# **2017 IEEE International Conference on Robotics and Biomimetics (ROBIO 2017)**

Macau, China 5-8 December 2017

Pages 1-656



IEEE Catalog Number: ISBN:

CFP17581-POD 978-1-5386-3743-2

## Copyright © 2017 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:	CFP17581-POD
ISBN (Print-On-Demand):	978-1-5386-3743-2
ISBN (Online):	978-1-5386-3742-5

#### 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

WeA1: Bio-inspired Robot Design I	
DESIGN AND DEVELOPMENT OF A SOFT ROBOTIC EARTHWORM WITH HYDROSTATIC SKELETON	1
Sitangshu Chatterjee, Ryuma Niiyama, Yoshihiro Kawahara	
OS Hand: Octopus-inspired Self-adaptive Underactuated Hand with Fluid-driven Tentacles and Force-changeable Artificial Muscles Yuangen Wei, Wenzeng Zhang	7
Implementation of Long Lifetime Dissected-muscle Actuator for Frog Cyborg Daisuke Ishii, Masahiro Shimizu, Hitoshi Aonuma, Koh Hosoda	13
MinIAQ-II: A Miniature Foldable Quadruped with an Improved Leg Mechanism Mohammad Askari, Cem Karakadioglu, Furkan Ayhan, Onur Ozcan	19
C-Quad: A Miniature, Foldable Quadruped with C-Shaped Compliant Legs Ahmet Furkan Guc, Mert Ali Ihsan Kalin, Cem Karakadioglu, Onur Ozcan	26
Jumping Aided Takeoff: Conceptual Design of A Bio-Inspired Jumping-Flapping Multi-Modal Locomotion Robot Jun Zhang, Chengcheng Dong, Aiguo Song	32
WeA2: Robot Vision I	
Robust face frontalization with adaptive symmetry Lingxiang Xia, Jianbo Su, Kejun Zhang	38
Real-time Safe Motion Generation through Dynamical System Modulation with Multiple Depth Sensors	44
Yajun Liao, Hongmin Wu, Guoying Zhang, Yisheng Guan, Haifei Zhu	
Invisibility: A Moving-object Removal Approach for Dynamic Scene Modelling using RGB-D Camera Yuxiang Sun, Ming Liu, Max Meng	50
Autonomous Mission Completion System for Disconnected Delivery Drones in Urban Area Albert Y. Chung, Joon Yeop Lee, Hwangnam Kim	56
Adaptive Pedestrian Detection by Modulating Features in Dynamical Environment Song TANG, Lijuan CHEN, Jinpeng MI, Mao YE, Qingdu LI, Jianwei ZHANG	62
An Illumination-invariant Nonparametric Model for Urban Road Detection Using Monocular Camera and Single-line Lidar Yingna Su, Yigong Zhang, Jose M. Alvarez, Hui Kong	68
WeA3: Mobile Robotics I	
Research on A New Approach of Auto Self-balancing for Rescue Robot on Uneven Terrain Jiabo Feng, Weijun Zhang, Guangming Guo	74
A Collision-Free Self-Deployment of Mobile Robotic Sensors for Three-Dimensional Distributed Blanket Coverage Control Xiaotian Yang	80
Object Detection Based on GPU Parallel Computing for RoboCup Middle Size League Sha Luo, Weijia Yao, Qinghua Yu, Junhao Xiao, Huimin Lu, Zongtan Zhou	86
Towards adaptive power consumption estimation for over-actuated road unmanned vehicle Ismail Bensekrane, Pushpendra Kumar, Yacine Amara, Rochdi Merzouki	92
FPGA based Parallelized Architecture of Efficient Graph based Image Segmentation Algorithm Roopal Nahar, Akanksha Baranwal, K. Madhava Krishna	98
Balanced Partitioning of Workspace for Efficient Multi-Robot Coordination Avinash Gautam, S P Arjun Ram, Virendra Singh Shekhawat, Sudeept Mohan	104
WeA4: Underwater Robots	
Effects of Pectoral Fins' Spanwise Flexibility on Forward Thrust Generation Soheil Arastehfar, Gunawan Gunawan, Khoon Seng Yeo, Chee-Meng Chew	110

	Backstepping and integrative sliding mode control for tracking trajectory of a hybrid remotely operated vehicle. Reginaldo Cardoso, Magno Meza, Silvia Titotto, Elvira Rafikova	116
	An Application of a Generalized Architecture to an Autonomous Underwater Vehicle Changlong Lin, Yiping Li, Guoliang Zhang, Jing Li, Yan Chen, Yiwen Zhang	122
	Map-based localization in structured underwater environment using simulated hydrodynamic maps and an artificial lateral line Juan Francisco Fuentes-Pérez, Naveed Muhammad, Jeffrey A. Tuhtan, Ruth Carbonell-Baeza, Mark Mussall, Gert Toming, Maaria Kruusmaa	128
	Computational fluid dynamics analysis and design of an ostraciiform swimming robot Daniele Costa, Matteo Franciolini, Giacomo Palmieri, Andrea Crivellini, David Scaradozzi	135
	Flippers-based turning analysis and implementation of a dolphin robot Liu Jincun, Zhengxing Wu, Junzhi Yu, Zhiqiang Cao	141
WeA	5: Sensing Systems I	
	Hand Pose Estimation and Motion Recognition Using Egocentric RGB-D Video Wataru Yamazaki, Ming Ding, Jun Takamatsu, Tsukasa Ogasawara	147
	Development of a low-cost smart home system using wireless environmental monitoring sensors for functionally independent elderly people DI ZHANG, WEISHENG KONG, RITARO KASAI, ZIXI GU, MINAMI SHIGUEMATSU YUKITOSHI, SARAH COSENTINO, SALVATORE SESSA, ATSUO TAKANISHI	153
	Knowledge-Based Role Recognition by Using Human-Object Interaction and Spatio-Temporal	159
	Analysis Chule Yang, Yijie Zeng, Yufeng Yue, Prarinya Siritanawan, Jun Zhang, Danwei Wang	
	A Novel Wearable Tactile Sensor Array Designed for Fingertip Motion Recognition Zhudong Huang, Fuchun Sun, Huasong Min, Bin Fan, Wenliang Zhang, Xiaohui hu	165
	Non-invasive Estimation Method for Lumbar Spinal Motion Using Flat Belts and Wires Yalcin Akin, Shouhei Shirafuji, Jun Ota	171
	Skin Stroking Haptic Feedback Glove for Assisting Blinds in Navigation Kashan Aqeel, Urooj Naveed, Faarah Fatima, Farah Haq, Muhammad Arshad, Ammar Abbas, Muhammad Nabeel. Muhammad Khurram	177
WeA	6: Service Robots I	
	A study on Human-Robot Collaboration for Table-setting task Krati Saxena, Ravi Prakash Joshi, Rollyn Labuguen, Nishanth Koganti, Tomohiro Shibata	183
	Replacing Cables on Robotic Arms by Using Serial via Bluetooth Marc Bestmann, Florens Wasserfall, Norman Hendrich, jianwei zhang	189
	Cognitive Orientation Assessment for Older Adults using Social Robots Francisco Erivaldo Fernandes Junior, Ha Manh Do, Kiran Muniraju, Weihua Sheng, Alex Bishop	196
	Reconfigurable Wireless Control System for Dual-arm Cooperative Robotic System Liang Han, Xiangliang Cheng, Wenfu Xu, Guodeng Tan	202
	Development of Ray Nondestructive Detecting and Grinding Robot for Weld Seam in Pipe Canhui YIN, Dewei TANG, Zongquan DENG	208
	Time-Optimal Motion Planning for a Nonholonomic Mobile Robot on a Barcode Map Jiarui Wang, Xuebo Zhang, Haiming Gao, Yongchun Fang	215
WeA	7: Field Robots	
	Analysis of Drop Test Using a One-Legged Robot Toward Parachute Landing by a Humanoid Robot	221
	Teppei Tsujita, Odpurev Altangerel, Satoko Abiko, Atsushi Konno Design and Simulation Analysis of a Terrain Adaptable Wheeled Mobile Platform	227
	Qinglong Xu, Jianjun Yuan, Liming Gao, Dongfeng Chen	<u> </u>
	Development of Cylindrical Cam Shape to Improve Efficiency of Jumping Function of Mobile Robot	233
	Sho Inoue, Katsuaki Tanaka, Yuya Okamoto, Daisuke Kuroiwa, Hiroya Yokoyama, Hiroyuki Ishii, Satoshi Okabavashi. Yusuke Suqahara. Qinq Shi. Atsuo Takanishi	
	Design of a Double-Propellers Wall-Climbing Robot Kanjanapan Sukvichai, Pruttapon Maolanon, Konlayut Songkrasin	239

