Effect of Inter-vehicle Traffic Signals at Signalized Intersections on Driving Behaviors

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Introduction
Emerging vehicular communication makes it possible to provide traffic light information to drivers inside vehicles with the application of in-vehicle devices. A driving simulator experiment was executed for eleven subjects, and driver behavior was evaluated for driving operations and eye-gaze behavior.

Inter-vehicle traffic signal for signalized intersection

Current mode
The real time information of ground traffic lights of the upcoming intersection is displayed directly to drivers by in-vehicle devices.

Predicted mode
This mode provides predicted ground traffic light information for the upcoming intersection based on the current driving speed of the vehicle.

DS experiments

Inter-vehicle traffic signal displayed by HUD

Three driving courses presented in three different colors

Results n=11

Number of braking operations
Number of accelerating operations
Glance frequency
Mean single glance time

The results demonstrated that disruptive braking and accelerating operations were significantly reduced under the predicted mode, and glance time was significantly shorter for the head-up display than for the normal 4.3-inch display. We concluded that the predicted mode easily prompts drivers to ecological driving, and that the head-up display is reliable for providing in-vehicle traffic light information. These findings could also be observed in the test car experiments.

Publications