Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UMTRI-2004-38		

4. Title and Subtitle	5. Report Date
Pedestrian Detection with Near and Far Infrared Night Vision Enhancement	December 2004
	6. Performing Organization Code 302753

7. Author(s)	8. Performing Organization Report No.
Tsimhoni, O., Bärgman, J., Minoda, T., and Flannagan, M.J.	UMTRI-2004-38

9. Performing Organization Name and Address	10. Work Unit no. (TRAIS)
The University of Michigan Transportation Research Institute 2901 Baxter Road Ann Arbor, Michigan 48109-2150 U.S.A.	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
The University of Michigan Industry Affiliation Program for Human Factors in Transportation Safety	14. Sponsoring Agency Code

15. Supplementary Notes

The Affiliation Program currently includes AGC Automotive America, Autoliv, Automotive Lighting, Avery Dennison, Bendix, BMW, Bosch, 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, Mitsubishi Motors, Muth, Nichia America, Nissan, North American Lighting, OLSA, OSRAM Sylvania, Philips Lighting, PPG Industries, Reflexite, Renault, Schefenacker International, Sisecam, SL Corporation, Solutia Performance Films, Stanley Electric, Toyoda Gosei North America, Toyota Technical Center USA, Truck-Lite, Valeo, Vidrio Plano, 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

Current headlighting and road lighting are only partly effective in reducing the risk of driving at night. Various forms of night vision enhancement systems, using a variety of sensing technologies, are being developed to further reduce this risk. Two major sensing technologies are receiving particular development interest and are both currently available on new vehicles: far infrared (FIR) systems, which generate images by passively detecting thermal emissions from objects and surfaces in the road scene, and near infrared (NIR) systems, which actively illuminate the scene in the near infrared spectrum and capture the reflected radiation. The images generated by these systems, and the ways they are used by drivers, are expected to differ. There is evidence that the major safety problem caused by darkness is increased risk of pedestrian collisions. Because pedestrians are usually prominent among far infrared sources in roadway scenes, their detection may be especially enhanced in FIR views.

To compare pedestrian detection in NIR and FIR views, a test vehicle equipped with each type of system was driven at night on several roads with pedestrians standing along the route. Video clips, recorded from both systems simultaneously, were later shown in a laboratory setting to 16 subjects (eight younger than 30 years and eight older than 60 years). Subjects pressed a button as soon as they saw each pedestrian. Detection distances with FIR were significantly greater than with NIR. Younger subjects had greater detection distances than did older subjects, and both age groups had greater detection distances with FIR. The effectiveness of NIR and FIR systems can be expected to depend on the details of implementation as well as any inherent advantages of either technology. To the extent that the two systems used in this experiment reasonably represent the respective technologies, the results support the expected enhancement of pedestrian detection in FIR systems.

17. Key Words	18. Distribution Statement
Night vision, infrared, FIR, NIR, pedestrian detection	Unlimited

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
None	None	25	