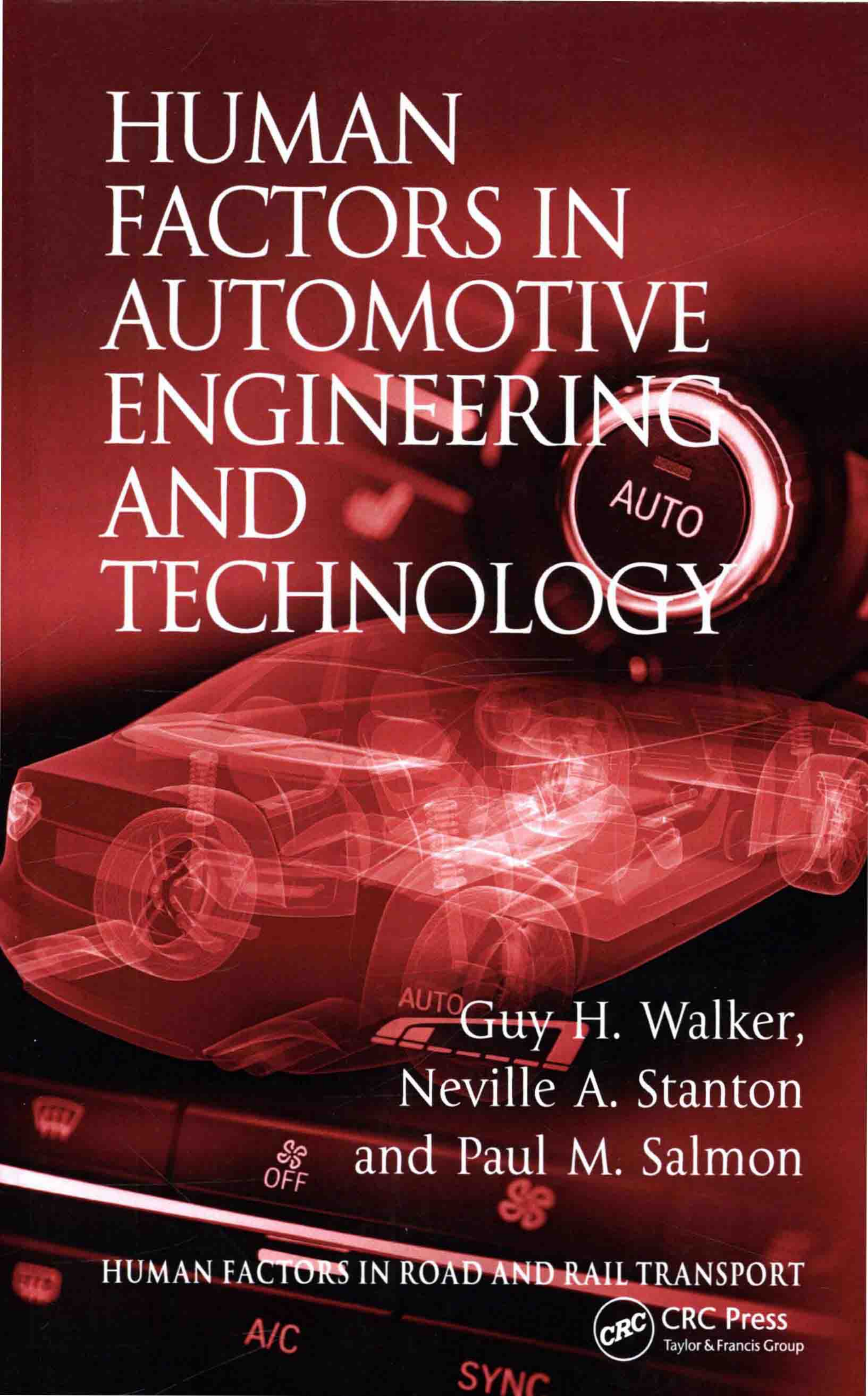
HUMAN FACTORS IN AUTOMOTIVE ENGINEERING AND TECHNOLOGY

Guy H. Walker,
Neville A. Stanton
and Paul M. Salmon



HUMAN FACTORS IN ROAD AND RAIL TRANSPORT

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Human Factors in Automotive Engineering and Technology

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Human Factors in Road and Rail Transport

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Today's society confronts major land transport problems. Human and financial costs of road vehicle crashes and rail incidents are increasing, with road vehicle crashes predicted to become the third largest cause of death and injury globally by 2020. Several social trends pose threats to safety, including increasing vehicle ownership and traffic congestion, advancing technological complexity at the human-vehicle interface, population ageing in the developed world, and ever greater numbers of younger vehicle drivers in the developing world.

Ashgate's Human Factors in Road and Rail Transport series makes a timely contribution to these issues by focusing on human and organisational aspects of road and rail safety. The series responds to increasing demands for safe, efficient, economical and environmentally-friendly land-based transport. It does this by reporting on state-of-the-art science that may be applied to reduce vehicle collisions and improve vehicle usability as well as enhancing driver wellbeing and satisfaction. It achieves this by disseminating new theoretical and empirical research generated by specialists in the behavioural and allied disciplines, including traffic and transportation psychology, human factors and ergonomics.

The series addresses such topics as driver behaviour and training, in-vehicle technology, driver health and driver assessment. Specially commissioned works from internationally recognised experts provide authoritative accounts of leading approaches to real-world problems in this important field.

