2023 IEEE International Conference on Soft Robotics (RoboSoft 2023)

Singapore
3-7 April 2023

Pages 1-474

IEEE Catalog Number: CFP23O23-POD
ISBN: 979-8-3503-3223-0

Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP23O23-POD
ISBN (Print-On-Demand):	979-8-3503-3223-0
ISBN (Online):	979-8-3503-3222-3
ISSN:	2769-4526

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
E-mail: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Mechanical Modeling and Optimal Model-Based Design of a Soft Pneumatic Actuator 1
Wu-Te Yang, Hannah S. Stuart, Masayoshi Tomizuka

Design of 3D-Printed Continuum Robots Using Topology Optimized Compliant Joints 8
Yilun Sun, Tim C. Lueth

Effects of Compliance on Path-Tracking Performance of a Miniature Robot 14
Mustafa Ugur, Burak Arslan, Alperen Özzeybek, Onur Özcan

A Vacuum-Powered Soft Mesh Gripper for Compliant and Effective Grasping 20
Liang Xinquan, Wang Yuzhe, Xie Zhen, Sibel Musaoglu Ocak

One-Piece 3D-Printed Legs Using Compliant Mechanisms that Produce Effective Propulsive Force for Hexapod Robot Locomotion 27
Atsushi Kaneko, Dai Owaki, Masahiro Shimizu, Takuya Umedachi

Kinematic-Model-Free Tip Position Control of Reconfigurable and Growing Soft Continuum Robots 34
Ahmad Alattar, Ikhlas Ben Hmida, Federico Renda, Petar Kormushev

DragonClaw: A Low-Cost Pneumatic Gripper with Integrated Magnetic Sensing 41
Vani H. Sundaram, Raunaq Bhirangi, Mark E. Rentschler, Abhinav Gupta, Tess Hellebrekers

A Sodium Azide-Powered Free-Piston Gas Compressor for Mobile Pneumatic Systems 49
Ronald H. Heisser, Tharm Sribhibhadh, Steven Adelmund, Kevin Shimasaki, Nathan Usevitch, Amirhossein H. Memar, Amirhossein Amini, Andrew A. Stanley

Design of a Soft Bio-Inspired Tissue Transport Mechanism 56
Vera G. Kortman, Jovana Jovanova, Aimée Sakes

EDAMS: An Encoder-Decoder Architecture for Multi-Grasp Soft Sensing Object Recognition 62
Oliver Shorthose, Alessandro Albini, Luca Scimeca, Liang He, Perla Maiolino

Measuring a Soft Resistive Strain Sensor Array by Solving the Resistor Network Inverse Problem 69
Yuchen Zhao, Choo Kean Khaw, Yifan Wang

Hydrogel-Actuated Soft Sucker with Mucus Secretion 76
Tianqi Yue, Alex Keller, Daniel Gosden, Hermes Bloomfield-Gadêlha, Jonathan Rossiter

A Soft Gripper for Automating Split Operation of Silkworm 82
Oki Morikage, Zhongkui Wang, Shinichi Hirai, Akira Nonaka

Inferring Environmental Interactions of Soft Everting Robots from Acoustic Signals 87
Allison Raines, Andrew Lewis, Joel Hwee, Blake Hannaford

Shape Sensing with Electrostatic Differential Capacitance for Ultrasound Imaging by Flexible Array Transducer 93
Chisato Hojo, Hiroki Kawagishi, Hiroki Shigemune, Ryosuke Tsumura

Design of a Pneumatically Driven Inchworm-Like Gas Pipe Inspection Robot with Autonomous Control 99
Yang Shen, Ryu Isono, Satoshi Kodama, Yoka Konishi, Taiga Inoue, Akihiko Onuki, Ryo Maeda, Jia-Yeu Lin, Hiroyuki Ishii, Atsuo Takanishi

RISO: Combining Rigid Grippers with Soft Switchable Adhesives 105
Shaunak A. Mehta, Yeunhee Kim, Joshua Hoegerman, Michael D. Bartlett, Dylan P. Losey

Variable Response Characteristics of a Soft Sensorized Hydrogel Using Mesoscale Cellular Structures 113
Naoki Tano, Ryman Hashem, David Hardman, Fumiya IIda