	Efficient Pole Detection and Grasping for Autonomous Biped Climbing Robots Shichao Gu, Manjia Su, Haifei Zhu, Yisheng Guan, Juan Rojas, Hong Zhang	246
	Design of a Hammer-Driven Type Robot(HDR) for Planetary Subsurface Exploration Chuanxi Xu, Wei Liu, Shengyuan Jiang, Yi Shen, Zongquan Deng	252
WeB	1: Bio-inspired Robot Design II	
	Optimal Work Space of Parallel Continuum Manipulator Consisting of Compact Bionic Handling	258
	Arms Inderjeet Singh, Manarshhjot Singh, Pushparaj Mani Pathak, Rochdi Merzouki	
	Performances Evaluation of Inverse Kinematic Models of a Compact Bionic Handling Assistant Inderjeet Singh, othman lakhal, Yacine Amara, Vincent Coelen, Pushparaj Mani Pathak, Rochdi Merzouki	264
	A Flying-Insect-Inspired Hybrid Robot for Disaster Exploration Jin Hu, Yuxin Liang, Xiumin Diao	270
	Research of Power Modulation Characteristics of Elastic Actuators Dunwen Wei, Tao Gao, Shuqin Zheng, Feiran Wang	276
	Soft Snake Robots: Mechanical Design and Geometric Gait Implementation Callie Branyan, Chloe Fleming, Jacquelin Remaley, Ammar Kothari, Kagan Tumer, Ross L. Hatton, Yiğit Mengüc	282
	Optimization of Centipede robot body designs through evolutionary algorithms and multiple rough terrains simulation Oleg Bulichev, Alexandr Klimchik, Nikolaos Mavridis	290
WeB2	2: Robot Vision II	
-	Robust person head detection based on multi-scale representation fusion of deep convolution	296
	neural network Yingying Wang, Yingjie Yin, Wenqi Wu, Siyang Sun, Xingang Wang	
	Precise Gaze Estimation for Mobile Gaze Trackers based on Hybrid Two-view Geometry Dan Su, Youfu Li, Yao Guo	302
	Beveled Needle Position and Pose Estimation based on Optical Coherence Tomography in Ophthalmic Microsurgery Mingchuan Zhou, Kai Huang, Abouzar Eslami, Daniel Zapp, Haotian Lin, Mathias Maier, Chris P. Lohmann, Alois Knoll, M. Ali Nasseri	308
	An Algorithm of Pose Estimation Based on Conic Correspondences Wenchao Wang, Xu Zhang, Yong Qi, Wei Cheng	314
	Learning to Detect Small Impurities with Superpixel Proposals Yue Guo, Yijia He, Haitao Song, Kui Yuan	320
	Development and Visual Servo Control of an Electromagnetic Actuated Micromanipulation System Xiao Xiao, Yangmin Li, Hui Tang	326
WeB3	3: Mobile Robotics II	
	Application of Obstacle-guided Informed Planning towards Robot Navigation in Cluttered Environments with Narrow Passages ZEHUI MENG, Hailong Qin, Hao Sun, Xiaotong Shen, Marcelo H. Ang Jr.	332
	Deep-learned Pedestrian Avoidance Policy for Robot Navigation Shengjie Hu, Chao Cao, Jia Pan	338
	Navigating A Mobile Robot to Avoid Moving Obstacles Using Virtual Source/Sink Force Field Ali Marzoughi	344
	Dynamic Objects Detection and Tracking for a Laser Scanner and Camera System Cheng Zou, Bingwei He, Liwei Zhang, Jianwei Zhang	350
	Improving Robustness of Monocular VT&R System with Multiple Hypothesis Xubin Lin, Weinan Chen, Yisheng Guan, Guanfeng Liu	355
	A Hybrid 3DoF Pose Estimation Method Based on Camera and Lidar Data Tingguang Li, Delong Zhu, Max QH. Meng	361

### WeB4: Soft Robotics I

	Design and Characterization of a Novel Fabric-based Robotic Arm for Future Wearable Robot Application Xinguan Liang, Yi Sun, Hong Kai Yap, Jin Guo, Chee Kong Chui, Chen Hua Yeow	367
	Adaptive Gripper with Soft Sheets for a Uniformly Distributed Grasping Force Yoshiyuki Furuta, Tokuo Tsuji, Yosuke Suzuki, Tetsuyou Watanabe, Masatoshi Hikizu, Hiroaki Seki	373
	Swinging Paper Actuator Driven by Conduction Electrohydrodynamics Hiroki Shigemune, Yu Kuwajima, Yuki Matsushita, Shingo Maeda, Vito Cacucciolo, Matteo Cianchetti, Cecilia Laschi. Hidevuki Sawada. Shuii Hashimoto. Shiqeki Suqano	379
	FEM-Based Training of Artificial Neural Networks for Modular Soft Robots Gundula Runge, Mats Wiese, Annika Raatz	385
	Design Optimization of Soft Pneumatic Actuators Using Genetic Algorithms Gundula Runge, Jan Peters, Annika Raatz	393
	A S shape continuum robot with a single actuation structued by NiTi slices Hao Liu, Zhuqing Ji, Jie Li, Yuanyuan Zhou, Wang Chongyang, Peng Ba	401
WeB	5: Sensing Systems II	
	Estimating three-axis contact force for fingertip by emitting vibration actively Nobuhiro Funato, Kentaro Takemura	406
	Estimation of Handgrip Force from Nonlinear SEMG-Force relationship during Dynamic Contraction Tasks Kai Wang, Yanjiang Huang, Xianmin Zhang	412
	Peg-in-hole Assembly based on Hybrid Vision/Force Guidance and Dual-arm Coordination Zheng Yanglong, Xianmin Zhang, Yanlin Chen, Yanjiang Huang	418
	Textile identification using fingertip motion and 3D force sensors in an open-source gripper Felix von Drigalski, Marcus Gall, Sung-Gwi Cho, Ming Ding, Jun Takamatsu, Tsukasa Ogasawara, Tamim Asfour	424
	Learning to Detect Slip for Stable Grasping Luxuan Li, Fuchun Sun, Bin Fang, Zhudong Huang, Chao Yang, Mingxuan Jing	430
WeB	6: Service Robots II	
	A Climbing Robot for Inspection of Lamppost in the Airport: Design and Preliminary Experiment Peng Li, Guangli Sun, Yunhui Liu	436
	CTSA Hand: A Novel Cluster-tube Self-adaptive Robot Hand Hong Fu, Haokun Yang, Weishu Song, Wenzeng Zhang	442
	Design of the Parallelly Indirect-self-adaptive Robot Hand with Single Chain of Double Racks Yu Zhang, Jingchen Qi, Wenzeng Zhang, Xiangrong Xu	449
	A Parallel and Indirectly Self-adaptive Finger with a Single Chain Transmission <i>Jingwei Su, Wenzeng Zhang</i>	455
	Hanamogera speech robot which makes a person feel a talking is fun Kazumi Kumagai, Kotaro Hayashi, Ikuo Mizuuchi	463
	Performance evaluation of an inverse kinematic based control system of a humanoid robot arm using MS Kinect	469
	Ha Xuan Nguyen, Hung Nguyễn Chấn Hùng, Ngoc Anh Mai, Bao-Lam Dang, Trung-Hung Nguyen, Xuan-Duc Tran. Minh-Hai Pham. Dinh Luona Nauven	
WeB	7: SLAM and Applications I	
	A Laser Triangulation Based on 3D Scanner Used for An Autonomous Interior Finishing Robot Pengfei Shan, Xin Jiang, Yufeng Du, Huanyong Ji, Peng Li, Congyi Lyu, Wei Yang, Yunhui Liu	475
	Efficient 3D LIDAR based loop closing using deep neural network Huan Yin, Xiaqing Ding, Li Tang, Yue Wang, Rong Xiong	481
	SceneSLAM: A SLAM Framework Combined with Scene Detection Zhehang Tong, Dianxi Shi, Shaowu Yang	487
	Generalizing Corrective Gradient Refinement in RBPF for Occupancy Grid LIDAR SLAM	495

