Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTRI-2006-1		

4. Title and Subtitle	5. Report Date
Implications of Fatal and Nonfatal Crashes for Adaptive Headlighting	April 2006
	6. Performing Organization Code 302753
7. Author(s) John M. Sullivan and Michael J. Flannagan	8. Performing Organization Report No. UMTRI-2006-1
9. Performing Organization Name and Address The University of Michigan Transportation Research Institute 2901 Baxter Road Ann Arbor, MI 48109-2150 U.S.A	10. Work Unit no. (TRAIS) 11. Contracts or Grant No.
12. Sponsoring Agency Name and Address The University of Michigan Industry Affiliation Program for Human Factors in Transportation Safety	13. Type of Report and Period Covered 14. Sponsoring Agency Code

15. Supplementary Notes

The Affiliation Program currently includes Alps Automotive/Alpine Electronics, Autoliv, Avery Dennison, Bendix, BMW, Bosch, Com-Corp Industries, DaimlerChrysler, DBM Reflex, Decoma Autosystems, Denso, Federal-Mogul, Ford, GE, General Motors, Gentex, Grote Industries, Guide Corporation, Hella, Honda, Ichikoh Industries, Koito Manufacturing, Lang-Mekra North America, Magna Donnelly, Muth, Nissan, North American Lighting, Northrop Grumman, OSRAM Sylvania, Philips Lighting, Renault, Schefenacker International, Sisecam, SL Corporation, Stanley Electric, Toyoda Gosei North America, Toyota Technical Center USA, Truck-Lite, Valeo, Visteon, 3M Personal Safety Products, and 3M Traffic Safety Systems. Information about the Affiliation Program is available at: http://www.umich.edu/~industry/

16. Abstract

Fatal and nonfatal pedestrian crashes spanning daylight saving time were analyzed to assess the relative magnitude of risk in darkness for crash scenarios related to each of three forms of adaptive headlighting—curve lighting, motorway lighting, and cornering light. For curve lighting, pedestrian crashes on curved roadways were examined; for motorway lighting, crashes with attributes associated with motorways were examined; and for cornering light, crashes involving turning vehicles at intersections were examined. Fatal crashes were sampled from FARS 1987-2004; fatal/nonfatal crashes were sampled from the North Carolina crash dataset, 1991-1999.

In the curve analysis, lower dark/light crash ratios were observed for curved sections of roadway compared to straight roads. This pattern was observed in both the fatal and nonfatal crash data. In the analysis of motorway attributes, posted speed limit was the dominant predictor of crash risk in darkness for the fatal crash dataset; road function class was the dominant predictor for the fatal/nonfatal dataset. Finally, in the analysis of intersection crashes, dark/light ratios for turning vehicles were lower than for nonturning vehicles; and dark/light ratios at intersections were lower than at nonintersections.

The risk for each crash scenario was paired with the corresponding annual rate of crashes in darkness for each scenario so that a relative safety need could be determined. While all three scenarios suggested a potential for safety improvement, scenarios related to the motorway environment showed the largest potential. The actual safety benefits from various forms of adaptive lighting can be expected to depend on both the relevant safety needs, for which this report provides estimates, and the visual effectiveness with which various forms of adaptive lighting can be implemented.

17. Key Words	18. Distribution Statement
Pedestrian collisions, visibility, conspicuity, daylight saving time, adaptive headlighting	Unlimited

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
None	None	28	