

Proceedings of the ASME

DYNAMIC SYSTEMS AND CONTROL CONFERENCE
- 2019 -

VOLUME 3

**RAPID FIRE INTERACTIVE PRESENTATIONS: ADVANCES
IN CONTROL SYSTEMS
ADVANCES IN ROBOTICS AND MECHATRONICS
AUTOMOTIVE AND TRANSPORTATION SYSTEMS
MOTION PLANNING AND TRAJECTORY TRACKING
SOFT MECHATRONIC ACTUATORS AND SENSORS
UNMANNED GROUND AND AERIAL VEHICLES**

presented at

ASME DYNAMIC SYSTEMS AND CONTROL CONFERENCE

OCTOBER 8-11 2019

PARK CITY, UTAH, USA

sponsored by

DYNAMIC SYSTEMS AND CONTROL DIVISION, ASME

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Two Park Avenue * New York, NY. 10016

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.

Statement from By-Laws: The Society shall not be responsible for statements or opinions
Advanced in papers. . .or printed in its publications (7.1.3)

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY ASME FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

For authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, Tel: 978-750-8400

Requests for special permission or bulk reproduction should be addressed to permissions@asme.org.

ISBN NO. 978-0-7918-5916-2

© 2019 ASME

All rights reserved.

Printed in U.S.A with permission by Curran Associates, Inc. (2020)

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
Web: www.proceedings.com

CONTENTS

DSCC2019

RAPID FIRE INTERACTIVE (RFI): ADVANCES IN CONTROL SYSTEMS

DSCC2019-8915	V003T16A001
Time Delay Control of a High-DOF Robot Manipulator Through Feedback Linearization Based Predictor <i>Mostafa Bagheri, Peiman Naseradinmousavi, Miroslav Krstic</i>	
DSCC2019-8923	V003T16A002
Adaptive NN Learning Control of Discrete-Time Nonlinear Uncertain Systems <i>Jingting Zhang, Chengzhi Yuan, Paolo Stegagno</i>	
DSCC2019-8941	V003T16A003
Evaluating the Performance of Foot Control of a Supernumerary Robotic Limb <i>Zachary Dougherty, Ryder C. Winck</i>	
DSCC2019-8957	V003T16A004
Comparison of Adaptive Control Laws for Wind Rejection in Quadrotor UAVs <i>Johannes Verberne, Hever Moncayo</i>	
DSCC2019-8988	V003T16A005
A Strictly Defined Orthogonal Global Task Coordinate Frame and its Contouring Control Application on Biaxial Systems <i>Can Yang, Zheng Chen, Bin Yao, Bobo Helian</i>	
DSCC2019-8998	V003T16A006
Learning Flatness-Based Controller Using Neural Network <i>Hailin Ren, Jingyuan Qi, Pinhas Ben-Tzvi</i>	
DSCC2019-9019	V003T16A007
Comparison of Position Control With and Without Friction on a Foot Interface <i>Brandon Rudolph, Ryder C. Winck</i>	
DSCC2019-9036	V003T16A008
Output Feedback Control Synthesis for a Helicopter Using Explicit Nonlinear Model Predictive Control, Dynamic Inversion and Extended High Gain Observers <i>JooHwan Seo, Jongeun Choi</i>	
DSCC2019-9067	V003T16A009
The Restricted Newton Method for Fast Nonlinear Model Predictive Control <i>Anson Maitland, Chi Jin, John McPhee</i>	
DSCC2019-9081	V003T16A010
Design and Control of a Power-Electronic Interface for Regenerative Suspension	

Systems

Abdullah A. Algethami, Won-jong Kim

DSCC2019-9098..... **V003T16A011**
Delay-Dependent Output-Feedback Control for Blood Pressure Regulation Using LPV
Techniques
Shahin Tasoujian, Karolos Grigoriadis, Matthew Franchek

DSCC2019-9162..... **V003T16A012**
Model Reference Control With Command Shaping for a Micro-Electromagnetic
Actuator With Input Constraints
Gerald Eaglin, Joshua Vaughan

**RAPID FIRE INTERACTIVE (RFI): ADVANCES IN ROBOTICS AND
MECHATRONICS**

DSCC2019-8955..... **V003T17A001**
Feasibility Study of Force Measurement for Multi-Digit Unconstrained Grasping via
Fingernail Imaging and Visual Servoing
Navid Fallahinia, Stephen Mascaro