	An Improved Serial Method for Mobile Robot SLAM Weina Xi, Yongsheng Ou, Wei Feng, Gang Yu	501
	A Vision-Based Autonomous Aerial Spray System for Precision Agriculture* Bo Dai, Yuqing He, Feng Gu, Liying Yang, Jianda Han, Weiliang Xu	507
WeB8	3: Rehabilitation and Assistive Robotics	
	Inclusive Human-Robot Interaction for Gait Rehabilitation and Wheel-Chair Exercises Ryo Saegusa	514
	Identifying invariant gait metrics for exoskeleton assistance Graham Henderson, Daniel Gordon, Sethu Vijayakumar	520
	Performance Analysis of 3-(HS)S/S Parallel Ankle Rehabilitation Robot Yongfeng Wang, Shuncheng Fan, Xiaojun Zhang, Guangda Lu, Guoru Zhao	527
	An Adaptive Impedance Controller for Upper Limb Rehabilitation Based on Estimation of Patients'	532
	Stiffness Lincong Luo, Liang Peng, Zengguang Hou, Weiqun Wang	
	An Ultra-Multijointed Assistive Robot Finger Rintaro Takashima, Hiroaki Kawamoto, Yoshiyuki Sankai	538
	Design a Soft Assistive Device for Elbow Movement Training in Peripheral Nerve Injuries Kornkanok Tripanpitak, Tapio V. J. Tarvainen, Ilker Sönmezisik, Jiang Wu, Wenwei Yu	544
WeP	1: Poster Session I	
	Vertical Motion Control of Underwater Robot Based on Hydrodynamics and Kinematics Analysis Mingjie Dong, Wusheng Chou, Bin Fang	549
	Multi-View Stereo via Geometric Expansion and Depth Refinement Tao Liu, Ding Yuan, Hongwei Zhao, Jihao Yin	555
	Generalized Framework for the Parallel Semantic Segmentation of Multiple Objects and Posterior Manipulation Adrian Llopart, Ole Ravn, Nils A. Andersen, Jong-Hwam Kim	561
	Tracking on Full-view Image for Camera Motion Estimation Based on Spherical Model Jianfeng Li, Shigang Li, Tong Chen, Yiguang Liu	569
	An Accurate Cavitation Prediction Thruster Model based on Gaussian Process Regression Yang Luo, Jianguo Tao, Hao Sun, Zhandong Li, Xingguo Song, Liang Ding, Zongquan Deng	575
	Self-calibration of Anchor Positions for Indoor Localization Wentao Yu, Xin Zhao, Guangyi Sun	581
	A Multi-Robot Cooperative Hunting Approach Based on Dynamic Prediction of Target Motion Zhiyong Wu, Zhiqiang Cao, Yingying Yu, Lei Pang, Chao Zhou, Erkui Chen	587
	Robust Target Detection, Tracking and Following for an Indoor Mobile Robot kang li, xiaoguang zhao, zengpeng sun, min tan	593
	How does the Compliant Legs Affect Walking Stability Jianwen Luo, Yili Fu, Shuguo Wang, Mu Qiao	599
	Frog-Inspired Hind Limb for Jumping Robots Zhijian Ren, Hesheng Wang, Weidong Chen	605
	Improved FDCM in Laser Scanning Inspection System for Workpiece Deformation yibin huang, Yue Guo, Kui yuan	611
	Path Planning of Six-DOF Serial Robots Based on Improved Artificial Potential Field Method Ning Zhang, Yong Zhang, Chao Ma, Bin Wang	617
	Research on Autonomous Obstacle Avoidance Algorithm of Teleoperation Manipulator in Unstructured Unknown Environment Enhui Zhang, Jianjun Yu, Meng Li	622
	Development of ROS-Based GUI for Control of an Autonomous Surface Vehicle Sai Velamala, Devendra Patil, Ming Xie	628
	A Novel Autonomous Navigation Approach for UAV Power Line Inspection Xiaolong Hui, Jiang Bian, Yongjia Yu, Xiaoguang Zhao, Min Tan	634
	The Driving of the Six-Bar Tensegrity Robot Ani Luo, Shijun Che, Heping Liu	640

	A Robust Vanishing Point Detection Method for UAV Autonomous Power Line Inspection Jiang Bian, Xiaolong Hui, Yongjia Yu, Xiaoguang Zhao, Min Tan	646
	Design of the fast speed two-arm robot in limited space Yinhui Xie, Jianhong Pan, Jinxing Yang, Jun Li	652
	Design and Analysis of Variable Stiffness Soft Manipulator Based on Jamming Structure Hongliang Yu, xu fengyu, Yudong Yang, Pengfei Zhou	657
	A Rolling Soft Cable Climbing Robot: Design Analysis and Fabrication Yudong Yang, xu fengyu, Hongliang Yu, PengFei Zhou	663
	Adaptive Task-space Tracking for Robot Manipulators with Uncertain Kinematics and Dynamics and without Using Acceleration Zhihao Xu, Xuefeng Zhou, Taobo Cheng, Kezheng Sun, Dan Huang	669
	DESIGN AND SIMULATION OF SPINE AFFECTED BY SCOLIOSIS AND PROPOSITION OF DYNAMIC BRACE mouna souissi, Walid Amokrane, Gérard Poisson	675
	Arm Movements Effect on Grasping Force Prediction Using Surface Electromyography Signals Chen Chen, Tao Xie, Lin Yao, Xinjun Sheng, Xiangyang Zhu	682
	Moving Obstacle Avoidance of a 5-DOF Robot Manipulator by using Repulsive Vector Shuang Du, Weiwei Shang, Shuang Cong, Chi Zhang, Kun Liu	688
	Design and Fabrication of a Miniature Underwater Angle of Attack Sensor for Robotic Fish Tianzhu Wang, Zhengxing Wu, Junzhi Yu, Min Tan	694
	Learning Probabilistic Representation of Shape Recognition from Volumetric Grid Kun Liu, Weiwei Shang	700
WeC1	: Bio-inspired Robot Design III	
	A Catapult Robot with Chameleon-inspired Multi-Body Elastic Nested system Zaigui Lu, Enguo Cao, Kun Wang, Tao Mei, Xuan Wu, Qiuju Zhang	706
	A starfish inspired robot with multi-directional tube feet locomotion Anon Poungrat, Thavida Maneewarn	712
	Optimization Design of a Bionic Lower Limb Rehabilitation Robot with Dynamic Analysis Libo Zhou, Weihai Chen, Jianhua Wang, Jingmeng Liu, Wenjie Chen, Shaoping Bai	718
	A Simple Stiffness Equation for a Variable Stiffness Joint Using a Leaf Spring Yan Wang, Lijin Fang	724
	Design Methodology of Linkage Morphology for High Speed Locomotion Jason Brown, Jason Pusey, Jonathan Clark	730
	Spatial Path Following Scheme for a Trans-humeral Prosthesis Kanishka Madusanka, Ruwan Gopura, Ranjith Amarasinghe, George Mann	737
WeC2	: Learning and Intelligent Systems I	
	Affordance Learning And Inference Based on Vision-Speech Association in Human-robot	743
	Interactions Chang'an Yi, Huaqing Min, Jinhui Zhu, Xinshi Xu, Pengshuai Yin, Guofei Zheng	
	Hierarchical Robot Learning for Physical Collaboration between Humans and Robots Zhen Deng, jinpeng mi, Dong Han, rui huang, xiaofeng xiong, jianwei zhang	750
	Robotic Skills Learning based on Dynamical Movement Primitives using a Wearable Device Xiang Wei, Fuchun Sun, Yuanlong Yu, Chunfang Liu, Bin Fang, Mingxuan Jing	756
	Nonrigid Point Matching of Chinese Characters for Robot Writing Bocheng Zhao, Minghao Yang, Hang Pan, Qingjie Zhu, Jianhua Tao	762
	An Autonomous Inter-task Mapping Learning Method via Artificial Neural Network for Transfer Learning Qiao Cheng, Xiangke Wang, Lincheng Shen	768
	Mapping human hand fingertips motion to an anthropomorphic robotic hand Umberto Scarcia, Roberto Meattini, Claudio Melchiorri	774
WeC3	: Mobile Robotics III	
	Trajectory Tracking Control of a Unicycle-type Mobile Robot With a New Planning Algorithm Shuaijun Li, Guilin Zhang, Xiangyu Lei, Xiao Yu, Huihuan Qian, Yangsheng Xu	780