SCoReR: Sensorized Collision Resilient Aerial Robot 119
Alihan Bakir, Doga Özbek, Amirali Abazari, Onur Özcan

A Combined Rigid-Soft Thruster Based on Jetting Propulsion 126
Christoph Stoeffler, Adriano Del Río, René Sonntag, Florian Hoffmann, Shivesh Kumar, Frank Kirchner

Differentiable Surrogate Models for Design and Trajectory Optimization of Auxetic Soft Robots 132
Chonghui Zhang, Audrey Sedal, Yaoyao Fiona Zhao

Sea Shell Bioinspired Variable Stiffness Mechanism Enabled by Hybrid Jamming Transition 140
Luca Arleo, Jasmine Pozzi, Niccoló Pagliarani, Matteo Cianchetti

Characterization and Control Platform for Pneumatically Driven Soft Robots: Design and Applications 147
Jialei Shi, Wenlong Gaozhang, Hanyu Jin, Ge Shi, Helge A. Wurdemann

A Soft Pneumatic Actuator with Multiple Motion Patterns Based on Length-Tuning Strain-Limiting Layers 155
Quan Xiong, Xuanyi Zhou, Chen-Hua Yeow

Design and Validation of Tunable Stiffness Actuator Using Soft-Rigid Combined Layer Jamming Mechanism 161
Seoyeon Ham, Brian Byunghyun Kang, Kevin Abishek, Hyunglae Lee, Wansoo Kim

Bayesian Optimization of Pneumatic Soft Grippers Via Reconfigurable Modular Molds 167
Tristan Sim Yook Min, Loong Yi Lee, Surya G. Nurzaman

Integrated Design of a Bio-Inspired Soft Gripper for Mushrooms Harvesting 173
Steeve Mbakop, Gilles Tagne, Alice Lagache, Kamal Youcef-Toumi, Rochdi Merzouki

Biodegradable Humidity Actuators for Sustainable Soft Robotics Using Deliquescent Hydrogels 179
Alexander Keller, Qiukai Qi, Yogeenth Kumaresan, Andrew T. Conn, Jonathan Rossiter

FONS: A Python Framework for Simulating Nonlinear Inflatable Actuator Networks 185
Arne Baeyens, Bert Van Raemdonck, Edoardo Milana, Dominiek Reynaerts, Benjamin Gorissen

Elbow Soft Robot Rehabilitation System for Hemiplegic Stroke Patients Based on sEMG Control 191
Qifeng Xun, Benjamin W. K. Ang, Chen-Hua Yeow

Robotized Additive Manufacturing of Silicone for Skeleton-Reinforced Linear Soft Actuators 197
Jérémy Sand, Benoît Wach, Maciej Bednarczyk, Laurent Barbé, Francois Geiskopf

Dynamic Modeling of an Origami Prismatic Joint 203
Mustafa Mete, Jian-Lin Huang, Jamie Paik

Articulated Legs Allow Energy Optimization Across Different Speeds for Legged Robots with Elastically Suspended Loads 209
Anna Astolfi, Marcello Calisti

Easy Cleaning of 3D SLA/DLP Printed Soft Fluidic Actuators with Complex Internal Geometry 216
Benn W. B. Proper, Brandon J. Caasenbrood, Irene A. Kuling

Collapse of Straight Soft Growing Inflated Beam Robots Under Their Own Weight 222
Ciera McFarland, Margaret M. Coad

Variable Kinematics Enabled by Layer Jamming Transition in a Soft Bending Actuator 230
Niccolò Pagliarani, Giacomo Picardi, Syeda Shadab Zehra Zaidi, Matteo Cianchetti

Squeeze-In Functionality for a Soft Parallel Robot Gripper 237
Metodi Netzev, Alexandre Angleraud, Roel Pieters

Design and Fabrication of Multi-Pouch Inflatable Holding Structure with Higher Payload 244
Yuyang Song, Umesh Gandhi, Danil V Prokhorov

Rapid Energy Release in Inflatable Soft Actuators Through Reversible Bond Breaking 250
Elias De Smet, Bert Van Raemdonck, Dominiek Reynaerts, Benjamin Gorissen

