Optical Vehicular Communication

Reza Ashtari, Auburn University

Abstract:

With increasing populations in urban areas, an intelligent and safer means of vehicular communication becomes a necessity. In this application, an optical alternative to radio frequency communication between vehicles is presented. A non-line-of-sight (NLOS) optical communication system is proposed to supplement vehicle safety among connected and autonomous vehicles. Conventional vehicular communications suffer from a lack of available spectrum and thus are limited to communicating a limited amount of information at a relatively slow data rate. In addition to utilizing a cost-free region of optical spectrum with over a thousand times more available bandwidth, optically connected vehicles may use existing LED lighting in vehicles to communicate information. With vehicles' LED lighting serving as transmitters, the infrastructure for vehicular communication is already present and capable of outperforming radio-based alternatives. Several applications of optical vehicular communication within amber alert scenarios, recovery of stolen vehicles, collision prevention, and vehicular networking are analyzed. Implementations in development including a low power LED-based transceiver adapted for car headlights and its applications within intelligent vehicle design are discussed as well.

Bio:

Reza Ashtari received the M.S. in electrical engineering and the B.S. in Wireless Engineering from Auburn University. He is currently pursuing a Ph.D. in Electrical Engineering at Auburn. His research interests include antenna design, metamaterials, free space optics, nonlinear optics and vehicular communication. Mr. Ashtari served as a power distribution engineer for Southern Company and was a recipient of NSF's Research for Engineering Undergraduates Scholarship as well as Auburn's Graduate Research Fellowship.