UTC Project Information	
Project Title	Countermeasures to Detect and Combat Inattention While Driving Partially Automated Systems
University	Texas A&M University Virginia Tech Transportation Institute (VTTI)
Principal Investigator	Thomas Ferris
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Funding Source(s) and Amounts Provided (by each agency or organization)	Safe-D (Federal): $58,278 Non-Federal: $119,884
Total Project Cost	$178,162
Agency ID or Contract Number	Grant No: 69A3551747115 Project: 01-002
Start and End Dates	June 2017 – August 2018
Brief Description of Research Project	This project will investigate and develop countermeasures for problems that can arise when human drivers are required to recognize a fault and assume manual control of a vehicle which is partially-automated. Researchers at Texas A&M University (TAMU) and Texas A&M Transportation Institute will collaborate with those at Virginia Tech Transportation Institute (VTTI) to complete and integrate two research thrusts. The VTTI group will develop and refine a Driver Monitoring System (DMS) for automated vehicles which will estimate the level of attentiveness the driver gives to driving tasks that may require human input and/or taking over from automation control. The TAMU team will first perform an extensive literature review to define a set of failure scenarios in which human action (or inaction) following automation faults could contribute substantially to driving performance and/or safety. These scenarios will be developed in a driving simulator at TAMU, which will be used to conduct a human subjects study to evaluate driving performance with and without various types of multisensory cues (visual, auditory, tactile, and combinations) designed to guide attention to relevant displays and controls. This study will identify the most promising cuing system for guiding attention to these areas of interest, and for easing the transition into manual control for the required task. Finally, researchers at both institutions will combine the products of their research to implement and test the cuing system in a partially-automated vehicle on a controlled test track at VTTI. A short qualitative pilot study will be conducted to validate the usefulness of the cuing system in more realistic driving contexts designed to encourage inattentiveness, and possibly using

	a Wizard-of-Oz style triggering of cues based on similar logic being developed for the DMS. This effort will also serve as a partial proof-of-concept to springboard future development in this research toward an integrated system that combines DMS attentiveness assessment and cuing to mitigate driver inattentiveness.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	Final report that details a technology transfer plan for extending the experimental results into commercial applications will be delivered as well as data from this research (as per DMP). The results of this work will be published in peer-reviewed journals, and presented at major conferences (SAE, TRB, HFES). Technology Transfer: It is anticipated that the developed DMS system and integrated multisensory cuing/control transition aids will have commercial value. The researchers will work with Safe-D Technology Transfer Coordinators at TAMU and VTTI to identify, and as appropriate consult with potential stakeholders. Education and Workforce Development: • This work will centrally-involve a PhD student and will serve as a final research effort required in completing his PhD thesis. • The research will also serve an educational purpose through the demonstrations. • Methods and data from the research will be integrated into undergraduate and graduate courses. • Existing infrastructure at TAMU will be leveraged to make course content available online for distance learning students at TAMU, and to the extent that it can be supported, other partner institutions. • The research team will prepare a demo of the work for K-12 campus events, as well as for and prospective undergraduate and graduate student visits and science events involving local communities.
Impacts/Benefits of Implementation (actual, not anticipated)	Through the implementation of the research outcomes, it is anticipated that this work will contribute to relevant research fields and lead to more research works, attract public attention and interests, and potentially improve transportation safety through technology transfer.
Web Links • Reports • Project website	http://www.vtti.vt.edu/utc/safe-d/index.php/projects/countermeasures-to-detect-and-combat-inattention-while-driving-partially-automated-systems/