POSTER PRESENTATION

EVALUATION OF THE RELIABILITY AND EFFECTIVENESS OF AN ANIMAL DETECTION SYSTEM ALONG STATE HWY 3 NEAR FT JONES, CALIFORNIA

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ABSTRACT

We investigated the reliability and effectiveness of a microwave break-the-beam animal detection system (ICx Radar Systems), along State Hwy 3 (SR-3) near Ft Jones, northern California, USA. The first reliability test involved a human passing through the beam at about (20 m) intervals. The results indicated that the system was capable of detecting a human and was therefore likely to be able to detect large ungulates such as black-tailed deer. While the system did not have any blind spots, three of the beams did show evidence of desensitizing during testing. For a second reliability test, we compared the detection data from the animal detection system with the video images from infrared cameras along the section of SR-3 that is covered by the system. At least 74% of all detections could be considered “correct”. Because of the limited range of the cameras, especially during the night, it is likely that the percentage of correct detections is substantially higher. Most of the triggers that were not identified were in the late afternoon and during the night when the range of the cameras was very limited, except for triggers that carried lights (e.g. vehicles). There were some system errors but except for one system error they did not result in the activation of the warning signs. About 93% of the correct detections related to vehicles turning on and off SR-3, suggesting that it is worthwhile to implement additional vehicle detectors at the side roads that keep the warning lights from turning on when a vehicle turns on or off the highway. Only about 4% of the correct detections related to black-tailed deer. However, compared to vehicles the number of deer that triggered the beam is more likely to have been underestimated as deer cannot be identified on night images if they are further away than about 100 ft (30 m) from the cameras. Vehicles reduced speed by about 5.5% with activated warning signs (from 56.2 mi/hr to 53.1 mi/hr), with greatest effectiveness during the evening and night. Because of the relatively low number of large mammal carcasses, the relatively short road section with the system (2/3 mile), and the relatively short time period
during which the system was present with the warning signs uncovered (7 months), it was not possible to conclude whether the animal detection system may have also reduced the number of large mammal-vehicle collisions. Finally, the results of a survey among drivers of the road section with the system indicated that most respondents wanted the system to be removed. The most common concerns related to the cost of the system, the perception that the system was in the wrong location, the brightness of the warning signs at night, and the perception that the system is not reliable. We recommend improving the reliability of the system, reducing potential downtime and operation and maintenance costs, improving the warning signs, and to implement an extensive communication program with drivers and the general public.

**BIOGRAPHICAL SKETCHES**


**Mohammad (Ashkan) Sharafsaleh** is a Senior Research and Development Engineer with California PATH Program of UC Berkeley. He received his B.S. in Civil Engineering from University of Cincinnati (1991) and M. of Eng. in Structural Engineering (1993) and M.S. in Transportation Engineering (1994) from UC Berkeley. He has passed all the course requirements and exams for his PhD in Transportation Engineering from UC Berkeley except for his dissertation. He has worked as a consultant in private sector as well as the assistant City Traffic Engineer for the City of Berkeley prior to joining PATH (2002-present). At PATH, he has managed a variety of projects including Performance Measurement System (PeMS), ITS Decision Support Website, Construction of PATH’s Intelligent Intersection Test-Bed, Hybrid Data Roadmap, and Evaluation of Animal Warning System Effectiveness. He is currently managing Silicon Valley Connected Vehicle Test Bed project. He has also contributed to a number of other internationally well-known PATH projects such as Intersection Decision Support, Vehicle-Infrastructure Integration, and Cooperative Intersection Collision Avoidance Systems. He has a vast experience dealing with cities, counties, and state institutions for deployment and field data collection efforts. Mr. Sharafsaleh is a registered Traffic Engineer in State of California.

**Christopher Nowakowski** is a Research and Development Engineer at the University of California, Berkeley, Partners for Advanced Transportation TecHnology (PATH) program. He has a background in Civil Engineering and a M.S. in Human Factors Engineering from the University of Michigan. His research interests include safety, usability, and transportation human factors issues such as driving behavior, transit behavior, technology use, and driver decision making in the context of transportation systems. At California PATH he has spent over 10 years conducting research on topics related to the design of in-vehicle controls and displays, navigation
and traveler information systems, Advanced Driver Assistance Systems (ADAS) and Collision Avoidance Systems (CAS), connected vehicles, cooperative adaptive cruise control (CACC), and automated vehicles.

Jonathan Felder received his B.S. in computer science (1998) and did some graduate work in computer science with a focus on system administration (1998-2000) at Florida State University in Tallahassee, FL. He has been employed as a systems administrator at the University of California, Berkeley for over a decade. First he worked for the California PATH Program (2001-2009) where he supported researchers working on solving various problems in transportation. He now works for Educational Technology Services where he focuses on supporting the online publishing and distribution of lectures from all across the UC Berkeley campus to the public (2009-present).