

Optimization Algorithm Predicts Traffic Signal Information to Improve Fuel Economy (09-073)

Uses upcoming traffic signal information to reduce idle time at stoplights, lowering fuel costs and travel duration

Market Overview

This optimization-based algorithm uses traffic signal timing information to improve fuel economy, cut emissions, and reduce trip duration for drivers. According to the Environmental Defense Fund, idling cars and trucks produce over 130,000 tons of carbon dioxide each year, costing drivers over \$80 billion and negatively impacting the environment. Required navigation and information broadcast technology is currently available and is expected to be more widely used in the transportation industry in coming years. The U.S. Department of Transportation in particular has been focusing on technology to assist with intersection collision avoidance and increase roadway safety. Clemson University researchers have recognized this trend and developed an optimization-based algorithm which equips vehicles with traffic signal information to predict the optimum velocity trajectory for the vehicle to lessen idle time at stoplights and lower fuel consumption.

Application

Automotive; Transportation

Stage of Development

Proof-of-concept, road demo at Clemson

Advantages

- Uses traffic flow information to generate optimal velocity trajectory, ensuring a safe distance is maintained between vehicles and increasing roadway safety
- Predicts traffic signal timing, reducing idle time and fuel consumption at stoplights
- Utilizes research already performed and supported by the U.S. National Science Foundation, increasing ease of incorporation into current transportation systems

Technical Summary

Using traffic signal information and potentially camera and radar, this software can predict and suggest the optimum speed for the vehicle. The optimal velocity trajectory can be shown on the instrumentation panel as the suggested speed to the driver or used as the reference velocity when the vehicle is in adaptive cruise mode. Detailed simulations using real-world traffic signal data and high-fidelity vehicle models indicates that the algorithm can reduce fuel use and emissions and may also reduce trip time. The software is compatible with conventional off-the-shelf systems.



Figure 1: Schematic of telematics-based predictive cruise control

A demo of this technology can be viewed here: https://www.youtube.com/watch?v=2Z3o_Giclf0

| App Type | Country | Serial No. | Patent No. | CURF Ref. Number | Inventors |
|----------|---------------|------------|---------------------------|------------------|----------------|
| Utility | United States | 12/872,567 | 8,478,500 | 09-073 | Ardalan Vahidi |

About the Inventor



Dr. Ardalan Vahidi is an Associate Professor in the Department of Mechanical Engineering at Clemson University. He earned his Ph.D. in Mechanical Engineering from University of Michigan, Ann Arbor. Dr. Vahidi previously served as a visiting scholar at University of California, Berkeley and a research fellow with BMW Group Technology Office USA. He holds three issued patents. His research interests include energy systems, vehicular systems, and automatic control.

For More Information

To learn more about this technology, please contact:

Andy Blugas

Technology Commercialization Officer

bluvasa@clemson.edu

(864) 656-5157