DSCC2019-8983..... **V003T17A002**
Active Vibration Rejection in Multi Actuator Drives: Data Driven Approach
Prateek Shah, Roberto Horowitz

DSCC2019-8996..... **V003T17A003**
A Series Elastic Actuator Design and Control in a Linkage Based Hand Exoskeleton
Raghuraj J. Chauhan, Pinhas Ben-Tzvi

DSCC2019-9083..... **V003T17A004**
Design of a Kangaroo Inspired Hopping Robot for Unrestricted Locomotion and
Controller Development
Austin Curtis, James Mynderse, Hamid Vejdani

DSCC2019-9123..... **V003T17A005**
Instantaneous Center of Rotation-Based Master-Slave Kinematic Modeling and
Control
Vikram Ramanathan, Andy Zelenak, Mitch Pryor

DSCC2019-9155..... **V003T17A006**
A Novel Buoyancy Control Device Using Reversible PEM Fuel Cells
Jalal Yazji, Hamza Zaidi, Luke Thomas Torres, Christopher Leroy, Alicia Keow, Zheng Chen

DSCC2019-9170..... **V003T17A007**
Learning Hyperparameters in Efficient Spatial Model by Robotic Sensors
Jinho Jeong, Soo Jeon, Jongeun Choi

DSCC2019-9173..... **V003T17A008**
Assembly Planning Using a Two-Arm System for Polygonal Furniture
Seth T. Payne, C. Fletcher Garrison IV, Steven E. Markham, Tucker Hermans, Kam K. Leang

DSCC2019-9186..... **V003T17A009**
A Preliminary Study on a Physical Model Oriented Learning Algorithm With
Application to UAVs
Minghui Zheng, Zhu Chen, Xiao Liang

DSCC2019-9194..... **V003T17A010**
A Passive Jumping Mechanism
Phanindra Tallapragada, Jake Buzhardt, Robert Seney

DSCC2019-9233..... **V003T17A011**
Drop Volume Control in Drop-on-Demand Inkjet Printing
Jie Wang, Xia Chen, George Chiu

DSCC2019-9245..... **V003T17A012**
Educational Force Control Using a Modular 2-DOF Serial Robot Manipulator and Low-
Cost 2-DOF Force Sensor
Stephen Mascaro

RAPID FIRE INTERACTIVE (RFI): AUTOMOTIVE AND TRANSPORTATION SYSTEMS

DSCC2019-8927..... **V003T18A001**
Hierarchical Estimator of Dual Clutch Torques for a Power-Split Hybrid Electric
Vehicle
Jianwu Zhang, Defeng Xu

DSCC2019-8960..... **V003T18A002**
Lane Keeping Control Using Finite Spectrum Assignment With Modeling Errors
Illes Voros, Balazs Varszegi, Denes Takacs

DSCC2019-9040..... **V003T18A003**
Optimal Lane Management in Heterogeneous Traffic Network
Pouria Karimi Shahri, Shubhankar Chintamani Shindgikar, Baisravan HomChaudhuri, Amir H. Ghasemi

DSCC2019-9053..... **V003T18A004**
Shared Control Between Human Driver and Automation in Cooperative Driving Based
on Game Theoretic Model Predictive Control
Sangjin Ko, Reza Langari

DSCC2019-9069..... **V003T18A005**
Hierarchical Nonlinear Moving Horizon Estimation of Vehicle Lateral Speed and Road
Friction Coefficient
Chi Jin, Anson Maitland, John McPhee

