

# Research Report Summary



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## Driver Behavior and Performances with In-Vehicle Display Based on Speed Compliance

Speeding endangers every road user and has contributed to one-third of all motor vehicle fatalities for more than two decades. Many advanced technologies and much research on speed surveillance systems have contributed to positively influence driving behavior [1] [2]. With advanced technology integrating with new automobiles, there are potential safety concerns if the means of communication between in-vehicle displays and the human driver adds visual clutter.

This study examines the effect of communication using alert location and alert style as independent variables compared with traditional post-mounted speed sign scenarios. Alert location included virtual dash and center stack; alert style

included steady display and flash display at a rate of 2 Hz (Figure 1).

A combination of two independent variables and a control scenario led to five scenarios for each participant where driver's behavior and response to

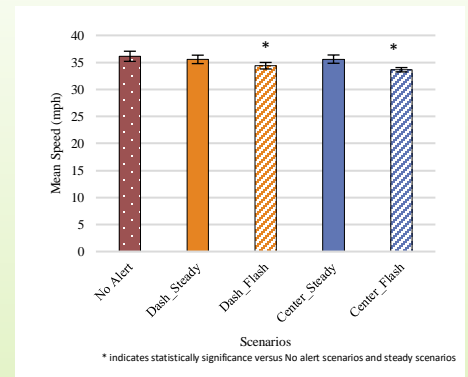


Figure 1 - Mean speed across scenarios

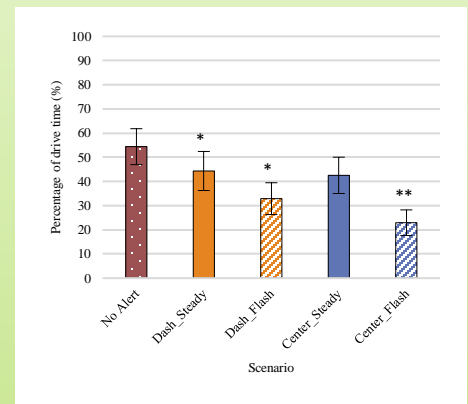


Figure 2 - Percentage of drive time above the posted limit across scenarios

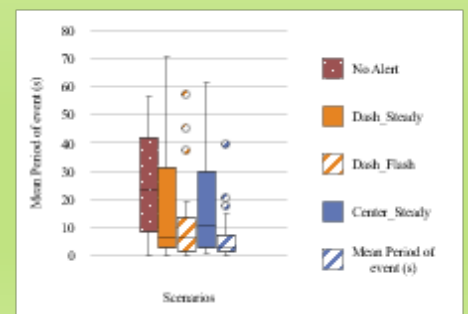


Figure 3 - Mean period of event across scenarios

\* Indicates statistical significance versus no alert scenarios  
\*\* Indicates statistical significance versus dash steady state and center stack steady state scenarios



Figure 4 - Virtual dash and center stack alert display

the alert system were recorded. The analyses were categorized demographically by gender and age groups, as well as scenario-wise. Measures of analysis defined for the study were mean speed, the percentage of drive time spent above the posted speed limit, mean duration of an event, and frequency of events. An event was recorded when the driver's speed was greater than the posted speed limit and ended when the driving speed dropped to the posted speed limit or below. Demographic

distribution analysis indicates that young drivers (18-23 years) drive at speeds greater than the posted speed limit for significantly longer than the mid-age group of drivers (24-40 years).

Scenario-wise results suggest that the flashing alert style significantly assisted drivers to stay within the posted speed limit as it triggered the rods (photoreceptors) in the peripheral vision. A few cases also indicated that the center

## References

- [1] H. W. Warner and L. Aberg, "The long-term effects of an ISA speed-warning device on drivers' speeding behaviour," *Transportation Research Part F: Traffic Psychology and Behaviour*, vol. 11, no. 2, pp. 96-107, 2008.
- [2] K. L. Young, A. R. Michael, J. T. Thomas, K. Jontof-Hutterm and S. Newstead, "Intelligent speed adaptation: Effects and acceptance by young inexperienced drivers," *Accident Analysis and Prevention*, vol. 42, pp. 935-943, 2010.

stack plus flash scenario resulted in a significant response over all other scenarios.

Eye glances were recorded as a binary variable for different scenarios during a drive. The results indicated that 52% of speed posts went unnoticed. The results of this study indicate that the presence of external alert systems help drivers stay within limits. The results also show that alert style and location has a significant effect on gaining the driver's response to the alert.

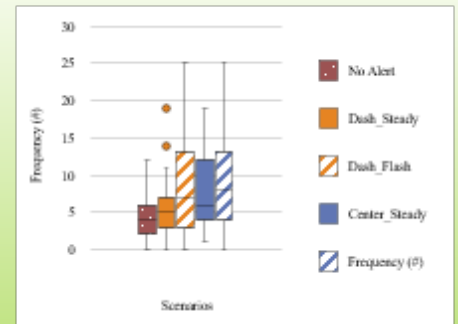


Figure 5 – Frequency of events across scenarios