	From one to many: unsupervised traversable area segmentation in off-road environment Li Tang, Xiaqing Ding, Yue Wang, Huan Yin, Rong Xiong	787
	Multi-Robot System for Tracking and Surrounding a Stationary Target: A Decentralized and Cooperative Approach	793
	Wagner Tanaka Botelho, Maria das Graças Bruno Marietto, Eduardo de Lima Mendes, João Carlos da Motta Ferreira, Edson Pinheiro Pimentel, Vera Lúcia da Silva	
	Person-following based on social navigation into the sensorized environments Julio C. Montesdeoca, J. Marcos Toibero, Ricardo Carelli	799
	Distributed Control of a Robotic Network for Protection of a Region from Intruders Andrey Savkin, Ali Marzoughi	804
WeC	4: Soft Robotics II	
	Multifilament Pneumatic Artificial Muscles to Mimic the Human Neck Arnau Garriga-Casanovas, Ahmad 'Athif Mohd Faudzi, Tatsuhiro Hiramitsu, Ferdinando Rodriguez y Baena, Koichi Suzumori	809
	Soft Robotic Glove for Hand Rehabilitation Based on a Novel Fabrication Method Yongkang Jiang, Diansheng Chen, Jiacheng Que, Zhe Liu, Ziqi Wang, Ying Xu	817
	A Kind of Soft Pneumatic Actuator Based on Multi-material 3D Print Technology Nianfeng Wang, Xiandong Ge, Hao Guo, Chaoyu Cui, Xianmin Zhang	823
	Development of a Bio-inspired Soft Gripper with Claws Mingjun Li, Majia Su, Rongzhen Xie, Yihong Zhang, Haifei Zhu, Tao Zhang, Yisheng Guan	828
	An Earthworm-Inspired Soft Crawling Robot Controlled by Friction Joey Zaoyuan Ge, Ariel Calderón, Néstor Pérez-Arancibia	834
	Modeling and Experimental Research on Bending and Wrinkling of long-arm bio-soft robot zonggui xu, Pengfei Yao, Shibo Cai, Zhiheng Wang, Guanjun Bao	842
WeC	5: Sensing Systems III	
	Motion Tracking of Both Hands with Occasional Mutual Occlusion Using RGB-D and IMU Sensors JH Chen, HF Zhu, ZH Zeng, JL Liang, YS Guan	848
	Accurate Fall Detection by Nine-axis IMU Sensor Yuanzhong Yan, Yongsheng Ou	854
	A Simple and Parallel Algorithm for Robot Position Estimation by Stereo Visual-Inertial Sensor Fusion Kai Wang, Ning Ding, Fuquan Dai	860
	Basic research of upper limb work support system "My Cybernic Robot Arm" for hemiplegic persons	865
	Hiroaki Toyama, Hiroaki Kawamoto, Yoshiyuki Sankai	
	On the Design of the 5-DoF Finger-wearable Cutaneous Haptic Device BYEONGKYU LIM, Keehoon Kim, Donghyun Hwang	872
	Towards Better Accuracy Calibration Method for Electronic Compass Based on Spatial Interpolation Algorithm Mingyue Liu, Liang Xiao, Zhibo Zhang, Chenlong Zou, Guangyi Shi, Uche Wejinya, Linqi Guo	879
WeC	6: Service Robots III	
	Gaze Calibration for Human-Android Eye Contact Using a Single Camera Akishige Yuguchi, Gustavo Alfonso Garcia Ricardez, Ming Ding, Jun Takamatsu, Tsukasa Ogasawara	883
	Robot Assisted Upper Limb Rehabilitation Training and Clinical Evaluation: Results of a Pilot Study	889
	Liang Peng, Zengguang Hou, Long Peng, Lincong Luo, weiqun wang	
	A Robotized Interior Work Process Planning Algorithm Based on Surface Minimum Coverage Set Yufeng Du, Xin Jiang, Pengfei Shan, Teng Chen, Huanyong Ji, Peng Li, Congyi Lyu, Wei Yang, Yunhui Liu	894
	On-the-Fly Detection of Novel Objects in Indoor Environments Edith Langer, Bram Ridder, Michael Cashmore, Daniele Magazzeni, Michael Zillich, Markus Vincze	900
	Robust Wi-Fi Indoor Localization With KPCA Feature Extraction of Dual Band Signal Linsheng Zhao, Hongpeng wang, Jiarui Wang, Haiming Gao, Jingtai Liu	908

	Assistive Mobility Cane Exploiting Skin-Stroke Tactile Haptic Feedback Mechanism for Visually Impaired Persons Hiba Ovais Latifee, Ammar Abbas, Taha Ahmed Siddiqu, Muhammad Nabeel, Muhammad Khurram	914
WeC7	: SLAM and Applications II	
	Fast online collision avoidance for mobile service robots through potential fields on 3D environment data processed on GPUs <i>Christian Jülg, Andreas Hermann, Rüdiger Dillmann, Arne Roennau</i>	921
	Real-time Globally Consistent 3D Grid Mapping Sining Yang, Shaowu Yang, Xiaodong Yi, Wenjing Yang	929
	A Method for Collision Free Navigation of Non-Holonomic 3D Robots in Unknown Tunnel Like Environments Andrey Savkin, chao wang	936
	Dynamic RGB-D Visual Odometry Dongsheng Yang, Shusheng Bi, Yueri Cai, Jingxiang Zheng, Chang Yuan	941
	A Collision-free Area Search and 3D Map Building Algorithm for a Ground Mobile Robot in Unknown Indoor Environments Andrey Savkin, Hang Li	947
	Real-Time Trust Region Ground Plane Segmentation for Monocular Mobile Robots Hong Liu, Yongqing Jin, Chenyang Zhao	952
WeC8	: Medical Robotics	
	Initial Design and Results of an Untethered Insertable Laparoscopic Robotic Surgical Camera System Ning Li, Reza Yazdanpanah Abdolmalaki, Gregory J. Mancini, Jindong Tan	959
	Wavelet-based Detection on MUAPs Decomposed from sEMG under different Levels of Muscle Isometric Contraction Ziyou Li, Qichuan Ding, Xingang Zhao, Jianda Han, Guangjun Liu	965
	A Haptic Force Feedback System for Teleoperated Needle Insertion Xue Li, Xie Yu, Zhang Kaiming, Chen Yanping, Geng Guojun	971
	Development of a New Rollator with a Free Rotating Chest Pad Integrated with Multiple Sensors and Investigation of its Effectiveness on Walk Assistance <i>Jian Huang, Noriho Koyachi</i>	977
	Approach and Control for Robot Assisted Sinus Surgery Zeyu Zeng, Yucheng He, Qi Zhang, Ying Hu, Yong Cao	983
	Prototype Development of a Hand-Held Steerable Tool for Hip Arthroscopy Lindsey Paul, Timothy Chant, Ross Crawford, Jonathan Roberts, Liao Wu	989
ThA1:	Bio-inspired Robot Design IV	
	Inerter Effects for Running Robots with Mechanical Impedance Yuta Hanazawa, Rin Takano, Masaki Yamakita	996
	Design and Experimental Research of an Underwater Vibration Suction Module Inspired by Octopus Suckers Rui Chen, Qiangian Fu, Ziyi Liu, Xiugi Hu, Min Liu, Ruizhou Song	1002
	PASA-SEBA Hand: An Underactuated Hand with Seven-gear Empty-trip Mechanisms and Built-in Actuators Sigiao Ruan, Wenzeng Zhang	1008
	High-Speed and Energy-Efficient Locomotion of a Seed-like Underactuated Robot on Level Surface by Utilizing Asymmetric Wobbling Effects Longchuan Li, Fumihiko Asano, Isao Tokuda	1014
	A Synergic Method for Anthropomorphic Dual-Arm Robots to Plan Bimanual Transport Tasks Hongcheng Xu, Xilun Ding	1020
ThA2:	Learning and Intelligent Systems II	
	Real-time Implementation of Vision-based Unmarked Static Hand Gesture Recognition with Neural	1026

