EiC Editorial

Daniela D'Auria

University of Naples, Federico II, Italy
Editor-in-Chief

Robotic Computing (RC) addresses the synergetic interaction of computing technologies and robotic technologies. The synergy between Robotics, Artificial Intelligence, and Computer Science is both realistic and strategic. Their mutual benefit is to make it possible to build and evolve new robotic systems, to reduce their development cost, and to enhance their quality.

This inauguration issue of the International Journal of Robotic Computing (IJRC) brings together selected papers presented at the 3rd IEEE International Conference on Robotic Computing (IRC 2019, February 25 – February 27, 2019). It consists of four papers. The selected papers underwent a rigorous extra refereeing and revision process. In particular, the papers have been extended with at least 30% new and unpublished materials.

The first paper is entitled “Automotive Radar-based Self Localization Using Navigation Maps for Autonomous Driving”, and is co-authored by Ahmad Pishchvari, Uri Iurgel, Stephanie Lessmann, Lutz Roese-Koerner, from Aptiv Services Deutschland GmbH, Germany. In their work, they provide a fast scan matching algorithm to improve the inaccurate ego-pose estimated basically by dead reckoning using a map which consists of mathematically described lines. Thus, the vehicle displacement caused by drift and bias of mechanical motion sensors is minimized by the matching of radar measurements to features of the environment representation. More specifically, their approach focuses on self-localization in a global frame without using Global Navigation Satellite Systems (GNSS). The performance and usability of their proposed approach is evaluated in real-world experiments and compared qualitatively and quantitatively to the state of the art matching methods.

The second paper is entitled “Automated Fixture Design using an Imprint-based Design Approach & Optimisation in Simulation” and is co-authored by Lukas Christoffer Malte Wiuf Schwartz, Lars-Peter Ellekilde and Norbert Kruger from University of Southern Denmark, Odense, Denmark. In this paper, they

present a method to design fixtures automatically for use in robotic assemblies and pick-and-place tasks. To achieve this, a new automated method to design the cut-out for a fixture is introduced. The method uses a parameterized version of the object’s imprint to design the cut-out. The fixtures generated using this method are optimized in simulations to determine their final parameters for a specific application. Dynamic simulations are used to evaluate each iteration of the cut-out. Lastly, the method is applied to a use-case from the industry to design a fixture for use in a robotic assembly task. Furthermore, the framework they developed is easy to use and requires little input from the user, which makes it easily usable by non-expert users.

The third paper is entitled “Real-time 6D Racket Pose Estimation and Classification for Table Tennis Robots” and is co-authored by Yapeng Gao, Jonas Tebbe, Julian Krismer and Andreas Zell from Cognitive Systems Group at the Computer Science Department University of Tuebingen, Germany. In this work, they present a novel table tennis racket pose detection method based on stereo vision. Through the colour and motion segmentation, they can extract the racket contours, then feed them into the proposed wide baseline stereo matching method to generate the 6D pose. Moreover, with a multilayer perceptron (MLP) neural network, the pose trajectories can be classified into five kinds of spin types. Finally, two experiments are performed to evaluate the accuracy of pose detection and classification.

Finally, the forth paper is entitled “Advanced Knowledge Representation And Reasoning Making Use Of An Advanced N-ARY Model” and is authored by Gian Piero Zarri from STIH Laboratory, University Paris-Sorbonne, Paris, France. In this paper, the author discusses some aspects of NKRL, the Narrative Knowledge Representation Language. This is a high-level n-ary conceptual tool specially conceived for the representation and management of real world, dynamically characterized entities like situations, events and complex events, actions (e.g., in a robotic context) scripts/scenarios/narratives etc. Thus, after having pointed out some shortcomings of the standard ontological solutions for dealing with this sort of information, and having recalled some general characteristics of NKRL, the author focuses on the rules/inferential aspects proper to this language. Moreover, the author introduces, then, the general, formal model of “rule” used in an NKRL context and it is shown how this can be appropriately adapted to the setup of advanced types of inference operations based, e.g., on “analogical” and “causal” reasoning.

We are expecting continued growth of this exciting field of research, and welcome contributions from authors from academia and industry.