Characterizing Drivers' Peripheral Vision via the Functional Field of View for Intelligent Driving Assistance

Abhijat Biswas
Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

Henny Admoni
Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

Abstract

Previous work has modeled the combination of foveal and peripheral gaze as the Functional Field of View (FFoV), showing a relationship between FFoV degradation and poor driving outcomes making it an object of interest for intelligent driving assistance algorithms. We study the shape and dynamics of the FFoV using a peripheral detection task in a virtual reality (VR) driving simulator with licensed drivers in urban driving environments. We find that missed targets occurred vertically higher in the driver FoV than hits. This supports a vertically asymmetric (upward-inhibited) shape of the FFoV. Additionally, we show that this asymmetry disappears when the same PDT is conducted in a non-driving setting. Finally, we examined the dynamics of the FFoV, finding that drivers' peripheral target detection ability is inhibited (general interference rather than tunnel vision) right after saccades but recovers once drivers fixate for some time.

In M. Goldwater, F. K. Anggoro, B. K. Hayes, & D. C. Ong (Eds.), *Proceedings of the 45th Annual Conference of the Cognitive Science Society.*