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Due to their maturity and the relative low cost of their implementations, robotics technologies play an ever-increasing role in many fields; the number of applications of robotics technologies to the consumer market is increasing at a surprising rate.

Transportation—meaning both the travel of people and the movement of goods—is a primary need in our life. Among the many application areas that robotics is addressing, transportation seems to be a domain that will dramatically benefit from automatic help. Indeed, the ultimate goal of disciplines such as robotics, electronics, computer science, communications, control, and artificial intelligence—here, more broadly referred to as "robotics"—applied to different transportation aspects is the complete automation of all driving tasks. Due to the inherent complexity of the many problems involved, the current target of these interdisciplinary efforts is the automation of single tasks.

Future transportation systems will benefit from these technologies. Besides augmenting safety levels, vehicle robotics will improve the quality of life through many aspects: from economical (lower fuel consumption, reduced number of accidents, optimized route definition, and the coordination among vehicles and earth stations which will reduce travel times and, consequently, costs as well) to social (unauthorized maneuvers can be automatically avoided or recognized and infirm, young, and elderly people will benefit from a higher level of mobility by riding in automatic vehicles) and from environmental (the increase of lane capacity will reduce the need to extend the road network and lower fuel consumption means reduced emissions) to even personal aspects (people will enjoy the completely automatic transportation in safety and comfort).

Transportation systems that offer such advantages fall under the name of intelligent transportation systems (ITS). More generally speaking, ITS aims to control the flow of people, vehicles, and information to achieve a seamless information/transportation space. ITS requires complex integrated efforts from all aspects of engineering and science, in which not only robotics technologies are involved but mechanical engineering and civil engineering as well. In fact, ITS considers not only the automation of vehicles as its ultimate goal but also the design and implementation of infrastructures, which can act as friendly environments to automatic vehicles.

Among the vast research areas involved in ITS, the most important components that need to be designed are sensing, control, cooperation, and actuation.

This special issue, sponsored by the Technical Committee on ITS of the IEEE Robotics and Automation Society, presents articles that deal with these aspects. We received more than 30 papers, and after a thorough review process, the following six articles were selected.

The first article, by Florent Lamiraux, Jean-Paul Laumond, Carl Van Geem, Daniel Boutonnet, and Gilbert Raust, is concerned with the difficult trajectory planning necessary for transporting the big parts of the new Airbus A380 to the common assembly sight in Toulouse, France.

The second article, by Anouck R. Girard, Stephen Spry, and J. Karl Hedrick, presents a joint effort between the University of California at Berkeley, Ford Scientific Research Laboratories, and General Motors to study the hybrid system modeling of the plant and controllers in order to make verification possible.

The third article, by Benjamin Maurin, Osama Masoud, and Nikolaos P. Papanikolopoulos, presents the challenges in computer vision for crowded scenes where many shadows and occlusions take place; experimental results are presented.

The fourth article, by Marinus B. van Leeuwen and Frans C.A. Groen, presents a method for detecting vehicles in image sequences without preknowledge about the position of the road. The presented algorithms have been tested with many different experiments.

The fifth article, by Jonathan Baber, Julian Kolodko, Tony Noël, Michael Parent, and Ljubo Vlacic, examines the cooperative autonomous driving maneuvers, the cooperative mobile test robots, and the decision and control algorithms that can be used for cooperative autonomous driving by intelligent vehicles in cities.

The last article, by Shu-Ching Chen, Mei-Ling Shyu, Srinivas Peeta, and Chengcui Zhang, proposes an unsupervised video segmentation method—simultaneous partition and class parameter estimation (SPCPE)—and a new method for background learning and subtraction for traffic intersection monitoring.

We really hope you will enjoy the issue.