3D Kinematics and Quasi-Statics of a Growing Robot Eversion 256
Flavie Przybylski, Yinoussa Adagolodjo, Anna Mîra, Giulio Cerruti, Jérémie Dequidt, Christian Duriez, Pierre Berthet-Rayne

A Small Soft-Bodied Crawling Robot with Electromagnetic Legs and Neural Control for Locomotion on Various Metal Terrains 262
Naris Asawalertsak, Worameth Nantareekurn, Poramate Manoonpong

Spatial Position Estimation of Lightweight and Delicate Objects Using a Soft Haptic Probe 270
Mohammad Sheikh Sofla, Srikishan Vayakkattil, Marcello Calisti

Learning-Based Position and Stiffness Feedforward Control of Antagonistic Soft Pneumatic Actuators Using Gaussian Processes 276
Tim-Lukas Habich, Sarah Kleinjohann, Moritz Schappler

Policy Adaptation Using an Online Regressing Network in a Soft Robotic Arm 283
Muhammad Sunny Nazeer, Diego Bianchi, Giulia Campinoti, Cecilia Laschi, Egidio Falotico

Robotic Fish Driven by Twisted and Coiled Polymer Actuators at High Frequencies 290
Tsam Lung You, Jonathan Rossiter, Hemma Philamore

A Decrease in Impedance of Monolithic Activated Carbon Cloth Electrodes at Increased Charge Density 296
Oleksandr Syzoniuk, Saoni Banerji, Alvo Aabloo, Indrek Must

Passive Shape Locking for Multi-Bend Growing Inflated Beam Robots 302
Rianna Jitosho, Sofia Simón-Trench, Allison M. Okamura, Brian H. Do

An Efficient Framework for the Solution of Contact Mechanics Problems in Soft Robotics 308
Kevin Wandke, Y. Z.

Hydraulic Modulation of Silicone Knuckles for Variable Control of Joint Stiffness 315
Satyam Bhawsinghka, Natasha Troxler, Steph Walker, Joseph R. Davidson

HISSbot: Sidewinding with a Soft Snake Robot 321
Farhan Rozaidi, Emma Waters, Olivia Dawes, Jennifer Yang, Joseph R. Davidson, Ross L. Hatton

Design and Manufacture of Edible Microfluidic Logic Gates 328
Shuhang Zhang, Bokeon Kwak, Dario Floreano

Subtract to Adapt: Autotomic Robots 335
Q. Tyrell Davis, Stephanie Woodman, Melanie Landesberg, Rebecca Kramer-Bottiglio, Josh Bongard

Anti-Slipping Adaptive Grasping Control with a Novel Optoelectronic Soft Sensor 341
Michael S. Han, Dan O. Popa, Cindy K. Harnett

Learning a Controller for Soft Robotic Arms and Testing Its Generalization to New Observations, Dynamics, and Tasks 347
Carlo Alessi, Helmut Hauser, Alessandro Lucantonio, Egidio Falotico

A Crawling Robot that Utilizes Propagation of Deformation Waves of a Bistable Lattice Actuated by a Single Motor 354
Yuto Horioka, Masahiro Shimizu, Takuya Umedachi

Dual Multilayer Extension Actuator for High Extension and High Compression Force Applications 361
Jonathan William Ambrose, Dylan Sin You Cheah, Raye Chen-Hua Yeow

Shape-Forming Donut-Shaped Soft Gripper 368
Cole Sterck, Olivia Kim, Thomas Anton, Mable P. Fok

Development of a Gripper for Component-Friendly Handling of Complex Capital Goods 374
Richard Blümel, Ditzia S. Garcia Morales, Annika Raatz

A Multi-Material Robotic Finger with Integrated Proprioceptive and Tactile Capabilities Produced with a Circular Process 380
Antonia Georgopoulou, Stijn Hamelryckx, Kai Junge, Louisa Marie Eckey, Simon Rogler, Robert Katzschmann, Josie Hughes, Frank Clemens

Reduced Finite Element Modelling and Closed-Loop Control of Pneumatic-Driven Soft Continuum Robots 386
Paul Chaillou, Jialei Shi, Alexandre Kruszewski, Isabelle Fournier, Helge A. Wurdemann, Christian Duriez

