

# **13th IFAC Symposium on Robot Control (SYROCO 2022)**

IFAC PapersOnline Volume 55, Issue 38

Online  
17 – 20 October 2022

**Editor:**

**Liz Rincon-Ardilla**

ISBN: 978-1-7138-7170-5

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

To the extent permissible under applicable laws, no responsibility is assumed by the Owner, the Publisher or the Licensee for any injury and/or damage to persons or property as a result of any actual or alleged libelous statements, infringement of intellectual property or privacy rights, or products liability, whether resulting from negligence or otherwise, or from any use or operation of any ideas, instructions, procedures, products or methods contained in the material therein.

The publication of an advertisement in the POD Edition does not constitute on the part of the Owner, the Publisher or the Licensee a guarantee or endorsement of the quality or value of the advertised products or services described therein or of any of the representations or the claims made by the advertisers with respect to such products or services.

Copyright© (2022) by the authors  
Open access publication under the CC-BY-NC-ND License  
<https://creativecommons.org/licenses/by-nc-nd/4.0/>  
All rights reserved.

Printed with permission by Curran Associates, Inc. (2023)

For permission requests, please contact the publisher, Elsevier Limited  
at the address below.

Elsevier Limited  
The Boulevard, Langford Lane  
Kidlington  
Oxford OX5 1GB UK

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

Experimental Evaluation of Intuitive Programming of Robot Interaction Behaviour During Kinesthetic Teaching Using sEMG and Cutaneous Feedback .....	1
<i>Roberto Meattini, Davide Chiaravalli, Kevin Galassi, Gianluca Palli, Claudio Melchiorri</i>	
Preference-Based Optimization of a Human-Robot Collaborative Controller .....	7
<i>Marco Maccarini, Filippo Pura, Dario Piga, Loris Roveda, Francesco Braghin</i>	
Kinematic Modelling and Design of a Tendon Actuated Soft Manipulator.....	13
<i>Nikola Banović, Filip Marić, Marija Seder, Ivan Petrović</i>	
A New Augmented RISE Feedback Controller for Pick-And-Throw Applications with PKMs .....	19
<i>G. Hassan, A. Chemori, M. Gouttefarde, M. El Rafei, D. Sallé</i>	
Control of an Orbital Manipulator with Reaction Wheels for On-Orbit Servicing.....	26
<i>Ria Vijayan, Marco De Stefano, Christian Ott</i>	
Sampling-Based Trajectory (re)planning for Differentially Flat Systems: Application to a 3D Gantry Crane .....	33
<i>M.N. Vu, M. Schwegel, C. Hartl-Nesic, A. Kugi</i>	
Attitude Control in the Mini Cheetah Robot Via MPC and Reward-Based Feed-Forward Controller.....	41
<i>Paolo Arena, Fabio Di Pietro, Alessia Li Noce, Luca Patanè</i>	
LiDAR Inertial Mapping of Non-Manhattan Topologies for UAV-Based Aircraft Inspection in GNSS-Denied Environments.....	49
<i>R. Pugliese, D. Abel</i>	
Stiffness Optimized Multi-Robot Behavior Planning Using Reduced Hessian Method.....	55
<i>X. Ye, M. Schwartz, S. Hohmann</i>	
Quality Analysis of Multi-Agent Multi-Item Pickup and Delivery Solutions Using a Decoupled Approach .....	61
<i>David Zahradka, Anton Andreychuk, Miroslav Kulich, Konstantin Yakovlev</i>	
Multivariable L1 Adaptive Depth and Attitude Control of MEROS Underwater Robot with Real-Time Experiments.....	67
<i>L. Chikh, A. Chemori, S. Wang</i>	
Control of a Three-Degree-Of-Freedom Variable Inertia Generator .....	73
<i>Samuel Verret, Thierry Laliberté, Clément Gosselin</i>	
2.5D Mapping, Pathfinding and Path Following for Navigation of a Differential Drive Robot in Uneven Terrain .....	80
<i>Stepan Dergachev, Kirill Muravyev, Konstantin Yakovlev</i>	
Fault Identification in Mechatronic Systems .....	86
<i>Alexey N. Zhirabok, Alexander V. Zuev, Alexey Ye. Shumsky</i>	
Control of a Robot Expressive Movements Using Non-Verbal Features .....	92
<i>Pablo Osorio, Gentiane Venture</i>	
Analysis and Design of a Macro-Mini Robotic System for Physical Human-Robot Interaction .....	98
<i>Jonathan Beaudoin, Thierry Laliberté, Muhammad Abdallah, Clément Gosselin</i>	

Whole-Body Control of a Mobile Manipulator for Passive Collaborative Transportation .....	106
<i>F. Benzi, C. Mancus, C. Secchi</i>	
An Experimental Study on MPC Based Joint Torque Control for Flexible Joint Robots .....	113
<i>Christian Ott, Fabian Beck, Manuel Keppler</i>	
OMNI-DRL: Learning to Fly in Forests with Omnidirectional Images .....	120
<i>Charles-Olivier Artizzu, Guillaume Allibert, Cédric Demonceaux</i>	
Evaluation of Lidar-Based 3D SLAM Algorithms in SubT Environment.....	126
<i>Anton Koval, Christoforos Kanellakis, George Nikolakopoulos</i>	
A Cognitive Architecture for Robot-Assisted Surgical Procedures .....	132
<i>Elena Zini, Marco Minelli, Lorenzo Sabattini, Federica Ferraguti</i>	
Modular Model-Based Design for Aerial Manipulation with Simulink and ROS .....	138
<i>David Bernstein, Micha Schuster, Klaus Janschek, Michael Beitelschmidt</i>	
Interval-Valued Invehicular Latency Characterization for Risk/Fault Management Purposes .....	145
<i>Nadhir Mansour Ben Lakhal, Lounis Adouane, Othman Nasri, Jaleleddine Ben Hadj Slama</i>	
Comparison of Routing Protocols and Communication Interfaces for the Implementation of Collision Avoidance Capabilities in Fleets of Industrial Mobile Robots .....	152
<i>Alessandro Bonetti, Lorenzo Sabattini</i>	
Proprioceptive Contact Force and Contact Point Estimation in a Stationary Snake Robot .....	160
<i>Jostein Løwer, Irja Gravdahl, Damiano Varagnolo, Øyvind Stavdahl</i>	
Adaptive Path Following for a Differential Drive Robot with EKF-Based Localization .....	166
<i>Xiule Fan, Niraj Reginald, Baris Fidan</i>	
Joint Level Adaptive Control for Mobile Robots in ROS 2.....	172
<i>Walter Fetter Lages</i>	
Robust Adaptive Control for Robotic System with External Disturbance and Guaranteed Parameter Estimation.....	178
<i>Yichi Huang, Jiajia Liu, Shiqiang Zhu, Fanghao Huang, Zheng Chen</i>	
A Multiple Lyapunov Functions Approach for Formation Tracking Control .....	184
<i>Sandeep Kumar Soni, Siyuan Wang, Ankit Sachan, Driss Boutat, Mohamed Djemai</i>	
Super Twisting Control and Stiffness Modulation for Tensegrity Systems .....	190
<i>José Angel Alvarez Duarte, Juan Carlos Avila Vilchis, Adriana H. Vilchis González, Juan Manuel Jacinto Villegas, Philippe Poignet</i>	
A Robust Post-Grasping Control Design for Robotic Testbed Demonstration of Space Debris Disposal .....	198
<i>Viswa Narayanan Sankaranarayanan, Avijit Banerjee, Sumeet Satpute, George Nikolakopoulos</i>	

## Author Index