Guest editorial: technologies for practical robot applications

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Robotics is on the verge of becoming the next disruptive technology to impact our society. Research volume, as well as technology development by the robotics industry, has grown exponentially in recent years. There are many market forecasts predicting a significant increase in the deployment of robotic systems in the next decade. Much of the increase of the robotics volume is expected to be in applications where robots act in direct support of humans, including health care, small-scale manufacturing, leisure and entertainment, the service sector and defense. In response to this growth, governments around the world have launched initiatives to support research and technology development in these areas.

The main objective of the IEEE International Conference on Technologies for Practical Robot Applications (TePRA) is to provide researchers, innovators, entrepreneurs and robotics professionals with a balanced forum in robotics science, engineering and technology. With an emphasis on practical applications and industry participation, TePRA technical programs featured more than 200 technical paper and poster presentations, robot demonstrations, student competitions, panel sessions and exhibits since 2009. The conference tracks covered application domains ranging from medical to defense, from educational to industrial robots, as well as new technologies in sensing, actuation and computation for enabling practical robot applications.

This special issue of the Journal of Intelligent Service Robotics is a compilation of extended manuscripts selected from the 2013 TePRA technical program. The special issue

consists of eight papers to be published in two parts. A number of select papers were invited to the special issue by the TePRA Technical Program Committee using an evaluation criteria comprising the technical content, overall quality of the paper and the conference presentation and the relevance of applications discussed by the authors. Furthermore, the extended papers have gone through the peer review process of the journal. The result is this collection of manuscripts reporting on methods, technologies and tools for practical robot applications in service of humans.

To provide the readers with more guidance and insight about the contents of the special issue, we would like to summarize the contributions of each paper, in no particular order. Stampfer addresses the composition and coordination of various robot behaviors problem by introducing dynamic state charts and demonstrates their tool on an indoor navigation for a service robot. Bazeille's work focuses on robot navigation over rough terrain by studying a trotting controller for a quadruped robot with visual feedback from a stereovision system for heading and distance control. Milella uses a multi-baseline stereovision system for scene detection and presents experimental results on autonomous vehicle navigation for agricultural robot applications. Komendera discusses an intelligent precision jiggling robot that enables assembling structures from triangular trusses as building blocks. This kind of robotics technology can be instrumental in precision construction tasks, both on earth and in space. Telepresence robotics has seen rapid growth in recent years. Tsui presents perspectives from a 3-year design cycle for a semi-autonomous social telepresence robot to study human–robot collaboration for navigation tasks. The special issue includes two papers on humanoid robots. Alunni introduces a manipulation framework for operating high degree-of-freedom robots and uses the valve-turning problem for a humanoid robot as a test case. Rasmussen's contribution is

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the detailed analysis of point clouds and labeling of a utility vehicle for humanoid robot driving for disaster response. Finally, Sinyukov concentrates on multi-modal navigation control for an intelligent wheelchair equipped with a modular and reconfigurable sensor suite. We acknowledge that this is a very brief content summary of this special issue

on TePRA and we believe the readers will find the details presented in each paper informative and applicable.

In closing, we hope that this special issue becomes an archival reference for many years to come highlighting technological advancements for practical robot applications in service of the society.