Piecewise Affine Curvature Model: A Reduced-Order Model for Soft Robot-Environment Interaction Beyond PCC 394
Francesco Stella, Qinghua Guan, Cosimo Della Santina, Josie Hughes

Plant-Inspired Behavior-Based Controller to Enable Reaching in Redundant Continuum Robot Arms 401
Enrico Donato, Yasmin Tauqeer Ansari, Cecilia Laschi, Egidio Falotico

Climbing Mini-Machines Using Plant-Inspired Micropatterned Adhesive Wheels Fabricated Via Two-Photon Lithography 407
Isabella Fiorello, Alessio Mondini, Barbara Mazzolai

Shape-Invariant Indirect Hardness Estimation for a Soft Vacuum-Actuated Gripper with an Onboard Depth Camera 414
Ting Rang Ling, Mohammed Ayoub Juman, Surya Girinatha Nurzaman, Chee Pin Tan

An Optical Shape Sensor for Integration in Soft Grippers 420
Malte Grube, Robert Seifried

A Comprehensive Dataset of Grains for Granular Jamming in Soft Robotics: Grip Strength and Shock Absorption 426
David Howard, Jack O'Connor, Jordan Letchford, Therese Joseph, Sophia Lin, Sarah Baldwin, Gary Delaney

A Preliminary Study on an Innovative Soft Robotic Artificial Heart Ventricle 434
Lucrezia Lorenzon, Giulia Beccali, Matteo Cianchetti

Are Active Soft Particles Suitable for Particle Jamming Actuators? 442
Qianyi Chen, Dingena Schott, Jovana Jovanova

The Jamming Donut: A Free-Space Gripper Based on Granular Jamming 448
Therese Joseph, Sarah Baldwin, Lillian Guan, James Brett, David Howard

Mechanics of Tubular Meshes Made of Helical Fibers and Application to Modeling McKibben Artificial Muscles 454
Jacopo Quaglierini, Marino Arroyo, Antonio Desimone

Dynamics of Suspended Cable Driven Parallel Robots Using the Geometric Variable Strain Approach 460
Anup Teejo Mathew, Ikhlas Ben Hmida, Suad Alhaj Mustafa, Ahmed Nader Ahmed, Rashid K. Abu Al-Rub, Bashar El-Khasawneh, Federico Renda

Balloon Pin Array Gripper: Mechanism for Deformable Grasping with Two-Step Shape Adaptation 467
Yuto Kemmotsu, Kenjiro Tadakuma, Kazuki Abe, Masahiro Watanabe, Masashi Konyo, Satoshi Tadokoro

Shape and Tip Force Estimation of Concentric Tube Robots Based on Actuation Readings Alone..... 475
Abdulaziz Y. Alkayas, Daniel Feliu-Talegon, Anup Teejo Mathew, Caleb Rucker, Federico Renda

Modeling the Behavior of Elastic Pouch Motors..... 483
Maziar Arfaee, Jolanda Kluin, Johannes T. B. Overvelde

Development of a Monolithic Pneumatic Soft Actuator for Fruit Grasping..... 489
Federico Bernabei, Matteo Lo Preti, Seonggun Joe, Lucia Beccai

3D Printable Origami-Inspired Pneumatic Soft Actuator with Modularized Design..... 495
Tatsuya Kako, Zheng Wang, Yoshiki Mori, Hongying Zhang, Zhongkui Wang

FinFix: A Soft Gripper with Contact-Reactive Reflex for High-Speed Pick and Place of Fragile Objects..... 500
Willem Heeringa, Cosimo Della Santina, Gerwin Smit

Multi-Modal Sensor Fusion for Learning Rich Models for Interacting Soft Robots..... 507
Thomas George Thuruthel, Fumiya IIda

A Multi-Segment, Soft Growing Robot with Selective Steering..... 513
Alexander M. Kübler, Sebastián Urdaneta Rivera, Frances B. Raphael, Julian Förster, Roland Siegwart, Allison M. Okamura

Self-Reconfiguring Soft Modular Cellbots..... 520
Ridhi Bansal, Helmut Hauser, Jonathan Rossiter

Hygroscopically-Driven Transient Actuator for Environmental Sensor Deployment 526
Manuela Heinrich, Fabian Wiesemüller, Xavier Aeby, Yusuf F. Kaya, Deeptanshu Sivaraman, Pham H. Nguyen, Sukho Song, Gustav Nyström, Mirko Kovac

