Systems And Methods For Cooperative Smart Lane Selection

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PATENT STATUS

| Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,916,125	02/09/2021	2018-877

OTHER INFORMATION

KEYWORDS

Traffic management, Connected vehicle, Advanced Driver Assistance Systems, ADAS, Lane change assistance, Traffic state prediction, Vehicle to Vehicle Communication, V2C, V2X, Lane Level Traffic Prediction

FULL DESCRIPTION

Background

Connected Vehicle (CV) technology plays an important role in Advanced Driver Assistance Systems (ADAS) for improving safety, efficiency and driving comfort. A large number of CV applications have been developed for driving assistance – though, only a few of them are focused on lateral control assistance such as lane assignment and optimal lane selection. Developing traffic state estimation and prediction models – a well-researched topic – could benefit advanced traffic management, But these prediction models are not focused at the lane level.

Invention

Researchers at UCR's Center for Environmental Research & Technology (CE-CERT) have developed, a patented application, based on a Spatio-Temporal (ST) model that uses CVs' information of road cells to predict future traffic states. The information is used by the lane selection application to identify, recommend and guide the equipped vehicle to select an optimal lane. The team has built a prototype model and simulation tested on a 15-mile stretch of SR-91 in California under various scenarios – including different traffic volumes, penetration rates of CV technology, and frequency of information update to the vehicle.

STATE OF DEVELOPMENT

The team has built a prototype model and simulation tested on a 15-mile stretch of SR-91 in California under various scenarios – including different traffic volumes, penetration rates of CV technology, and frequency of information update to the vehicle. The benefits/advantages of the application are:

- Accuracy of the ST model is significant in terms of traffic state prediction – errors are less than 2%.
- Travel times of equipped vehicles are reduced by up to 8%.
- The strategic and informed lane changes reduce the number of potential conflicts (or accidents).
- Effective even at early deployment stage of CV technology – because the application provides the aforementioned benefits even at the penetration rate as low as 5%.
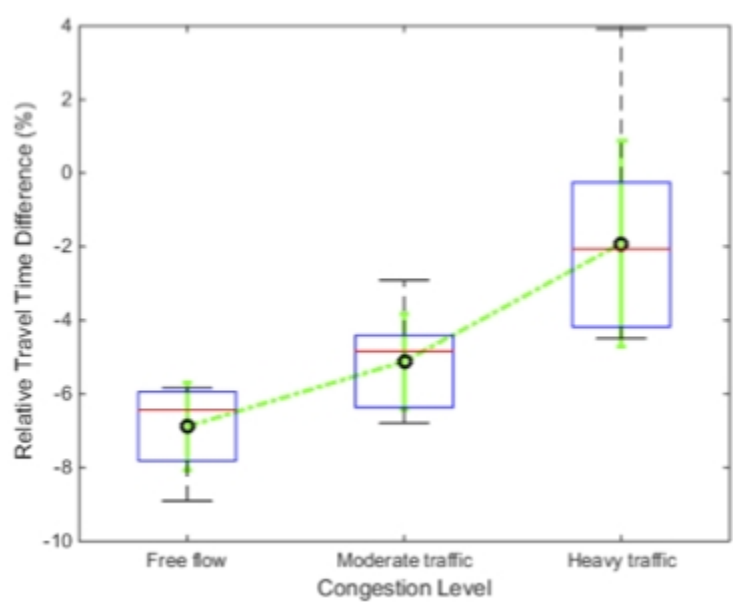
CATEGORIZED AS

- ▶ **Communications**
  - ▶ Networking
  - ▶ Other
  - ▶ Wireless
- ▶ **Computer**
  - ▶ Software
- ▶ **Engineering**
  - ▶ Engineering
- ▶ **Sensors & Instrumentation**
  - ▶ Other
- ▶ **Transportation**
  - ▶ Automotive
  - ▶ Personal

RELATED CASES

2018-877-0, 2018-556-0, 2018-558-0
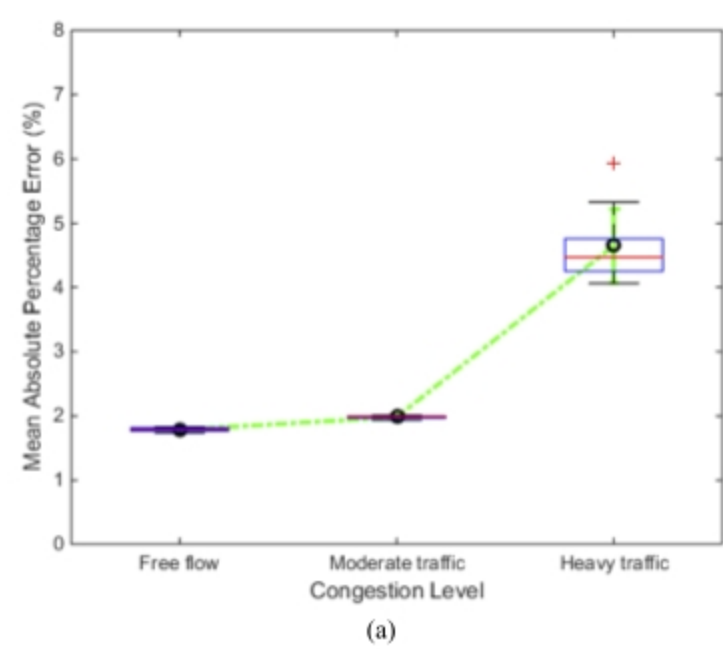
Measure of prediction accuracy of the ST model

Improvement in travel time for the application equipped in vehicle

APPLICATIONS

- ▶ Personal passenger vehicles
- ▶ Autonomous vehicles
- ▶ Commercial transportation
- ▶ Fleet vehicles

RELATED TECHNOLOGY

Please see all related inventions by the team

RELATED MATERIALS

- ▶ Connected Vehicle-Based Lane Selection Assistance Application

RELATED TECHNOLOGIES

- ▶ Anticipatory Lane Change Warning Using Dsrc