DSCC2019-9076	V003T18A006
Deep Reinforcement Learning for Adaptive Traffic Signal Control <i>Kai Liang Tan, Subhadipto Poddar, Soumik Sarkar, Anuj Sharma</i>	
DSCC2019-9105	V003T18A007
Lifetime Optimization for a Grid-Friendly DC Fast Charge Station With Second Life Batteries <i>Matilde D'Arpino, Massimo Cancian</i>	
DSCC2019-9148	V003T18A008
Surface Recognition for Cars: A Comprehensive Approach for Neural Networks <i>Ashkan Pourkand, Chris White, Naghmeh Zamani, David Grow</i>	
DSCC2019-9153	V003T18A009
Analysis of Reference Shaping Control for Improved Yaw Stability in a Steer-by-Wire Vehicle <i>Srivatsan Srinivasan, Matthias J. Schmid, Venkat N. Krovi</i>	
DSCC2019-9178	V003T18A010
Human Driver Modeling Based on Analytical Optimal Solutions: Stopping Behaviors at the Intersections <i>Jihun Han, Dominik Karbowski, Namdoo Kim, Aymeric Rousseau</i>	
DSCC2019-9179	V003T18A011
Combining Reachability Analysis and Importance Sampling for Accelerated Evaluation of Highly Automated Vehicles at Pedestrian Crossing <i>Xinpeng Wang, Huei Peng, Ding Zhao</i>	
DSCC2019-9196	V003T18A012
Analysis of a Novel Command Governor-Based Adaptive Cruise Controller for Non-Cooperative Vehicle Following <i>Ben Groelke, Christian Earnhardt, John Borek, Chris Vermillion</i>	
RAPID FIRE INTERACTIVE (RFI): MOTION PLANNING AND TRAJECTORY TRACKING	
DSCC2019-8924	V003T19A001
Optimal Strategy for Multiple Evaders Against an Agile Pursuer <i>Chunsheng Liu, Mark V. Trevorrow</i>	
DSCC2019-8945	V003T19A002
Periodic Tracking Control Using Gain-Scheduled Fourier Series-Based Internal Models <i>Dylan Caverly, Ryan James Caverly, James Richard Forbes</i>	
DSCC2019-8959	V003T19A003
Sliding-Mode Control With Switching-Gain Adaptation for Trajectory Tracking of Underactuated Unmanned Surface Vessels <i>Rui Yu, Haochen Qi, Kamal Upadhyay, Hua Zhou</i>	

DSCC2019-9022	V003T19A004
Following Fast-Dynamic Targets With Only Slow and Delayed Visual Feedback: A Kalman Filter and Model-Based Prediction Approach <i>Hui Xiao, Xu Chen</i>	
DSCC2019-9028	V003T19A005
Backstepping-Based Trajectory Tracking for Underwater Gliders <i>Demetris Coleman, Maria Castano, Osama Ennasr, Xiaobo Tan</i>	
DSCC2019-9063	V003T19A006
Geometric Trajectory Planning for Robot Motion Over a 3D Surface <i>Bashir Hosseini Jafari, Nolan Walker, Ronald Smaldone, Nicholas Gans</i>	
DSCC2019-9108	V003T19A007
Line-of-Sight Pure Pursuit Guidance Stability Analysis and Design Guideline for Car-Like Autonomous Ground Vehicles <i>Letian Lin, J. Jim Zhu</i>	
DSCC2019-9163	V003T19A008
Observer-Based Control of a Dual-Stage Piezoelectric Scanner <i>Yuhe Chang, Sean B. Andersson</i>	
DSCC2019-9208	V003T19A009
Motion Planning for Industrial Mobile Robots With Closed-Loop Stability Enhanced Prediction <i>Jessica Leu, Masayoshi Tomizuka</i>	
DSCC2019-9214	V003T19A010
Safe, Aggressive Quadrotor Flight via Reachability-Based Trajectory Design <i>Shreyas Kousik, Patrick Holmes, Ram Vasudevan</i>	
DSCC2019-9216	V003T19A011
Sub-Optimal Tracking in Switched Systems With Controlled Subsystems and Fixed-Mode Sequence Using Approximate Dynamic Programming <i>Tohid Sardarmehni, Xingyong Song</i>	
DSCC2019-9237	V003T19A012
On Receding Horizon Chance Constraint Motion Planning for Uncertain Multi-Agent Systems <i>Yash Bagla, Vaibhav Srivastava</i>	
 RAPID FIRE INTERACTIVE (RFI): SOFT MECHATRONIC ACTUATORS AND SENSORS	
DSCC2019-8999	V003T20A001
A New Approach to Model Constant Curvature Continuum Robot Dynamics <i>Yujiong Liu, Pinhas Ben-Tzvi</i>	

