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Book review

Automotive Ergonomics: Driver-Vehicle Interaction, Nikolaos Gkikas (Ed.). CRC Press/Taylor & Francis, Boca Raton, Florida (2013). £77.00, Hardback, ISBN: 978-1-4398-9425-5

'Automotive Ergonomics: Driver–Vehicle Interaction' comprises a successful compilation of articles written by experienced and eminent automotive engineers/ergonomists. This is a valuable book of compact size with 10 chapters consisting of total 182 pages. It includes 69 illustrations and 10 tables which are of black and white. This book is a reflection of 'Quantity does not necessarily equate with quality'. Most chapters of the book portray ample information in eloquent manner by providing content in various sections and subsections; adequate illustrations and/or tables.

In past 20 years, technological developments in the automotive industry have undergone a remarkable evolution and set new magnitudes in automobile ergonomics. This book provides a wide coverage, taking a broader view of driver-vehicle interaction. It addresses research challenges and the latest developments in the field of ergonomics/human factors and discusses their implications in the design of modern and futuristic vehicles.

Relatively up-to-date chapters of this book cover emerging developments in automotive ergonomics. The introductory chapter 1 begins with a historic background and then focuses on new opportunities and threats in ergonomics aspects of automobile design. It briefly gives overview of the contents of succeeding chapters. In chapter 2, significant discussion is directed toward the applications of digital human modeling (DHM) in the automotive industry by different domain actors (seat and dashboard designers; members of structural team; other stakeholders, etc.) who collaborate during the design process. This chapter also outlines the gap between DHM research and end-user need. Chapter 3 deals with the importance of considering ergonomics in the occupant package development process. Basic dimensions and occupant locations are illustrated with figures for clear understanding. Some of the difficulties in occupant packaging are also highlighted in this chapter. Negotiation of driver–vehicle systems has been depicted in chapter 4, with in-vehicle information systems (IVIS), advanced driver assistance systems (ADAS) and observation–orientation–decision–action (OODA) model. Chapter 5 focuses on the study of advanced driver assistance systems (ADAS) and presents its role in ergonomic intervention on driver's behavior. Well-written, chapter 6 thoroughly discusses human perception and discomfort from vibration with good number of illustrations and explanation. This chapter provides suggestions to support countermeasures and controls against many of the adverse effects of vibration. Chapter 7 delivers information regarding the thermal comfort indices; in-vehicle thermal comfort of driver and passengers; and the impact of personal characteristics on comfort perception. There is also a description of thermal comfort assessment in laboratory/chamber simulation and in field trials with human subjects. Chapter 8 presents an interesting discussion related to the driving posture and health. At the end of this chapter, the car selection checklist is helpful for choosing a vehicle from an ergonomics and health perspective to avoid some musculoskeletal problems. Chapter 9 focuses on simulators developed for research and the training of drivers. Discussion started with the aviation industry such as simulation of pilot task in advanced modern aircrafts and PBM-3 aircraft simulators; and gradually shifts towards the automotive industry. Lastly, technologies and issues related to design of a Human–Machine Interface (HMI) for electric vehicle are discussed in chapter 10. In particular, it describes driving task and HMI for information display, vehicle control and secondary controls (wipers, charging controls, etc.) in electric vehicle.

The strength of this book is the thought-provoking discussion on various topics of current automotive research with up-to-date references listed at the end of each chapter. These references will help readers to locate supplementary materials relevant to their specific area of interest. The chapter 7: 'Thermal Environments and Vehicles' is very interesting and the author has rightly addressed issues of in-vehicle human thermal comfort and how to assess the effectiveness of climate control systems via thermal manikin and human subject evaluation. Particularly chapters 4, 5 and 9 have been found very informative and interesting to the reviewers as these are dealing with modern automotive technologies.

Dr. Gkikas's edited volume is enriched with valuable nuggets of information on recent advancements in automotive ergonomics for those with prior knowledge or familiarity with subject concerned but the book does not provide great detail of the underlying basic ergonomics theories and practices for unversed readers. A few chapters in the book are rather brief and have poor quality images/illustrations; including a few coloured images would have improved the visual appeal to readers. The effectiveness of this book has been to some extent limited by the constraint of its small volume and failure to include a few more topics highlighting essential ergonomic issues such as: driver's internal and external field of view; evaluation techniques for driver's performance; vehicle's interior/exterior design; principles of in-vehicle control/display design and layout; problems faced by occupants of different sizes and somatotypes during ingress–egress; internal and external automotive lighting systems; automotive craftsmanship, etc. Moreover, the book as a whole concentrates on the ergonomics of car products and thus specific scenarios related to other automotive products like trucks, vans, motor coaches, mopeds, off-road commercial vehicles and motorbikes have not been mentioned.

In spite of the various aforementioned shortcomings, this book published by CRC Press has rightfully earned its place in human factors issues of automotive design. Overall contents of this book will be of interest to a wide spectrum of readers including researchers, transportation engineers, designers, ergonomists/human factor specialists and anyone working in and around the

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automotive industry, particularly those who have an interest in modern technologies used in research and development of driver-vehicle interaction.

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