



IEEE ROBOTICS & AUTOMATION LETTERS

A PUBLICATION OF THE IEEE ROBOTICS & AUTOMATION SOCIETY

JANUARY 2016

VOLUME 1

NUMBER 1

IRALC6

(ISSN 2377-3766)

Editorial	<i>A. Bicchi</i>	1
LETTERS		
Management of Intermodal Freight Terminals by First-Order Hybrid Petri Nets	<i>G. Cavone, M. Dotoli, and C. Seatzu</i>	2
Efficient Penetration Depth Computation Between Rigid Models Using Contact Space Propagation Sampling	<i>L. He, J. Pan, D. Li, and D. Manocha</i>	10
Exploring Representation Learning With CNNs for Frame-to-Frame Ego-Motion Estimation	<i>G. Costante, M. Mancini, P. Valigi, and T. A. Ciarfuglia</i>	18
A Probabilistic Eulerian Traffic Model for the Coordination of Multiple AGVs in Automatic Warehouses	<i>V. Digani, L. Sabattini, and C. Secchi</i>	26
Intractability of Optimal Multirobot Path Planning on Planar Graphs	<i>J. Yu</i>	33
A Conformable Force/Tactile Skin for Physical Human–Robot Interaction	<i>A. Cirillo, F. Ficuciello, C. Natale, S. Pirozzi, and L. Villani</i>	41
Enhancing Semantic Segmentation for Robotics: The Power of 3-D Entangled Forests	<i>D. Wolf, J. Prankl, and M. Vincze</i>	49
Visual Servoing of Quadrotors for Perching by Hanging From Cylindrical Objects	<i>J. Thomas, G. Loianno, K. Daniilidis, and V. Kumar</i>	57
Parsimonious Kinematic Control of Highly Redundant Robots	<i>V. M. Gonçalves, P. Fraisse, A. Crosnier, and B. V. Adorno</i>	65
Viewpoint Evaluation for Online 3-D Active Object Classification	<i>T. Patten, M. Zillich, R. Fitch, M. Vincze, and S. Sukkarieh</i>	73
Path-Accurate Online Trajectory Generation for Jerk-Limited Industrial Robots	<i>F. Lange and A. Albu-Schäffer</i>	82
Limit Cycle Control Using Energy Function Regulation With Friction Compensation	<i>G. Garofalo and C. Ott</i>	90
Rapid, Reliable Shape Setting of Superelastic Nitinol for Prototyping Robots	<i>H. B. Gilbert and R. J. Webster III</i>	98
Passive Interaction Control With Dynamical Systems	<i>K. Kronander and A. Billard</i>	106
Robot-Assisted Landing of VTOL UAVs: Design and Comparison of Coupled and Decoupling Linear State-Space Control Approaches	<i>M. Maier, A. Oeschger, and K. Kondak</i>	114
A Novel Approach to Increase the Locomotion Performance of Mobile Robots in Fields With Tall Grasses	<i>K. Tanaka, H. Ishii, D. Kuroiwa, Y. Okamoto, E. Mossor, H. Sugita, Q. Shi, S. Okabayashi, Y. Sugahara, and A. Takanishi</i>	122
Optimal Impedance Force-Tracking Control Design With Impact Formulation for Interaction Tasks	<i>L. Roveda, N. Iannacci, F. Vicentini, N. Pedrocchi, F. Braghin, and L. M. Tosatti</i>	130
An Enhanced Unified Camera Model	<i>B. Khomutenko, G. Garcia, and P. Martinet</i>	137

(Contents Continued on Page ii)



