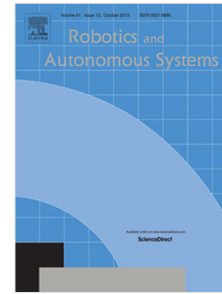


Accepted Manuscript

Dual-arm cooperative manipulation under joint limit constraints

Davide Ortenzi, Rajkumar Muthusamy, Alessandro Freddi, Andrea Monteriù, Ville Kyrki



PII: S0921-8890(17)30067-2
DOI: <https://doi.org/10.1016/j.robot.2017.10.005>
Reference: ROBOT 2928

To appear in: *Robotics and Autonomous Systems*

Received date: 31 January 2017
Revised date: 31 August 2017
Accepted date: 11 October 2017

Please cite this article as: D. Ortenzi, R. Muthusamy, A. Freddi, A. Monteriù, V. Kyrki, Dual-arm cooperative manipulation under joint limit constraints, *Robotics and Autonomous Systems* (2017), <https://doi.org/10.1016/j.robot.2017.10.005>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Dual-Arm Cooperative Manipulation under Joint **Limit** Constraints

Davide Ortenzi^a, Rajkumar Muthusamy^b, Alessandro Freddi^c,
Andrea Monteriù^a, Ville Kyrki^{b,*}

^a*Dipartimento di Ingegneria dell'Informazione, Università Politecnica delle Marche,
Via Brece Bianche, 60131 Ancona, Italy*

^b*Department of Electrical Engineering and Automation, Aalto University,
P.O. Box 15500, 00076 Aalto, Finland.*

^c*SMARTEST Research Centre, Università degli Studi eCampus,
Via Isimbardi 10, 22060 Novedrate (CO), Italy*

Abstract

Cooperative manipulation of a rigid object is challenging and represents an interesting and active research area, especially when these robots are subject to joint and task **prioritization** constraints. In cooperative manipulation, a primary task is to maintain the coordination of motions, to avoid severe damage caused by the violation of kinematic constraints imposed by the closed chain mechanism. This paper proposes a kinematic controller for dual-arm cooperative manipulation that ensures safety by providing **relative** coordinated motion as highest priority task and joint limit avoidance and **world-space** trajectory following at a lower priority. The coordination of motions is based on **modular** relative Jacobian formulation. The approach is applicable to systems composed of redundant or non-redundant manipulators. Experiments in simulation demonstrate the behavior of the approach under different redundancy configurations. Experiments on two robots with different number of redundant motions show the applicability of the proposed approach to cooperative manipulation under joint limit constraints.

*Corresponding author

Email address: d.ortenzi@univpm.it (D. Ortenzi), rajkumar.muthusamy@aalto.fi (R. Muthusamy), alessandro.freddi@unicampus.it (A. Freddi), a.monteriu@univpm.it (A. Monteriù), ville.kyrki@aalto.fi (Ville Kyrki)

Download English Version:

<https://daneshyari.com/en/article/6867394>

Download Persian Version:

<https://daneshyari.com/article/6867394>

[Daneshyari.com](https://daneshyari.com)