Composite Stretchable Sensors for the Detection of Asymmetric Deformations in a Soft Manipulator 534
David Hardman, Ryman Hashem, Fumiya IIda

A Soft Approach to Convey Vibrotactile Feedback in Wearables Through Mechanical Hysteresis 540
Nathaniel Fino, Zane A. Zook, Barclay Jumet, Daniel J. Preston, Marcia K. O'Malley

Soft Robotic Tactile Perception of Softer Objects Based on Learning of Spatiotemporal Pressure Patterns 546
Tetsushi Nonaka, Arsen Abdulali, Chapa Sirithunge, Kieran Gilday, Fumiya IIda

Bio-Inspired Miniature Soft Robots Fueled by Light 553
Ming Gu, Tim J. Echtermeyer

Development of a Modular and Submersible Soft Robotic Arm and Corresponding Learned Kinematics Models 559
W. David Null, James Menezes, Y. Z.

Full-Body Grasping Strategy for Planar Underactuated Soft Manipulators Using Passivity-Based Control 565
Hoang Chu, Brandon J. Caasenbrood, Mahboubeh Keyvanara, Irene A. Kuling, Henk Nijmeijer

GelBat: An Edible Gelatin-Based Battery 572
Hsing-Yu Chen, Alexander Keller, Andrew T. Conn, Jonathan Rossiter

Design Optimization for Bellow Soft Pneumatic Actuators in Shape-Matching 578
Yao Yao, Yuwen Chen, Liang He, Perla Maiolino

The Xeno-Tongue Gripper: Granular Jamming Suction Cup with Bellow-Driven Self-Morphing 585
Kieran Gilday, Ryman Hashem, Arsen Abdulali, Fumiya IIda

Modelling the Inflation of an Elastic Membrane with a Load 591
Ge Shi, Azadeh Shariati, Jialei Shi, Nicolas Herzig, Sara-Adela Abad, Helge A. Wurdemann

Programmable Inflatable Origami 599
Saravana Prashanth Murali Babu, Riddhi Das, Barbara Mazzolai, Ahmad Rafsanjani

Robo-Squid: Experimental Investigation of Pulsed Jet Propulsion Based on Magnetohydrodynamics 605
Saba Firouznia, Ciqun Xu, Hemma Philamore, Jonathan Rossiter

Proprioceptive Sensing of Soft Tentacles with Model Based Reconstruction for Controller Optimization 611
Andrea Vicari, Nana Obayashi, Francesco Stella, Gaetan Raynaud, Karen Mulleners, Cosimo Della Santina, Josie Hughes

Dynamic Model of an Online Programmable Textile Soft Actuator 617
Ludwig Dellinger, John Nassour, Gordon Cheng

Comparing and Configuring Soft Tendon Designs for Variable Stiffness Actuators on a Robot Arm 623
Laurenz Elstner, Raquel Motzfeldt Tirach, Erik Kyrkjebø, Martin F. Stoelen

Effects of Lateral Undulation in Granular Medium Burrowing with a Peristaltic Soft Robot 631
Riddhi Das, Saravana Prashanth Murali Babu, Alessio Mondini, Barbara Mazzolai

Soft Continuum Actuator Tip Position and Contact Force Prediction, Using Electrical Impedance Tomography and Recurrent Neural Networks 637
Amirhosein Alian, George Mylonas, James Avery

GelSight EndoFlex: A Soft Endoskeleton Hand with Continuous High-Resolution Tactile Sensing 643
Sandra Q. Liu, Leonardo Zamora Yañez, Edward H. Adelson

Smell Driven Navigation for Soft Robotic Arms: Artificial Nose and Control 649
Francesco Piqué, Francesco Stella, Josie Hughes, Egidio Falotico, Cosimo Della Santina

Soft Air Pocket Force Sensors for Large Scale Flexible Robots 656
Michael R. Mitchell, Ciera McFarland, Margaret M. Coad

Linear Kinematics for General Constant Curvature and Torsion Manipulators 664
Bill Fan, Farhan Rozaidi, Capprin Bass, Gina Olson, Melinda Malley, Ross L. Hatton