Networks based on FPGAs Weiguo Zhou, Congyi Lyu, Xin Jiang, Peng Li, Haoyao Chen, Yunhui Liu

	Model Learning Based on Grid Cell Representations Huang Guanwen, Si Bailu, Tang Fengzhen	1032
	A Stable Recognition System for Human Gestures Based on sEMG Signals xina ren, feng duan	1038
	sEMG-based Estimation of Human Arm Force using Regression Model Chenliang Wang, Li Jiang, Chuangqiang Guo, Qi Huang, Bin Yang, Hong Liu	1044
	An Incremental sEMG Classification Model to Detect and Recognize Randomly-occurred Outlier Motion	1050
	Qichuan Ding, Xingang Zhao, Ziyou Li, Jianda Han	
	sEMG-based Hand Motion Recognition By Means of Multi-class AdaBoost Algorithm Shengli Zhou, Kuiying Yin, Zhengxiong Liu, Fei Fei, Jinyi Guo	1056
ThA3:	Mobile Robotics IV	
	Mechanical Design of a Jumping and Rolling Spherical Robot for Children with Developmental Disorders	1062
	Yujiro Mizumura, Keitaro Ishibashi, Yamada Soichi, Atsuo Takanishi, Hiroyuki Ishii	
	Dual-spring AGV Shock Absorption System Design: Dynamic Analysis and Simulations Xiangyu Lei, Guilin Zhang, Shuaijun Li, Huihuan Qian, Yangsheng Xu	1068
	Mobile 4-URU Parallel Robot with Multiple Modes Yu Jiang, Bing Li, zhihuai Miao	1075
	Development of Hexapod Robot with one passive joint on foot Lei Zhang, Xinzhi Liu, Xijie Guo	1082
	SPC ROBOT: A Novel Pipe-climbing Robot with Spiral Extending of Coupled Differential Jingzhou Dai, Yishen Xu, Wenzeng Zhang	1088
	EasySRRobot: An Easy-to-Build Self-Reconfigurable Robot with Optimized Design Minjing Yu, Yong-Jin Liu, Charlie C.L. Wang	1094
ThA4:	Micro/Nano Robotics	
	Design and Simulation of a Passive-Type Constant-Force MEMS Microgripper Sijie Yang, Qingsong Xu	1100
	Depth Detection for a Stereo Cell Micro-injection System with Dual Cameras Zhijie Nan, Qingsong Xu	1106
	Design and Analysis of a Constant-Force Parallel Micro-Gripper Xiaozhi Zhang, Qingsong Xu	1112
	Automated contact assembly of vessel-mimetic microstructure through position and orientation estimation based on object detection Yanan Li, Huaping Wang, Qing Shi, Juan Cui, Jianing Li, Tao Sun, Zhigiang Zheng, Toshio Fukuda	1118
	The Fabrication of Au Nanowire by Phase-Control Mode of USV-assisted AFM Nanomachining jialin shi, Lianging Liu, Peng Yu, Yang Cong	1124
	Miniature Rotation Robot for Full-orientation Imaging under Microscopy Haojian Lu, Wenfeng Wan, Yajing Shen	1130
ThA5:	Sensing Systems IV	
	The efficient Calibration and the Normal Calculation Method of the Stereoscopic Deflectometry <i>li chen, zhang xu, tu dawei</i>	1136
	Summary on Calibration Method of Line-structured Light Sensor Xi Zhang, Jian Zhang	1142
	Odor Tracing in Turbulent Airflow Field Using Only Three MOX Sensors Jia-Ying Wang, Qing-Hao Meng, Bing Luo, Xu-Yang Dai, Ming Zeng	1148
	Acoustic Emission Monitoring in High-speed Micro End-milling Based on SVD–EEMD Method Yun Qi, Jinkai Xu, Zhanjiang Yu, Huadong Yu	1154
	Motion Fuzzy Images Reduction of High-voltage Line Inspection Based on Spectrum Analysis and Image Autocorrelation <i>Kuocheng Zhang, Xin Wang</i>	1160

	Pilot Study on Shape Sensing for Continuum Tubular Robot with Multi-Magnet Tracking Algorithm Jie Wang	1165
ThA6	: Tele-Robotics I	
	Direct Teleoperation System of Multi-limbed Robot for Moving on Complicated Environments Yasushi Mae, Toshihiko Inoue, Kazuto Kamiyama, Masaru Kojima, Mitsuhiro Horade, Tatsuo Arai	1171
	Teleoperation of a Concentric Tube Robot through Hand Gesture Visual Tracking Andrew Razjigaev, Ross Crawford, Jonathan Roberts, Liao Wu	1175
	Grasping Virtual Fish: A Step Towards Robotic Deep Learning from Demonstration in Virtual Reality Jonatan S. Dyrstad, John Reidar Mathiassen	1181
	An EEG Based Dynamic Shared Control Method For Online Teleoperation Guodong Zhu, Kaiming Zhang, Shuang Liu, bo qian, xiancheng zhang	1188
	Design and Application of Intelligent Patrol System Based on Virtual Reality Zheng Huang, Diansheng Chen, Min Wang	1194
	Augmented Reality System Training for Minimally Invasive Spine Surgery Xiaozhuang Liu, Hua Bai, Song Guoli, Zhao Yiwen, Jianda Han	1200
ThA7	: Bio-inspired Robot Control I	
	Set-based path following and obstacle avoidance for underwater snake robots Anna M. Kohl, Signe Moe, Eleni Kelasidi, Kristin Y. Pettersen, Jan Tommy Gravdahl	1206
	A Kalman filter based force-feedback control system for hydrodynamic investigation of unsteady aquatic propulsion Li Wen, Tao Yuan, Ziyu Ren, Kainan Hu, Mengxi Ren, Siqi Wang, Tianmiao Wang	1214
	Stability Analysis and Control of Adhesive Forces of Bio-inspired Spines Yanan Zhang, Xuan Wu, Xiaojie Wang, Tao Mei	1220
	SnakeSIM: a ROS-based Rapid-Prototyping Framework for Perception-Driven Obstacle-Aided Locomotion of Snake Robots Filippo Sanfilippo, Øyvind Stavdahl, Pål Liljebäck	1226
	Snake-like Robot Climbs Inside Different Pipes Shanshan Xiao, Zhenshan Bing, Kai Huang, YuHong Huang	1232
ThB1	: Biomimicking Robots/Systems	
	Concept and Design of a Lightweight Biped Robot for Walking on Rough Terrain Yixiang Liu, Xizhe Zang, Zhenkun Lin, Jie Zhao	1240
	On statistical analysis for shepherd guidance system Yusuke Tsunoda, Yuichiro Sueoka, Koichi Osuka	1246
	Pheromone Combination Effect on Collective Construction by Object Stacking Agents inspired by Termites	1252
	Kazuma Nakanishi, Yuichiro Sueoka, Koichi Osuka Painlevé paradox during passive dynamic walking of biped robots	1258
	Ye Kuang, Yunian Shen, Wei Wang, Sai Zhang	4004
	Weak Actuators Generate Versatile Locomotion Patterns without a Brain Keisuke Naniwa, Yoichi Masuda, Masato Ishikawa, Koichi Osuka	1264
	Proprioceptive postural control of a musculoskeletal model against horizontal disturbances Kohei Kaminishi, Ping Jiang, Ryosuke Chiba, Kaoru Takakusaki, Jun Ota	1270
ThB2	: Learning and Intelligent Systems III	
	A Robotic System Towards Concrete Structure Spalling And Crack Database Liang Yang, Bing Li, Wei Li, Jizhong Xiao, Guoyong Yang, Zhaoming Liu	1276
	Deep Learning-Based Human Head Detection and Extraction for Robotic Portrait Drawing Ye Xiaofeng, Gu Ye, Weihua Sheng	1282
	Object Recognition and Pose Estimation base on Deep Learning Liwei XUE, Li-guo CHEN, Ji-zhu LIU, Yang-jun WANG, Qi SHEN, Hai-bo HUANG	1288
	Face Attribute Prediction with Convolutional Neural Networks Doudou Gao, Peijiang Yuan, Ning Sun, Xulei Wu, Ying Cai	1294

