
Foreword

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Biographical notes: Danwei Wang received his PhD from the University of Michigan, Ann Arbor in 1989. Currently, he is Professor and Head, Division of Control and Instrumentation, the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. He has served as General Chairman, Technical Chairman and in various positions in international conferences. He has served as an Associate Editor of Conference Editorial Board, IEEE Control Systems Society from 1998 to 2005. He is an Associate Editor of International Journal of Humanoid Robotics. He was a recipient of Alexander von Humboldt Fellowship, Germany. His research interests include robotics, control theory and applications.

Shuzhi Sam Ge is a IEEE Fellow, is the Director of Social Robotics Lab of Interactive Digital Media Institute and Professor of Department of Electrical and Computer Engineering, the National University of Singapore. He has (co)-authored three books: Adaptive Neural Network Control of Robotic Manipulators (World Scientific, 1998) Stable Adaptive Neural Network Control (Kluwer, 2001) and Switched Linear Systems: Control and Design (Springer-Verlag, 2005), edited a book: Autonomous Mobile Robots: Sensing, Control, Decision Making and Applications (Taylor and Francis, 2006), and over 300 international journal and conference papers. He has served/been serving as an Associate Editor for a number of flagship journals.

Christian Laugier is the Research Director at INRIA and Scientific Leader of the e-Motion project-team (<http://emotion.inrialpes.fr>). He is also the Deputy Director of the LIG Laboratory. He received a PhD and "State Doctor" in Computer Science from Grenoble University (France) in 1976, and 1987 respectively. His current research interests mainly lies in the areas of *Motion*

Autonomy, Intelligent Vehicles and Probabilistic Robotics. He is a Member of several scientific national and international committees including the Adcom of IROS conference and the IEEE TC on ITS & Autonomous Vehicles. He has been the General Chair or Programme Chair of several international conferences such as IEEE/RSJ IROS'97, IROS'02, IROS'08, or FSR'07. In addition to his research and teaching activities, he participated in the start-up of four industrial companies in the fields of Robotics, Computer Vision and Computer Graphics.

In robotics research, autonomy in general and motion autonomy in particular has been a longstanding challenge in many fronts. Granting autonomy to a mobile robot demands various technological solutions and their functional integration. Some key areas include mobility, perception, localisation, map building, obstacle avoidance, safety, maintenance, etc. One potential application of these technologies is intelligent transportation for urban and/or outdoor industrial environments. Vast resources and manpower have been invested worldwide. Good coordination of such efforts can achieve good efficiency and better outputs. The France-Asia Cyber Transportation (FACT) project has been such a framework for coordination in the past few years.

This Special Issue reports the state-of-the-art developments on the autonomous robots and intelligent transportation. This issue consists of ten technical papers of novel research results, ranging from system of systems, behaviour-based learning, vision-based perception, GPS-based navigation, high-fidelity cosimulation platform for vehicle convoying, dynamic modelling and parameter identification for heavy-duty vehicles, data-fusion for vehicle detection, vehicle tracking, sonar-based sensor system for navigation and vehicle position estimation.

These papers cover a wide spectrum of theory and technology issues for robot autonomy. The paper 'Toward urban driverless vehicles' addresses the system of systems in intelligent transportation vehicles and highlights various aspects of functionalities and technologies for safety and navigation. The paper 'Learning to drive the human way: a step towards intelligent vehicles' discusses the learning aspects for autonomous driving based on intelligent computation. The paper 'Efficient GPU-based construction of occupancy grids using several laser range-finders' presents a generic calculus architecture to build occupancy grids for any kind of range-finder with a Graphical Processor Unit (GPU). The paper 'Autonomous navigation in urban areas using GIS-managed information' shows the usefulness of a Geographical Information System (GIS) for autonomous navigation of intelligent vehicles. The paper 'A high-fidelity cosimulation platform for motion and control research for vehicle platooning' creates a powerful tool for mobility study on autonomous vehicle convoying. The paper 'Dynamic models and parameter identification of a heavy-duty autonomous vehicle' lays a foundation for mobility research on a large-size, four-wheel drive and four-wheel steering vehicle. The paper 'Vehicle recognition and tracking using a generic multisensor and multialgorithm fusion approach' provides an improved solution for vehicle detection. The paper 'An efficient formulation of the Bayesian occupation filter for target tracking in dynamic environments' presents a solution to discretisation problem in grid space representation. The paper 'Simultaneously firing sonar ring-based high-speed navigation for non-holonomic mobile robots in unstructured environments' describes a

sensor system for obstacle avoidance. Finally, the paper 'Position estimation for intelligent vehicles using unscented Kalman filter' presents a case of a data-fusion solution and associated experiments. We hope that this Special Issue stimulates more interest and provides more motivation for further research and development on intelligent transportation and autonomous robotics.