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Photonics and Electronics

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Driver-vehicle dynamics and the internal model hypothesis



Abstract

With the increasing need to reduce time and cost of vehicle development there is increasing advantage in simulating mathematically the dynamic interaction of driver and vehicle. The larger design space arising from the introduction of active chassis technology further increases the potential advantage. In this presentation, progress in understanding and simulating human steering control will be reviewed. Central to the theme is the internal model hypothesis: the idea that a human learns a model of how the vehicle responds to control inputs, and then uses this model to aid perception, cognition and action while driving the vehicle. Despite progress in recent years, much remains to be understood. Activity in the fields of psychology, human factors, neuroscience, and machine learning will be considered for potential to further our understanding, particularly in relation to subjective responses and to shared control.

Biography

David Cole received his first degree in engineering in 1985 from the Department of Engineering, University of Cambridge (CUED). After a few years at Rolls Royce Motors he returned to CUED to do a PhD degree in vehicle dynamics. From 1990 to 1996, he undertook postdoctoral research in heavy vehicle dynamics at CUED. From 1996 to 2000, he was a lecturer at the University of Nottingham. In 2000, he returned to CUED and is now a Senior Lecturer there. His main teaching activity is in mechanical engineering, and his research is in the field of vehicle dynamics and driver-vehicle interaction. He collaborates with the road vehicle and racing car industries, and is currently a co-investigator in the EPSRC-funded Sustainable Road Freight project.