	A Facial Expression Recognition Method based on Cubic Spline Interpolation and HOG features Fen Xu, Zhe Wang	1300
	Turning Strategy Analysis Based on Trot Gait of a Quadruped Robot Wan Liu, Liguang Zhou, Huihuan Qian, Yangsheng Xu	1306
ThB3:	Manipulator Design and Control I	
	A Smooth Position-Force Controller for Asbestos Removal Manipulator Kamal Mohy el dine, Juan-Antonio Corrales-Ramon, Youcef Mezouar, Jean-Christophe Fauroux	1312
	V2: a Novel Two Degree-of-Freedom Parallel Manipulator Designed for Pick-and-Place Operations <i>Qizhi Meng, Fugui Xie, Xin-Jun Liu</i>	1320
	From the McGill Pepper-Mill Carrier to the Kindai Atarigi Carrier, A novel two limbs six-dof parallel robot with kinematic and actuation redundancy <i>Takashi Harada, Jorge Angeles</i>	1328
	A Computationally Efficient and Robust Kinematic Calibration Model for Industrial Robots with Kinematic Parallelogram Yang Lin, Huan Zhao, Congcong Ye, Han Ding	1334
	Kinematic and Workspace Analyses of a 2-RRU&RSR Parallel Manipulator Chao Zhang, Bin Li, Xinhua Zhao, Yangmin Li	1340
	Kinematics and Singularity Analysis of a 3-RPS Parallel Mechanism Yongfeng Wang, Shuncheng Fan, Xiaojun Zhang, Guangda Lu, Guoru Zhao	1346
ThB4:	Control Theory and Application I	
	N-value Estimation Method for Hydraulic Excavator in Real Time by Using Logistic Regression	1352
	Model Hirotaka Tani, Soichiro Hayakawa, Ryojun Ikeura, Takeshi Ooi, Takuma Nakamura	
	Deformation Analysis of Lumbar Spine Based on Mechanics of Materials and Finite Element Method Haiyun Chen, Yu Sun, Qi Zhang, Ying Hu, Yongmei Sun	1358
	Connectivity-Preserving Rendezvous for Networked Lagrange Systems with Actuator Faults <i>zhi feng, guoqiang hu</i>	1363
	Force Tracking Impedance Control with Moving Target Houde Liu, Weifeng Lu, Xiaojun Zhu, Xueqian Wang, Bin Liang	1369
	Force Tracking on Unknown Surface Using Impedance Control with Force Sensor Filtering Kelin Li, Huan Zhao, Yangyang Mao, Han Ding	1375
	Fuzzy Impedance Control Based on a Built-in Torque Sensor in Harmonic Drive Gear Xiaowei Tan, Yong Jiang, Yifeng Song, Guowei Liu, Zhengguo Zhu	1383
ThB5:	Space and Aerial Robots	
	Experimental Study on An Automatic Drilling Strategy for Lunar Regolith Coring Jieneng Liang, Liang Ding, Shengyuan Jiang, Yong Pang, Zongquan Deng, Junyue Tang	1389
	Learning to control space robots with flexible appendages using model-based policy search Qiyuan Zhang, Deshan Meng, Xueqian Wang, Bin Liang, Weining Lu	1395
	Low Rank Representation for Vehicle Counting and Traffic Flow Analysis with UAV Pengfei Wang, Xu Yan, Zhi Gao	1401
	Detection for Power Transmission Line in Low-resolution Aerial Image guodong yang, Dezheng Zhao, Wenkai Chang, En Li, Zize Liang	1406
	A reconfigurable quadcopter with foldable rotor arms and a deployable carrier Haohua Xiu, Tao Xu, Guowu Wei, Anthony H. Jones, Lei Ren	1412
	AUV Antagonistic Tactics Study for Naval Battle Based on Dynamic Game Na Wei, Mingyong Liu	1418
ThB6:	Tele-Robotics II	
	Simulation System for Myoelectric Hand Prosthesis Using Augmented Reality Yunan He, Osamu Fukuda, Nan Bu, Shunsuke Ide, Hiroshi Okumura, Nobuhiko Yamaguchi	1424

Teleoperation of Multiple Cooperative Slave Manipulators Using Graph-based Non-singular Terminal Sliding-Mode Control Henghua Shen, Ya-Jun Pan, Bingwei He	1430
Design of a Haptic Master Device for Teleoperation Applications Kai Xu, Bin Zhao, Shu'an Zhang, Zhaoyu Zhang, Nianzeng Xing	1436
Characterizing Dynamic Swimming Behaviors of Three-Particle Magnetic Microswimmer Near a Solid Surface Qianqian Wang, Lidong Yang, Jiangfan Yu, Li Zhang	1442
DROCS: Distributed multi-Robot On-demand Control System Woong Gyu La, Seungho Yoo, Hwangnam Kim	1448
Optimization and Simulation on Key Parameters of Foot Trajectory for a Hydraulic Quadruped Robot Meng Gao, Qing-sheng Luo, Ya-nan Li	1454
ThB7: Bio-inspired Robot Control II	
Coordination, Symmetry, and Grouping Parameters for Redundant Movement Strategies for Articulated Platforms <i>Umer Huzaifa, Amy La Viers</i>	1460
Recurring Side-winding Motion Generation for Modular Snake Robot Sajjad Manzoor, Youngjin Choi	1468
Slip Reduction Controls of Mesh-Body Worm Robot Developed from a Mathematical Model Yifan Huang, Akhil Kandhari, Hillel Chiel, Roger Quinn, Kathryn Daltorio	1474
Efficient Parallel Implementation of Stochastic Dynamic Operators for Robot Control Terence Sanger	1480
Interactive Torque Controller with Electromyography Intention Prediction Implemented on Exoskeleton Robot NTUH-II Lee-Kai Liu, Li-Yu Chien, Shang-Heh Pan, Jia-Liang Ren, Wei-Hsuan Chen, Chi-Lun Chiao, Li-Chen Fu, Jin-Shin Lai	1485
Controllability and Accessibility of Vibrations in Multiple Planes on Link-Elastic Robot Arms Freia Irina John, Jörn Malzahn, Torsten Bertram	1491
ThP1: Poster Session II	
Attenuating the Impact of Limb Position on Surface EMG Pattern Recognition Using a Mixed-LDA Classifier Yang Yu, Xinjun Sheng, Weichao Guo, Xiangyang Zhu	1497
Design and Experimental Testing of the Contractive and Elongate Water Hydraulic Flexible Manipulator Wanda Zhao, He Xu, Yaowen Ma, Yan Xu	1503
sEMG-Based Continuous Hand Gesture Recognition Using GMM-HMM and Threshold Model Jinxing Yang, Jianhong Pan, Jun Li	1509
A Method of Simultaneously Action Recognition and Video Segmentation of Video Streams Ji Liang, Xiong Rong, Yue Wang, Yu Hongsheng	1515
An Execution Mechanism for Natural Language Tasks Based on Auxiliary Decision Database Jing Gong, Guohui Tian	1521
A 3D Object Detection and Pose Estimation Pipeline Using RGB-D Images Ruotao He, Juan Rojas, Yisheng Guan	1527
A New Simulation Force Algorithm for Vascular Interventional Surgery Simulation dapeng zhang, Hanyue Wang	1533
Toward A Novel Deformable Robot Mechanism to Transition between Spherical Rolling and Quadruped Walking Wenchuan Jia, Zhongshu Huang, Yi Sun, Huayan Pu, Shugen Ma	1539
Research on Nanoscale Displacement Online Modeling and Control of PCA Qun Jia, Chao Zhou, Lu Deng, Zhangming Du, Zhiqiang Cao	1545
PISA-GBM Hand: An Indirectly Self-adaptive Robot Hand with Built-in Actuators Yuchen Xing, Siqiao Ruan, Wenzeng Zhang	1551
	4

Kinematic Analysis and Optimization of A Kangaroo Geared Five-Bar Knee Joint Mechanism Bo Liu, Wenjie Ge, Dianbiao Dong, Lei Zheng, Guoxiong Zhang 1557