DSCC2019-9029	V003T20A002
Toward Magneto-Electroactive Endoluminal Soft (MEESo) Robots <i>Jake A. Steiner, Omar A. Hussain, Lan N. Pham, Jake J. Abbott, Kam K. Leang</i>	
DSCC2019-9037	V003T20A003
Adaptive Control of Large-Scale Soft Robot Manipulators With Unknown Payloads <i>Jonathan S. Terry, Justin Whitaker, Randal W. Beard, Marc D. Killpack</i>	
DSCC2019-9045	V003T20A004
Neural-Based Control of Compliant Foils With Spanwise Flexibility <i>Annika-verena Haecker, Gabriel N. Carryon, James L. Tangorra, Thomas Sattel</i>	
DSCC2019-9060	V003T20A005
Modeling Actuation of Ionomer Cilia in Salt Solution Under an External Electric Field <i>Alain Boldini, Maxwell Rosen, Youngsu Cha, Maurizio Porfiri</i>	
DSCC2019-9062	V003T20A006
Completing Complex Contact Tasks Using Integrated Active and Passive Compliant Control Methodologies <i>Adam Pettinger, Mitch Pryor</i>	
DSCC2019-9100	V003T20A007
Modelling and Experimental Study for PVC Gel Actuators <i>Zachary Frank, Zakai Olsen, Taeseon Hwang, Kwang J. Kim</i>	
DSCC2019-9169	V003T20A008
The Effects of Nylon Polymer Threads on Strain-Loading Hysteresis Behavior of Supercoiled Polymer (SCP) Artificial Muscles <i>Revanth Konda, Jun Zhang</i>	
DSCC2019-9175	V003T20A009
Path Following for the Soft Origami Crawling Robot <i>Oyuna Angatkina, Kimberly Gustafson, Aimy Wissa, Andrew Alleyne</i>	
DSCC2019-9220	V003T20A010
Distributed Control of a Planar Discrete Elastic Rod Model for Caterpillar-Inspired Locomotion <i>Helene Nguewou-Hyousse, William L. Scott, Derek A. Paley</i>	
DSCC2019-9228	V003T20A011
Cooperative Collision Avoidance Control of Robotic Fish Propelled by a Servo/IPMC Driven Hybrid Tail <i>Xiongfeng Yi, Zheng Chen, Animesh Chakravarthy</i>	

RAPID FIRE INTERACTIVE (RFI): UNMANNED GROUND AND AERIAL VEHICLES

DSCC2019-8946	V003T21A001
Bayesian Estimation of Snow-Avalanche Victim Pose: A Method to Assist Human and/or Robot First Responders to Quickly Locate a Buried Victim	
<i>Joseph R. Bourne, Kam K. Leang</i>	
DSCC2019-8970	V003T21A002
A Probabilistic Technique for Allocation of Tasks With Priorities in a School of Autonomous Mobile Robots	
<i>Soovadeep Bakshi, Tianheng Feng, Zeyu Yan, Dongmei Chen</i>	
DSCC2019-9025	V003T21A003
A New Quasi-Steady In-Ground Effect Model for Rotorcraft Unmanned Aerial Vehicles	
<i>Xiang He, Kam K. Leang</i>	
DSCC2019-9027	V003T21A004
Gaussian-Based Kernel for Multi-Agent Aerial Chemical-Plume Mapping	
<i>Xiang He, Jake A. Steiner, Joseph R. Bourne, Kam K. Leang</i>	
DSCC2019-9086	V003T21A005
Self-Reflective Learning Strategy for Persistent Autonomy of Aerial Manipulators	
<i>Xu Zhou, Jiucui Zhang, Xiaoli Zhang</i>	
DSCC2019-9099	V003T21A006
Chemical-Source Localization Using a Swarm of Decentralized Unmanned Aerial Vehicles for Urban/Suburban Environments	
<i>Jake A. Steiner, Joseph R. Bourne, Xiang He, Donald M. Cropek, Kam K. Leang</i>	
DSCC2019-9104	V003T21A007
Integrated Forward and Reverse Trajectory Tracking Control for Car-Like Ground Vehicle	
<i>Yuanyan Chen, J. Jim Zhu, Letian Lin</i>	
DSCC2019-9131	V003T21A008
Cooperative Transport of a Payload With Offset CG Using Multiple UAVs	
<i>Shraddha Barawkar, Manish Kumar</i>	
DSCC2019-9154	V003T21A009
Modeling and Predictive Control of an Unmanned Underwater Vehicle	
<i>Renato Rodriguez Nunez, Damoon Soudbakhsh</i>	
DSCC2019-9201	V003T21A010
Compressive Sensing-Based Reconstruction of Lissajous-Like Nodding Lidar Data	
<i>Michael T. Benson, Harish Sathishchandra, Garrett M. Clayton, Sean B. Andersson</i>	
DSCC2019-9241	V003T21A011
Modelling and Simulation of Perching With a Quadrotor Aerial Robot With Passive Bio-Inspired Legs and Feet	
<i>David J. Dunlop, Mark A. Minor</i>	

DSCC2019-9248..... **V003T21A012**
Sub-Optimal Control of Autonomous Wheel Loader With Approximate Dynamic
Programming
Tohid Sardarmehni, Xingyong Song