Design, Characterization, and Modeling of Barometric Tactile Sensors for Underwater Applications 671
Aiden Shaevitz, Matthew L. Johnston, Joseph R. Davidson

Hybrid Soft-Rigid Continuum Robot Inspired by Spider Monkey Tail 677
Mary C. Doerfler, Katalin Schaffer, Margaret M. Coad

Deployable Robotic Structures Via Passive Rigidity on a Soft, Growing Robot 683
Francesco Fuentes, Laura H. Blumenschein

Design and Characterization of Viscoelastic McKibben Actuators with Tunable Force-Velocity Curves 690
Michael J. Bennington, Tuo Wang, Jiaguo Yin, Sarah Bergbreiter, Carmel Majidi, Victoria A. Webster-Wood

Soft Robotic Link with Controllable Transparency for Vision-Based Tactile and Proximity Sensing 697
Quan Khanh Luu, Dinh Quang Nguyen, Nhan Huu Nguyen, Van Anh Ho

Modular Sensor Integration into Soft Robots Using Stretchable Wires for Nuclear Infrastructure Inspection and Radiation Spectroscopy 703
Calder Wilson, Joseph Karam, Callen Votzke, Farhan Rozaidi, Camille J. Palmer, Ross L. Hatton, Matthew L. Johnston

Continuous Skin Eversion Enables an Untethered Soft Robot to Burrow in Granular Media 709
Korkut Eken, Nick Gravish, Michael T. Tolley

Dynamically Feasible Trajectory Generation for Soft Robots 715
Haley P. Sanders, Marc D. Killpack

Wheelless Soft Robotic Snake Locomotion: Study on Sidewinding and Helical Rolling Gaits 723
Dimuthu D. K. Arachchige, Dulanjana M. Perera, Sanjaya Mallikarachchi, Iyad Kanj, Yue Chen, Isuru S. Godage

Modelling Handed Shearing Auxetics: Selective Piecewise Constant Strain Kinematics and Dynamic Simulation 729
Maximilian Stölzle, Lillian Chin, Ryan L. Truby, Daniela Rus, Cosimo Della Santina

Towards a Pump-Controlled, Propellant-Powered Pneumatic Source for Untethered Soft Robots: Modelling and Experiments 737
Samuel Dutra Gollob, Ellen T. Roche

Soft Inflatable Fingers: An Overview of Design, Prototyping and Sensorisation for Various Applications 745
Faisal Aljaber, Ahmed Hassan, Taqi Abrar, Ivan Vitanov, Kaspar Althoefer

Multi-Sensory Fusion of Wearable Sensors for Automatic Grasping and Releasing with Soft-Hand Exoskeleton 751
Guan Erjiage, John Nassour, Gordon Cheng

Kinematic Modeling of a Soft Everting Robot from Inflated Beam Theory 757
Joel Hwee, Andrew Lewis, Allison Raines, Blake Hannaford

A Soft Wearable Robot to Support Scapular Adduction and Abduction for Respiratory Rehabilitation 763
Kosuke Isobe, Masakazu Hirokawa, Kenji Suzuki

Whole-Arm Grasping Strategy for Soft Arms to Capture Space Debris 769
Camilla Agabiti, Etienne Ménager, Egidio Falotico

Active Vibration Fluidization for Granular Jamming Grippers 775
Cameron Coombe, James Brett, Raghav Mishra, Gary W. Delaney, David Howard

Teleoperation of Soft Modular Robots: Study on Real-Time Stability and Gait Control 783
Dulanjana M. Perera, Dimuthu D. K. Arachchige, Sanjaya Mallikarachchi, Talal Ghafoor, Iyad Kanj, Yue Chen, Isuru S. Godage

Three-Dimensional Shape Construction in a Soft Large-Scale Vision-Based Tactile Sensor with a Single Rotational Camera 790
Satoshi Nagasawa, Van Anh Ho

Evolving Variable Stiffness Fiber Patterns for Multi-Shape Robotic Sheets 796
Atoosa Parsa, Medha Goyal, Maggy Lambo, Bilige Yang, Josh Bongard, Rebecca Kramer-Bottiglio