	An indoor path planning and motion planning method based on POMDP wenjie dong, Chen Zhixian, Xiaozhi Qi, chao song, xiaojun yang	1564
	Localization Error Compensation of Percutaneous Surgery Robot based on Magnetic Positioner Zijian Men, Jianxun Zhang, Yu Dai, Xin Zhao, Dagang Huang, He Su	1571
	Locomotion Control of Three Dimensional Passive-Foot Biped Robot Based on Whole Body Operational Space Framework Jianwen Luo, Ye Zhao, Donghyun Kim, Oussama Khatib, Luis Sentis	1577
	Dynamic Model Based Fuzzy-Impedance Interaction Control for Rehabilitation Robots Zihao Xu, weiqun wang, Zengguang Hou, Xiaoming Ling, Xu Liang	1583
	An improved head pose estimation method for the robotic wheelchair interaction control guozheng xu, lei xu, cheng lv, bo zhu	1589
	Study on Dynamic Characteristics of V-Type Leg Hydraulic System of Truck Mounted Concrete Pump Qing Zhao, Huiyong Liu, Yeping Xiong	1594
	Maxout Neurons Based Deep Bidirectional LSTM for Acoustic Modeling Yuan Luo, Yu Liu, Yi Zhang, Boyu Wang, Zhou Ye	1599
	Research on High Precision Magnetic Suspension Positioning Platform Zhihan YANG, Hai-bo HUANG, Feng ZHAO, Wen-wen ZHANG, Yong-chao PEI, Li-guo CHEN, Ji-zhu LIU	1605
	The high efficient dynamics modeling method for modular manipulator based on Space Operator Algebra Zhang Xiaodong, He Yongqiang	1612
	Study on Visual Navigation System for Intelligent Robot in the Unstructured Environment Qimeng Tan, Qingqing Wei, Ruqi Ma, Lei Chen, Yaobing Wang, Yimin Lin	1618
	Camera-Odometer Calibration and Fusion using Graph Based Optimization Yijia He, Yue Guo, Aixue Ye, Kui Yuan	1624
	Push Recovery by Stepping with Step Timing Adjustment Siyuan Yu, Mingguo Zhao	1630
	Mimicking Fly Motion Tracking and Fixation Behaviors with a Hybrid Visual Neural Network <i>Qinbing Fu, Shigang Yue</i>	1636
ThC1	: Bio-inspired Assist Systems	
	Development and evaluation of a waist assist device for shipbuilding tasks Shinya Kondo, Ryojun Ikeura, Arata Tachi, Kyohei Murakami, Koji Yasuda, Soichiro Hayakawa	1642
	A Coordination Control for a Wearable Walking-Assist robot Xia Zhang, Minoru Hashimoto	1648
	Evaluation of Long-term Effect on Gait Improvement for a Soft Robotic Suit Shanhai Jin, Shijie Guo, Kazunobu Hashimoto, Motoji Yamamoto	1654
	Modeling and simulation of cormorant's webbed-feet assisted take-off from water surface Yixue Dong, Jianhong Liang, Xingbang Yang, Jinguo Huang, Xiaoqiang Xue, Yubo Fan	1659
	Time-varying Stiffness Tracking Control of Knee Exoskeleton Wenhao Ma, Hong Cheng, Zhan Li, Jing Qiu	1665
	Development of a tendon-driven mechanism with liquid circulation system for improving wear resistance Shota Miyake, Shunsuke Nagahama, Shigeki Sugano	1670
ThC2	: Learning and Intelligent Systems IV	
	A Theory for the Risk Bound of Myoelectric Control with Adaptive Learning Qi Huang, Li Jiang, Yang Dapeng, Bin Yang, Chenliang Wang, Boya Wang, Hong Liu	1676
	Emotion Recognition Based on Feedback Weighted Fusion of Multimodal Emotion Data Wei Wei, Qingxuan Jia, Yongli Feng	1682
	On how self-body awareness improves autonomy in social robots Igor Rodriguez, José María Martínez-Otzeta, Elena Lazkano, Txelo Ruiz, Basilio Sierra	1688
	Dependability in Robotics as a Consensus Problem João Sequeira	1694

Dependability in Robotics as a Consensus Problem João Sequeira

	Robotics Education Methodology for K-12 Students for Enhancing Skill Sets Prior to Entering Universitv Muhammad Nabeel, Hiba Ovais Latifee, Obaid Naqi, Kashan Aqeel, Huzaifa Sheikh, Muhammad Arshad, Muhammad Khurram	1702
	Balancing Different Performance Indices in Complex Robotic Assembly Processes Heping Chen, Biao Zhang, Thomas Fuhlbrigge, George Zhang	1708
ThC3	: Manipulator Design and Control II	
	A Light Cooperative Manipulator with Wireless Communication and High Payload guodeng Tan, Wenfu Xu, Can Luo, Liang Han, Han Yuan	1713
	The Impact of Visual Cues on Haptic Compliance Discrimination Using a Pseudo-Haptic Robotic System Evan Fakhoury, Pete Culmer, Brian Henson	1719
	Kinematics Calculation of Minimally Invasive Surgical Robot based on FPGA	1726
	Ziyang Jiang, Yu Dai, Jianxun Zhang, Su He	
	Kinematics Analysis of a four Degree-of-Freedom Parallel Manipulator Chao Zhang, Bin Li, Xinhua Zhao, Yangmin Li	1731
	Design of Real-time Ethernet Motion Controller Based on FPGA JianChao Shi, Jianxun Zhang, Yu Dai, He Su	1737
	Multi-robot coordination for high-speed pick-and-place tasks Chao Yu, Xin-Jun Liu, Fei Qiao, Fugui Xie	1743
ThC4	: Control Theory and Application II	
	Trajectory Tracking Control for Quadrotor UAV Tienan Ma, Seng Fat Wong	1751
	Continuous terminal sliding mode control of a 6-DOF wire-driven parallel robot Liu Jun, Wang Xiaoguang, Wang Yuqi, Lin Qi	1757
	Cable Tension Control of Cable-Driven Parallel Manipulators with Position-Controlling Actuators Hao Xiong, Xiumin Diao	1763
	Adaptive Backstepping Control Approach for the Trajectory Tracking of Mobile Manipulators Bhavik Patel, Ya-Jun Pan, Usman Ahmad	1769
	Robust Finite-Time Attitude Tracking Control for Nonlinear Quadrotor with Uncertainties and Delays	1775
	Xiang Zheng, Ziwei Wang, Tao Zhang	4704
	Underactuated Control of Swing in Orbit Debris Towing Removal via Tether Space Robots Zhongjie Meng	1781
ThC5	: Humanoids and Legged Robots	
	A Robust Biped Gait Controller Using Step Timing Optimization with Fixed Footprint Constraints Haitao Wang, Mingguo Zhao	1787
	Energy Efficiency Optimization of an Interactive Quadruped Robot Jiaming Zhang, Yu Meng, Fuhao Deng, Huihuan Qian, Yangsheng Xu, Fufei Fan	1793
	Structure Design and Motion Analysis of Waist of Humanoid Robot for Jumping and Crawling Fangzhou Zhao, Junyao Gao, Jingchao Zhao, Chunlei Zhang, Zhe Xu, Xuanyang Shi, Yi Liu, Chuzhao Liu, Cunaiu Liu	1800
	Robust real-time walking pattern generation with dynamical consistency: an analytical method combined with optimal solution Jiatao Ding, Minghui Yang, Jiangchen Zhou, Daojin Yao, Xiaohui Xiao	1806
	Bayesian optimization of gaits on a bipedal SLIP model Kaur Aare Saar, Andre Rosendo, Fumiya Ilda	1812
	A Deep Reinforcement Learning Approach for Dynamically Stable Inverse Kinematics of Humanoid	1818
	robots Phani Teja S, Parijat Dewangan, Pooja Guhan, Abhishek Sarkar, Madhava Krishna K	
ThC6	: Special session :	
	Path Generation and Tuning with Touchscreen Device for Industrial Robot Xinyu Fang, Cheng Li, Hao Gu	1824