About the Authors

Dr Guy H. Walker is an Associate Professor within the Institute for Infrastructure and Environment at Heriot-Watt University in Edinburgh. He lectures on transportation engineering and human factors, and is the author/co-author of over 90 peer-reviewed journal articles and 12 books. He and his co-authors have been awarded the Institute for Ergonomics and Human Factors (IEHF) President's Medal for the practical application of ergonomics theory, the Peter Vulcan prize for best research paper, and Heriot-Watt's Graduate's Prize for inspirational teaching. Dr Walker has a BSc (Hons) degree in Psychology from the University of Southampton, a PhD in Human Factors from Brunel University, is a Fellow of the Higher Education Academy and is a member of the Royal Society of Edinburgh's Young Academy of Scotland. His research interests are wide-ranging, spanning driver behaviour and the role of feedback in vehicles, using human factors methods to analyse black-box data recordings, the application of sociotechnical systems theory to the design and evaluation of transportation systems through to self-explaining roads and driver behaviour in road works. His research has featured in the popular media, from national newspapers, TV and radio through to an appearance on the Discovery Channel.

Professor Neville A. Stanton is both a Charted Psychologist and Chartered Engineer, and holds a Chair in Human Factors Engineering in the Faculty of Engineering and the Environment at the University of Southampton. He has published over 200 peer-reviewed journal papers and 25 books on human factors and ergonomics. In 1998, he was awarded the Institution of Electrical Engineers Divisional Premium Award for a co-authored paper on engineering psychology and system safety. The Institute for Ergonomics and Human Factors awarded him the Sir Frederic Bartlett medal in 2012, the President's Medal in 2008 and the Otto Edholm medal in 2001 for his original contribution to basic and applied ergonomics research. In 2007, the Royal Aeronautical Society awarded him and his colleagues the Hodgson Medal and Bronze Award for their work on flight-deck safety. He is also the recipient of the Vice Chancellor's Award for best postgraduate research supervisor in the Faculty of Engineering and the Environment at the University of Southampton. He is an editor of the journal *Ergonomics* and is on the editorial board of *Theoretical Issues in Ergonomics Science*. He is also a Fellow and Chartered Occupational Psychologist registered with the British Psychological Society, a Fellow of the Institute of Ergonomics and Human Factors Society, and a Chartered Engineer registered with the Institution of Engineering and Technology. He has a BSc (Hons) in Occupational Psychology from the University of Hull, an

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Paul M. Salmon is a Professor in Human Factors and leader of the USCAR (University of the Sunshine Coast Accident Research) team at the University of the Sunshine Coast. He holds an Australian Research Council Future Fellowship in the area of road safety and has over 13 years' experience in applied human factors research in a number of domains, including military, aviation, and road and rail transport. He has co-authored 10 books, over 90 peer-reviewed journal articles, and numerous conference articles and book chapters. He has received various accolades for his research to date, including the 2007 Royal Aeronautical Society Hodgson Prize for best paper and the 2008 Ergonomics Society's President's Medal. He was also named as one of three finalists in the 2011 Scopus Young Australian Researcher of the Year Award.

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This book describes the authors' work which, over the past 20 years, has taken place in various institutions and under various funded projects. We would like to acknowledge the support of Heriot-Watt University, the University of Southampton, the University of the Sunshine Coast, Brunel University and Monash University. We would also like to acknowledge the important role of our sponsors, which have included Jaguar Cars, Ford Motor Company, the UK Engineering and Physical Sciences Research Council (EPSRC), the Australian Research Council (ARC) and the Carnegie Trust. Some of the research reported here has also been undertaken via a current ARC Discovery grant and another provided by the Australian National Health and Medical Research Council, and a joint EPSRC and industry funded project called the Centre for Sustainable Road Freight. Over these past 20 years, we have worked with many friends and colleagues who have advanced their own research agendas using some of the same facilities and equipment. We will leave it to them to tell their own equally fascinating research stories, but nonetheless would like to particularly acknowledge: Dr Dan Jenkins, Dr Mark Young, Dr Tara Kazi, Professor Mike Lenne, Dr Kristie Young, Dr Ashleigh Filtness, Dr Catherine Harvey, Alain Dunoyer, Adam Leatherland, Dr Melanie Ashleigh, Ben McCaulder, Dr Philip Marsden, Amy Williamson, Natalie Taylor, Melissa Bedinger and of course all our many hundreds of experimental participants, most of whom were not compelled to nausea in the driving simulator.

Glossary

ABS	Anti-Lock Braking System
ACC	Adaptive Cruise Control
ANOVA	Analysis of Variance
AS	Active Steering
CC	(Conventional) Cruise Control
DSA	Distributed Situational Awareness
DSQ	Driving Style Questionnaire
GIDS	Generic Intelligent Driver Support
HTAoD	Hierarchical Task Analysis of Driving
HUD	Head-Up Display
I-E Scale	Internality-Externality Scale
KR	Knowledge of Results
LoC	Locus of Control
MDIE	Driving Internality and Externality scale
NASA-TLX	NASA Task Load Index
ns	not significant
RHT	Risk Homeostasis Theory
SA	Situational Awareness
SAGAT	Situation Awareness Global Assessment Technique
SART	Situation Awareness Rating Technique
SD	Standard Deviation
S&G-ACC	Stop & Go Adaptive Cruise Control

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