Simultaneous Hand-Eye and Robot-World Calibration by Solving the $AX = YB$ Problem Without Correspondence	145
..... <i>H. Li, Q. Ma, T. Wang, and G. S. Chirikjian</i>	
Active Magnetic Anomaly Detection Using Multiple Micro Aerial Vehicles	153
..... <i>P. M. Dames, M. Schwager, D. Rus, and V. Kumar</i>	
Antagonistic Impedance Control for Pneumatically Actuated Robot Joints	161
..... <i>A. Toedtheide, T. Lilge, and S. Haddadin</i>	
Tactile Manipulation With a TacThumb Integrated on the Open-Hand M2 Gripper	169
..... <i>B. Ward-Cherrier, L. Cramphorn, and N. F. Lepora</i>	
Fast Keypoint Features From Laser Scanner for Robot Localization and Mapping	176
..... <i>F. Kallasi, D. L. Rizzini, and S. Caselli</i>	
Passivation of Projection-Based Null Space Compliance Control Via Energy Tanks	184
..... <i>A. Dietrich, C. Ott, and S. Stramigioli</i>	
Hierarchical Voxel Block Hashing for Efficient Integration of Depth Images	192
..... <i>O. Kähler, V. Prisacariu, J. Valentin, and D. Murray</i>	
A Single-Query Manipulation Planner	198
..... <i>P. Lertkultanon and Q.-C. Pham</i>	
Batch Fabrication of Microscale Gear-Like Tissue by Alginate-Poly-L-lysine (PLL) Microcapsules System	206
..... <i>Z. Liu, M. Takeuchi, M. Nakajima, T. Fukuda, Y. Hasegawa, and Q. Huang</i>	
Lazy Data Association For Image Sequences Matching Under Substantial Appearance Changes	213
..... <i>O. Vysotska and C. Stachniss</i>	
Simulation of Networked Dielectric Elastomer Balloon Actuators	221
..... <i>F. Chen and M. Y. Wang</i>	
On the Accuracy of Dense Fisheye Stereo	227
..... <i>J. Schneider, C. Stachniss, and W. Förstner</i>	
Learning Robot Manipulation Tasks With Task-Parameterized Semitied Hidden Semi-Markov Model	235
..... <i>A. K. Tanwani and S. Calinon</i>	
Developing and Comparing Single-Arm and Dual-Arm Regrasp	243
..... <i>W. Wan and K. Harada</i>	
On Stochastic Self-Assembly of Underwater Robots	251
..... <i>V. Ganesan and M. Chitre</i>	
Hybrid Visual Servoing With Hierarchical Task Composition for Aerial Manipulation	259
..... <i>V. Lippiello, J. Cacace, A. Santamaria-Navarro, J. Andrade-Cetto, M. Á. Trujillo,</i> <i>Y. R. Esteves, and A. Viguria</i>	
A Model-Free Controller for Guaranteed Prescribed Performance Tracking of Both Robot Joint Positions and Velocities	267
..... <i>Y. Karayiannidis, D. Papageorgiou, and Z. Doulgeri</i>	
Modal Matching: An Approach to Natural Compliant Jumping Control	274
..... <i>D. Lakatos and A. Albu-Schäffer</i>	
AVEXIS—Aqua Vehicle Explorer for In-Situ Sensing	282
..... <i>A. Griffiths, A. Dikarev, P. R. Green, B. Lennox, X. Poteau, and S. Watson</i>	
Benchmarking the Grasping Capabilities of the iCub Hand With the YCB Object and Model Set	288
..... <i>L. Jamone, A. Bernardino, and J. Santos-Victor</i>	
Large Scale Image Mosaic Construction for Agricultural Applications	295
..... <i>Z. Li and V. Isler</i>	
Robust Catheter and Guidewire Tracking Using B-Spline Tube Model and Pixel-Wise Posteriors	303
..... <i>P.-L. Chang, A. Rolls, H. D. Praetere, E. V. Poorten, C. V. Riga, C. D. Bicknell, and D. Stoyanov</i>	
Rigidity-Based Surface Recognition for a Domestic Legged Robot	309
..... <i>C. Kertész</i>	
Accurate Continuous Sweeping Framework in Indoor Spaces With Backpack Sensor System for Applications to 3-D Mapping	316
..... <i>K. Lee, S.-H. Ryu, S. Yeon, H. G. Cho, C. H. Jun, J. Kang, H. Choi, J. Hyeon, I. Baek,</i> <i>W. Jung, H. Kim, and N. L. Doh</i>	
Static-Map and Dynamic Object Reconstruction in Outdoor Scenes Using 3-D Motion Segmentation	324
..... <i>C. Jiang, D. P. Paudel, Y. Fougerolle, D. Fofi, and C. Demonceaux</i>	
Industry 4.1 for Wheel Machining Automation	332
..... <i>F.-T. Cheng, H. Tieng, H.-C. Yang, M.-H. Hung, Y.-C. Lin, C.-F. Wei, and Z.-Y. Shieh</i>	
Constraint-Based and Sensorless Force Control With an Application to a Lightweight Dual-Arm Robot	340
..... <i>D. Nicolis, A. M. Zanchettin, and P. Rocco</i>	
Emergence of Consensus in a Multi-Robot Network: From Abstract Models to Empirical Validation	348
..... <i>V. Trianni, D. D. Simone, A. Reina, and A. Baronchelli</i>	
Robotic Disease Detection in Greenhouses: Combined Detection of Powdery Mildew and Tomato Spotted Wilt Virus	354
..... <i>N. Schor, A. Bechar, T. Ignat, A. Dombrovsky, Y. Elad, and S. Berman</i>	
Hierarchical 2.5-D Scene Alignment for Change Detection With Large Viewpoint Differences	361
..... <i>D. W. J. M. van de Wouw, G. Dubbelman, and P. H. N. de With</i>	

