

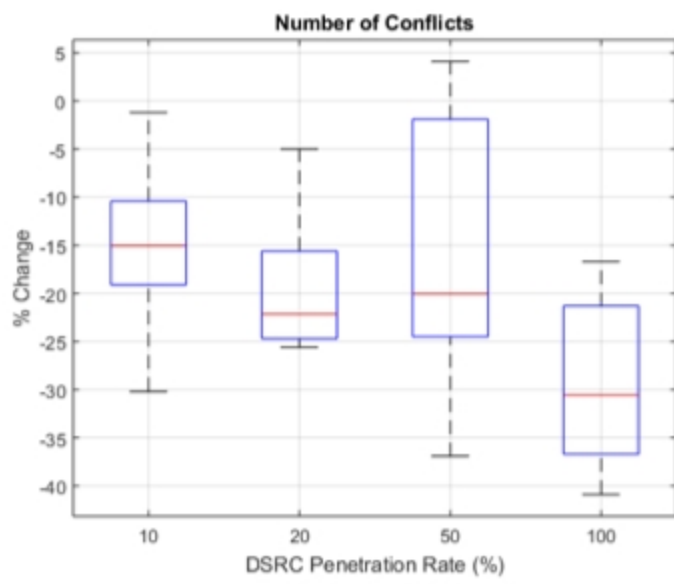
Connected vehicles, Vehicle to Vehicle Communication, V2V, Lane hazard prediction, Autonomous vehicles, Data mining, Machine learning, Lane sensing, Pattern recognition, Traffic mapping

CATEGORIZED AS

- ▶ **Computer**
 - ▶ Software
- ▶ **Engineering**
 - ▶ Engineering
- ▶ **Transportation**
 - ▶ Automotive

RELATED CASES

2018-556-0, 2018-558-0, 2018-877-0



Results from a simulation of traffic on I-270 in Ohio

ADVANTAGES

The significant advantages of their invention are:

- ▶ Does not have line of sight (LOS) limitations and can detect vehicles occluded by other vehicles.
- ▶ Predicts the safety of an intended lane change a few seconds in advance of the lane change.
- ▶ Useful for both lane change warning and automated lane change.
- ▶ Low impact on mobility of motorists – less than 1% change in average speed.

SUGGESTED USES

- ▶ Personal vehicles
- ▶ Autonomous vehicles
- ▶ Commercial Transportation
- ▶ Shipping and logistics - fleet vehicles

STATE OF DEVELOPMENT

Prototype built and tested

RELATED INVENTIONS

[See related inventions](#)

RELATED MATERIALS

- ▶ [Anticipatory Lane Change Warning using Vehicle-to-Vehicle Communications](#)

RELATED TECHNOLOGIES

- ▶ [Systems And Methods For Cooperative Smart Lane Selection](#)

University of California, Riverside
Office of Technology Commercialization
 200 University Office Building,
 Riverside, CA 92521
otc@ucr.edu
research.ucr.edu/