The Advanced Safe Truck Concept (ASTC) Project: Defining and Developing Future Concepts to Enhance Heavy Vehicle Safety

Michael G. Lenné [1a,b], Michael Fitzharris [b], Tim Horberry [b], Darren Wood [c], Jeremy da Cruz [a], Jonny Kuo [a,b], Christine Mulvihill [b], Mitchell Peden[d]

[1]mike.lenne@seeingmachines.com
[a] Seeing Machines Ltd, 1/11 Lonsdale St, Braddon ACT, Australia
[b] Monash University Accident Research Centre, Monash University, VIC, Australia
[c] Ron Finemore Transport Services Pty Ltd, Wodonga VIC, Australia
[d] Volvo Trucks Australia, Wacol QLD, Australia

Abstract

The need to address heavy vehicle safety, both in terms of reducing the number of crashes and the flow-on impacts on productivity, is acknowledged by the industry itself as well as the broader road safety community. Advances in technology now enable transport operators to strengthen their ability to measure and monitor in-cab driver performance in real-time as a way of complementing existing company safety policies and further ensuring they meet OHS requirements. This paper outlines a new Commonwealth-funded program, the Advanced Safe Truck Concept project, led by Seeing Machines in collaboration with Monash University Accident Research Centre, Ron Finemore Transport, and Volvo Trucks Australia. This program is aimed at better understanding the real-world risks faced by trucking operations and their drivers, and the research undertaken to generate new technological solutions.

Background

According to BITRE, 2462 Australians were killed as a result of involvement in a heavy vehicle crashes between 2005-2014, representing 17.5% of deaths on Australian roads. The need to eliminate these crashes and flow-on negative impacts to productivity is obvious. Any improvement in driver safety will also likely deliver other productivity gains to businesses and the sector more broadly. As driver fatigue and distraction are known problems, these represent key target areas to address.

Recent advances in technology afford new opportunities for companies to strengthen their ability to measure and monitor in-cab driver performance in real-time as a way of complementing existing company safety policies. The National Transport Commission (NTC), along with state and national road safety strategies recognise these as priority issues. Funded under the Cooperative Research Centre Projects (CRC-P) scheme, the Advanced Safe Truck Concept (ASTC) project brings together techology, research and operational expertise to develop an innovative driver state sensing concept for use in commercial vehicles. This paper outlines the purpose of the ASTC and how the project will ultimately be used to improve commercial transport operations.

Method

This three-year project has three elements. First, and the focus of this paper, an engineering plan was developed that defined the driver sensing technology and platforms that would be used to generate the novel data. This plan was informed by the research literature, available human sensing technologies, and expert and practical input from the project's industry partner, Ron Finemore Transport (RFT). Second, driving simulator studies will examine the impact of drowsiness and distraction using the newly developed technology platform. Third, driver performance will be examined through in-cab obervation of drivers in up to 10 RFT trucks over a 6 month period. Finally, this knowledge will collectively be used to define a safety concept that aims to enhance the operational performance of commercial vehicle drivers.

Results

Assessments of the literature confirmed that driver drowsiness, distraction and workload correlated with poorer safety outcomes. Moreover, industry professionals highighted the risks these driver states present in the commercial vehicle sector. This knowledge informed the development of an engineering plan which defined a range of sensing needs. This included Seeing Machines' core driver monitoring technology, which records metrics related to driver head and eyelid position, gaze direction and fixation points (where they are looking). In combination, forward roadway facing cameras, along with wearable technologies for health and sleep state monitoring will bring new insights to driver performance. Having developed this sensing platform, driver performance will next be assessed in the the MUARC car and new truck simulator developed for this program. The same sensing platform is to be used in RFT trucks to collect naturalistic data. Details of the sensing platforms and early testing will be presented.

Conclusion

The advanced sensing platform has been developed and implemented and is now generating novel data on driver state and operational performance in real-time. This information is fundamental to achieving the goal of this project, this being the production of an advanced driver state sensing technology concept aimed at improving driver safety and commercial vehicle operations.