Gathering Bearing Data for Target Localization	<i>H. Bayram, J. V. Hook, and V. Isler</i>	369
Handling and Describing String-Tying Operations Based on Metrics Using Segments Between Crossing Sections	<i>H. Onda, S. Kudoh, and T. Suehiro</i>	375
Planar Path Following of Underwater Snake Robots in the Presence of Ocean Currents	<i>A. M. Kohl, K. Y. Pettersen, E. Kelasidi, and J. T. Gravdahl</i>	383
Motion Planning Based on Learning From Demonstration for Multiple-Segment Flexible Soft Robots Actuated by Electroactive Polymers	<i>H. Wang, J. Chen, H. Y. K. Lau, and H. Ren</i>	391
Visibility-Based Finite-Horizon Target Tracking Game	<i>R. Zou and S. Bhattacharya</i>	399
No Correlations Involved: Decision Making Under Uncertainty in a Conservative Sparse Information Space	<i>V. Indelman</i>	407
Bent Sheet Grasping Stability for Sheet Manipulation	<i>Y. Fujihira, T. Nishimura, and T. Watanabe</i>	415
Appearance-Based Indoor Navigation by IBVS Using Line Segments	<i>S. R. Bista, P. R. Giordano, and F. Chaumette</i>	423
Model-Based Reactive Control for Hybrid and High-Dimensional Robotic Systems	<i>E. Tzorakoleftherakis, A. Ansari, A. Wilson, J. Schultz, and T. D. Murphey</i>	431
Optimal Placement for a Limited-Support Binary Sensor	<i>J.-P. Ramirez-Paredes, E. A. Doucette, J. W. Curtis, and N. R. Gans</i>	439
On the Equivalence of Direct Strain Feedback and Lumped Parameter Wave Echo Control for Oscillation Damping of Elastic-Link Arms	<i>J. Malzahn and T. Bertram</i>	447
Model Predictive Control of a Magnetically Guided Rolling Microrobot	<i>R. Pieters, S. Lombriser, A. Alvarez-Aguirre, and B. J. Nelson</i>	455
Hopping on Uneven Terrains With an Underwater One-Legged Robot	<i>M. Calisti, E. Falotico, and C. Laschi</i>	461
On the Problem of Moving Objects With Autonomous Robots: A Unifying High-Level Planning Approach	<i>H. Marino, M. Ferrati, A. Settini, C. Rosales, and M. Gabiccini</i>	469
Compliant Aerial Manipulators: Toward a New Generation of Aerial Robotic Workers	<i>T. Bartelds, A. Capra, S. Hamaza, S. Stramigioli, and M. Fumagalli</i>	477
Beyond Holistic Descriptors, Keypoints, and Fixed Patches: Multiscale Superpixel Grids for Place Recognition in Changing Environments	<i>P. Neubert and P. Protzel</i>	484
The Effect of Shapes in Input-State Linearization for Stabilization of Nonprehensile Planar Rolling Dynamic Manipulation	<i>V. Lippiello, F. Ruggiero, and B. Siciliano</i>	492
Mixed-Integer and Constraint Programming Techniques for Mobile Robot Task Planning	<i>K. E. C. Booth, T. T. Tran, G. Nejat, and J. C. Beck</i>	500
Energy-Bounded Caging: Formal Definition and 2-D Energy Lower Bound Algorithm Based on Weighted Alpha Shapes	<i>J. Mahler, F. T. Pokorny, Z. McCarthy, A. F. van der Stappen, and K. Goldberg</i>	508
Human-Inspired Neurorobotic System for Classifying Surface Textures by Touch	<i>K. E. Friedl, A. R. Voelker, A. Peer, and C. Eliasmith</i>	516
Energy Consumption of Geared DC Motors in Dynamic Applications: Comparing Modeling Approaches	<i>T. Verstraten, R. Furnémont, G. Mathijssen, B. Vanderborght, and D. Lefeber</i>	524
Pupil Variation Applied to the Eye Tracking Control of an Endoscopic Manipulator	<i>Y. Cao, S. Miura, Y. Kobayashi, K. Kawamura, S. Sugano, and M. G. Fujie</i>	531
Passive Position Control of a Quadrotor With Ground Effect Interaction	<i>E. Davis and P. E. I. Pounds</i>	539
The Next Step in Robot Commissioning: Autonomous Picking and Palletizing	<i>R. Krug, T. Stoyanov, V. Tinçani, H. Andreasson, R. Mosberger, G. Fantoni, and A. J. Lilienthal</i>	546
Independent Control of Identical Magnetic Robots in a Plane	<i>D. Wong, E. B. Steager, and V. Kumar</i>	554
Noise, But Not Uncoupled Stability, Reduces Realism and Likeability of Bilateral Teleoperation	<i>J. M. Walker, N. Colonnese, and A. M. Okamura</i>	562
In-Hand Object Pose Estimation Using Covariance-Based Tactile To Geometry Matching	<i>J. Bimbo, S. Luo, K. Althoefer, and H. Liu</i>	570
Changing Task Objectives for Improved Sweet Pepper Detection for Robotic Harvesting	<i>E. Vitzrabin and Y. Edan</i>	578
Development of a Novel Slip Haptic Display Device Based on the Localized Displacement Phenomenon	<i>V. A. Ho, H. Honda, and S. Hirai</i>	585
Multitype Activity Recognition in Robot-Centric Scenarios	<i>I. Gori, J. K. Aggarwal, L. Matthies, and M. S. Ryo</i>	593
