## Preface

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**Biographical notes:** Xiong Zhang is a Senior Engineer in Engineering Development & Technology, GDLS-Canada. He received his PhD from the Concordia University at Montreal Canada and joined the GDLS-Canada (formerly GM Defense) at London Ontario in 2001. His expertise includes vehicle dynamics, shock and vibration analysis and test data interpretation, with a focus on off-road vehicle mobility and applications of advanced technologies in modelling terrain-tyre interfaces for ground vehicle systems. He is the Guest Editor of the special issue series 'The Performance and Dynamics of Diversified Land Vehicle Systems' of *IJHVS*. He serves as the associate editor of *IJHVS and IJVP*.

Zeljko Knezevic is the Area Manager of Computer Modelling and Simulation team, Engineering Development and Technology, GDLS–Canada. He graduated from the University of Belgrade, Serbia, and pursued his MSc in Engineering at Carleton University, Ottawa, Canada and MBA at Wilfrid Laurier University, Waterloo, Canada. He has been involved in extensive computer modelling and simulation activities related to ground vehicles since he joined GDLS-C (formerly GM Defense) in 1998. His areas of expertise include vehicle dynamics, control systems and mobility analysis of off-road vehicles. He is a member of the Association of Professional Engineers Ontario, Canada.

Qingrong (Annie) Zhao is a Senior Researcher at General Motors Global R&D Center. Her research interests include vehicle dynamics, simulation, controls, and integration. She obtained her PhD in Electrical Engineering from the University of Cincinnati, Ohio, USA, in 2007. She is an author of a dozen peer-reviewed papers in international journals and conferences, and co-inventor of two US patents (pending) and has received numerous honors and awards. She is an Associate Editor of the *International Journal of Vehicle Autonomous Systems*.

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This special issue provides a unique source of cutting-edge development and results in autonomy research of Unmanned Ground Vehicle (UGV) systems. With the main theme on autonomous control of a UGV, the six papers cover subjects in relation to the performance of autonomous operating systems for mobile robotic platforms as well as the controllability and safety of ground vehicles.

The first paper presents a methodology for generating rough terrain surfaces in reality, as required by high-fidelity modelling of UGV-terrain systems in a virtual simulation environment. The second paper presents a simplified motion prediction algorithm for a navigating robot to avoid its collision with moving objects. The algorithm was proposed based on the use of fuzzy inference rules and verified with experimental data. The third paper promotes a cost-effective yet highly versatile autonomous navigation algorithm. The proposed algorithm allows a robot to recognise and respond quickly to unanticipated events and may have potential application in path planning and speed control of non-holonomic robotic platforms. The fourth paper shows a comprehensive driver steering model developed potentially for replacing human driver in vehicle lateral control. The fifth paper proposes an adaptive control strategy applicable for wheeled mobile manipulators subject to external forces and uncertainties. The last paper highlights an approach for estimation of lateral load transfer and vertical tyre-ground contact forces, with results showing the feasibility of replacing expensive dynamometric hub sensors by real-time software observers as improving the controllability and safety of ground vehicles.

We hope that this special issue encourages more results in the area of design and control of UGVs and motivates further research and development in autonomous mobile platforms and intelligent vehicles. We would like to thank all the authors for their hard work, their excellent contributions and their patience with the refereeing process. Special thanks to the anonymous reviewers who provided valuable comments and suggestions that ensured the quality of the special issue. Finally, the support from the journal staff and online submissions team of Inderscience Publishers Ltd, which warrants the successful completion of the editorial process and the launch of the special issue, is gratefully acknowledged.