Design of a Multi-Degree-Of-Freedom Elastic Neck Exoskeleton for Persons with Dropped Head Syndrome 803
Santiago Price Torrendell, Yang Chen, Hideki Kadone, Modar Hassan, Kenji Suzuki

Exploring Dynamically Controlled Frisbee Throws Using a Highly Compliant Robotic Arm 811
Kai Junge, Josie Hughes

Variable Length-Angle and Stiffness Joint Mechanism that Enables Extension, Contraction and Rotation Elements by S-Shape Folded Flat Tube 817
Kagetora Takahashi, Kenjiro Tadakuma, Masahiro Watanabe, Kazuki Abe, Satoshi Tadokoro

Towards Open Loop Control of Soft Multistable Grippers from Energy-Based Modeling 825
Harith Morgan, Juan C. Osorio, Andres F. Arrieta

Passive Suction Enhanced Adhesion Pads for Soft Grippers 831
A. Chooi, T. Calais, S. Dontu, S. Jain, A. Castillo Ugalde, G. Hiramandala, E. Kanhere, T. Stalin, P. Valdivia Y Alvarado

Manta Ray Inspired Multistable Soft Robot 839
Juan C. Osorio, Chelsea Tinsley, Kendal Tinsley, Andres F. Arrieta

A Modular Bio-Inspired Robotic Hand with High Sensitivity 845
Chao Liu, Andrea Moncada, Hanna Matusik, Deniz Irem Erus, Daniela Rus

Stretchable Optical Waveguide Sensor Suitability for Wrinkle Degree Detection in Soft Robots 852
J. Garrett Williamson, Joshua Schultz

Reconfigurable Kirigami Skins Steer a Soft Robot 858
Burcu Seyidoglu, Saravana Prashanth Murali Babu, Ahmad Rafsanjani

Evaluation and Comparison of Reversible Water Electrolysis as a Means for Pneumatic Actuation 864
Kristan Hilby, Peter Morice, Michael Aling, Ian Hunter

Design and Additive Manufacturing of a Hedgehog-Inspired Soft Robot Companion 872
G. Hiramandala, T. Calais, T. Stalin, A. Chooi, A. R. Plamootil Mathai, S. Jain, Elgar Vikram Kanhere, P. Valdivia Y Alvarado

GelSight360: An Omnidirectional Camera-Based Tactile Sensor for Dexterous Robotic Manipulation 879
Megha H. Tippur, Edward H. Adelson

A Data-Driven Topology Optimization Framework for Designing Robotic Grippers 887
Valerio Bo, Enrico Turco, Maria Pozzi, Monica Malvezzi, Domenico Prattichizzo

Development and Characterization of an Origami-Based Vacuum-Driven Bending Actuator for Soft Gripping 893
Sasheeka Himaruwan, Chanuka L. Tennakoon, Asitha L. Kulasekera

Sensorizing a Compression Sleeve for Continuous Pressure Monitoring and Lymphedema Treatment Using Pneumatic or Resistive Sensors 899
Joseph Delpreto, Cheryl L. Brunelle, Alphonse G. Taghian, Daniela Rus

Soft Fluidic Closed-Loop Controller for Untethered Underwater Gliders 907
Kalina Bonofiglio, Lauryn Whiteside, Maya Angeles, Matthew Haahr, Brandon Simpson, Josh Palmer, Yijia Wu, Markus P. Nemitz

Earthworm-Inspired Multimodal Soft Actuators 913
Jonathan Tirado, Jonas Jørgensen, Ahmad Rafsanjani

GelSight Baby Fin Ray: A Compact, Compliant, Flexible Finger with High-Resolution Tactile Sensing 919
Sandra Q. Liu, Yuxiang Ma, Edward H. Adelson

Towards a Modular Framework for Visco-Hyperelastic Simulations of Soft Material Manipulators with Well-Parameterised Material 927
Max Bartholdt, Rebecca Berthold, Moritz Schappler

Automated Design of Pneumatic Soft Grippers Through Design-Dependent Multi-Material Topology Optimization 935
Josh Pinskier, Prabhat Kumar, Matthijs Langelaar, David Howard

Fabrication and Characterization of a Passive Variable Stiffness Joint Based on Shear Thickening Fluids 942
Philip H. Johnson, Mini Rai, Marcello Calisti

Author Index