New England University Transportation Center

Principal Investigator:	Manbir Sodhi	**Co-Principal Investigator:**	Mark Wood
Title:	Professor	**Title:**	Professor
University:	University of Rhode Island	**University:**	University of Rhode Island
Email:	Sodhi@egr.uri.edu	**Email:**	Mark_wood@uri.edu
Phone:	401-874-5189	**Phone:**	

Final Report

Project Title:

Assessment of Older Driver Performance Under Low Level Alcohol Impairment

Project Number:	**Project End Date:**	**Submission Date:**
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Summary:

This report summarizes the outcomes, to date, of the work undertaken to examine the effects of low level alcohol impairment, especially for older drivers, based on on-road driving studies. Some of the questions the project initially sought answer were:

1. How does alcohol impairment at low (legal) levels influence driver performance and eye movements of drivers in laboratory experiments?
2. How does alcohol impairment at low (legal) levels influence driver performance and eye movements of drivers in on-road experiments?
3. How do the use of devices such as cell phones and navigation devices impact the eye movements of drivers who are operating vehicles, whilst under the legal limits of alcohol impairment?

This project has added to the existing literature on impaired driving by examining eye movement patterns and other biometric data that characterize alcohol impaired driving. A working paper on the subject, [1], is planned for release shortly.

The following tasks were initially planned for completion of the study:
1. To prepare an integrated suite of sensors for data collection from drivers be to procure biometric sensors such as differential blood pressure measurement systems, heart-rate, blood level oxygen metering systems among others, and tie these into the existing hub of sensor integration developed at URI.
2. Development of algorithms for correlating biometric data with driving responses.
3. Design of protocol for testing drivers under various levels of BAC.
4. Pilot runs with small sample size for protocol verification.
5. Analysis of pilot runs data.
6. Large sample (production) runs.
7. Data analysis of production runs.

Task 1 was completed as planned, and the recent availability of biometric sensors with networking capability facilitated this task considerably.

Task 2 was also completed as planned, and additional information will be reported in a forthcoming paper [2].

Task 3 took the most time and was significantly more complex than initially estimated. Most of the effort was directed at obtaining the IRB approval. Although the principal investigators are experienced in preparing IRB protocols for on-road driving and for alcohol studies, combining both presented challenges that required extensive detailed planning. However, after a period of over a year, the necessary approvals were obtained and recruitment for the pilot was done. The final protocol differed from the original plan in that the BAC used for testing was set to 0.06% as opposed to 0.04%, and tests using the simulator were excluded. The reason for the first change was that while 0.06% BAC is also within the legal limits, it was

concluded that the higher range would better highlight the differences between the baseline (0.00%BAC) and the low level inebriation (0.06%BAC). The second change was motivated by some preliminary tests that indicated that motion sickness would become a significant issue with alcohol inebriation, and would likely confound and interfere with the on-road data collection, and simulator based tests were thus excised.

An extended description of the protocol and the experimental setup will be reported in the forthcoming document, [2].

Tasks 4 and 6, and tasks 5 and 7 were consolidated because of time constraints. Data collection from on-road and laboratory tests has been ongoing since summer 2012, and the initial analyses show some differences between 0.00% BAC and 0.06%BAC. However, further data collection is required for enhanced resolution and this is ongoing in an extension of the initial project. Once processed, the data will be made available to the public through the MovieLab website, and extended description and conclusions will be reported in [2].

Two graduate students and eight undergraduate students have been funded by this project. One of the graduate students is completing her Ph. D. in Psychology and this study constitutes the main project for her dissertation. Undergraduate students from Engineering have participated in the execution of the study and in the fabrication of hardware and software. Undergraduate students from Psychology have also participated in the project in developing the testing protocol, recruitment of participants, conducting laboratory tests and supporting on-road tests.

In conclusion, on-road tests of inebriated driving performance are very complex and hard to manage projects. The details of this study should serve as a useful template/guide for future studies by other researchers. The conclusions from the initial data are not definitive, but further testing and analyses are ongoing.

[1] Youssef, R., Sodhi, M., Norman, M., "Driving under the influence: A review", under preparation.
[2] Sodhi, M., Youssef, R,, "On road testing of Driving under the influence of alcohol", under preparation.