	Acoustic Contacting Detection in Robotic Accurate Assembly Shunchong Li, Hao Gu	1829
	Optimized throughput improvement of assembly flow line with digital twin online analytics heqing sun, Cheng Li, Xinyu Fang, Hao Gu	1833
	Improving the Local Absolute Accuracy of Robot with Touch Panel Cheng Li, Hao Gu	1838
	A Leveling Measurement Method and Its Application in Robotic Systems Cheng Li, Hao Gu	1844
	Accuracy Analysis for Robotized Assembly System Feifei Zhao, Hao Gu, Chanjuan Chen, Cheng Li	1850
ThC7	: Bio-inspired Robot Control III	
	Affordance Triggering For Arbitrary States Based on Robot Exploring Chang'an Yi, Guofei Zheng, Sheng Bi, Ronghua Luo, Pengshuai Yin, Xinshi Xu, Huaqing Min	1856
	The coordination behaviors of robots in the framework of evolutionary game theory Qiaoyu Li, Xiaolong Yang, Yuying Zhu, Jianlei Zhang	1862
	Cognitive and Action Control for Goal-Directed Reaching in a Humanoid Robot Jerald Kralik, Daniel Muldrew, Divya Gunasekaran, Richard Lange	1868
	Bioinspiration Lessons from a Self-Replicating Machine Concept in a Constrained Environment Alex Ellery	1874
	Sloth and Slow Loris Inspired Behavioral Controller for a Robotic Agent Lakshmi Nair, Ronald Arkin	1880
	A Spring-like Pipe Climbing Gait for the Snake Robot Yunhu Zhou, Yuanfei Zhang, Fenglei Ni, Hong Liu	1886
FrA1:	Mechatronic Systems I	
	Fast-BIT*: Modified Heuristic for Sampling-based Optimal Planning with a Faster First Solution and Convergence in Implicit Random Geometric Graphs Alexander Holston, Deok-Hwa Kim, Jong-Hwan Kim	1892
	Geometry of Gaudi-inspired Screw and Nut for Differential Drive Mechanism Kengo FUJII, Takashi Harada	1900
	Stability Analysis and Optimization on Conical Cylinder Block in Swash Plate Piston Pumps Yan Wei-peng, Jiang Ji-hai	1906
	Design and optimal springs stiffness estimation of a Modular OmniCrawler in-pipe climbing Robot Enna Sachdeva, Akash Singh, K. Madhava Krishna, Abhishek Sarkar	1912
	A Hybrid and Compact Spherical Mechanism of Large Workspace and Output Torque with Unlimited Torsion for Hand-Held Gimbal <i>Guangzeng Chen, Yunjiang Lou, Yi Shen</i>	1918
FrA2:	Trajectory and Motion Planning I	
	Search control in an unknown environment using shortest path calculation and Lyapunov technique Takashi Betsuyaku, Yoshiro Fukui	1924
	Autonomous Navigation of a Quadrotor in Unknown Environments Dongliang Zheng, Hesheng Wang, Zheyuan Xie, Weidong Chen, Xiangyu Kong	1930
	A strategy for mid-air collision avoidance: Speed modulation to increase minimum separation using a mutually independent and mutually beneficial technique Dasun Gunasinghe, Mandyam Srinivasan	1936
	A Hierarchical Decision-making Algorithm of UAV for Collision Avoidance in Target Tracking Yunyun Zhao, Xiangke Wang, Lincheng Shen, Weiwei Kong	1944
	Motion Description Language for Trajectory Generation of a Robot Manipulator Zhaoming Liu, Nailong Liu, Qing Wei, Long Cui	1950
	Motion Planning of Lower Limb Exoskeleton with Passive Anklefor Paraplegics Chun-Hao Zhong, Xuan Zhao, Bing Chen, Feng-Yan Liang, Hao Ma, Wei-Hsin Liao	1956

### FrA3: Manipulator Design and Control III

FIA3	Manipulator Design and Control III	
	Interactive Humanoid Robot Arm Imitation System using Human Upper Limb Motion Tracking Chao Hong, Zhong Chen, Junyi Zhu, Xianmin Zhang	1962
	Generalization of Task Model using Compliant Movement Primitives in a Bimanual Setting Aleksandar Batinica, Bojan Nemec, Jose Santos-Victor, Andrej Gams, Mirko Rakovic	1967
	Mechanical design and analysis of a novel dexterous hand based on grasping manipulation Wenliang Zhang, Bin Fang, Yiyong Yang, Fuchun Sun, Zhudong Huang	1973
	Tracking of Trajectory with Dynamic Deformation Based on Dynamic Compensation Concept Kenta Kajihara, Shouren Huang, Niklas Bergstrom, Yuji Yamakawa, Masatoshi Ishikawa	1979
	Geometric Isotropy Indices for Workspace Analysis of Spatial Parallel Manipulators Hao Xiong, Xiumin Diao	1985
	Design and experimental study of compliant joints of robot based on magneto-rheological fluid Cai Shibo, Wang Pengfei, Tian Liubin, Xu Fang, Zhang Libin	1991
FrA4	Control Theory and Application III	
	Elbow Position Control of the Redundant Industrial Dual-arm Robot Taeyong Choi, Hyunmin Do, Dongil Park, Chanhun Park, Jinho kyung, Dookyung Kim, Hwisu Kim	1997
	An Optimized Cooperative Control Algorithm of Multi-Agent Array Based on the Skeletal Mechanism of Chrysopelea Xiaobo Lu, Baolin Feng, Lu Li, Keyu Zhu	2003
	Cycle Stability and Consumption Energy Efficiency Evaluation of Walking Stabilized by Stepping Feedforward and Visual-lifting Feedback Keli Shen, Xiang Li, Daiji Izawa, Mamoru Minami	2009
	Online Generation of Collision-free Trajectories for Multiple Robots in A Shared Workcell Hongmin Wu, Yisheng Guan, Yansui Liu	2015
	Modelling and Control of Dual-Arm Free-Floating Space Robot Using Virtual Decomposition Control for Capturing Target Xueqian Wang, Bo Xia, Gang Li, Houde Liu, Bin Liang	2021
FrA5	Bio-inspired Sensing and Navigation	
	Geomagnetic Navigation for an AUV Based on Multi-objective Simulating Annealing Algorithm Hong Li, Mingyong Liu, Feihu Zhang	2027
	Robust Translational/Rotational Eye-Vergence Visual Servoing under Illumination Varieties Hongzhi Tian, Yejun Kou, Win Khaing Phyu, Mamoru Minami	2032
	Whisker-like Sensors with Soft Resistive Follicles Federico Fries, Pablo Valdivia y Alvarado	2038
	An Insertable Low-Cost Continuum Tool for Shape Sensing Kai Xu, Yuyang Chen, Zhaoyu Zhang, Shu'an Zhang, Nianzeng Xing, Xiangyang Zhu	2044
	Design of Anthropomorphic Robot Bionic Eyes Di Fan, xiaopeng chen, Taoran Zhang, Xu Chen, Guilin Liu, Owais Hafiz Muhammad, Kim Hyunwoo, Ye Tian, Weimin Zhang, Qiang Huang	2050
FrA6	: Human-Machine Interface	
	Low-Cost Assistive Robot for Mirror Therapy Rehabilitation Colin Morris, Yuxin Fu, Scott McCormick, Bradley Wachter, Santosh Devasia	2057
	Development of Rehabilitation Robot for hand "ReRoH" Hayato Mukai, Chihiro Sato, Isao Abe, Hayato Mukai	2063
	Estimation of Upper Limb Muscle Stiffness Based on Artificial Neural Network Ze Cui, Wangyang Han, Donghai Qian, Yumei Wang, Guowen Qiu, Danjie Zhu	2069
	Pin Array Hand: A Universal Robot Gripper with Pins of Ellipse Contour An Mo, Wenzeng Zhang	2075
	Measuring the Performance of Aerial Projection of 3D Hologram Object (3DHO) Asyifa Imanda Septiana, Mahfud Jiono, Takafumi Matsumaru	2081

Measuring the Performance of Aerial Projection of 3D Hologram Object (3DHO) Asyifa Imanda Septiana, Mahfud Jiono, Takafumi Matsumaru

Consideration of Tilting Speed of Lower Back Fatigue Reduction System based on Actively Tilting 2087 Seat Naoto Hojo, Kenji Tanaka, Yuta Chinen, Taichi Wada, Masao Sugi

### FrA7: Late-news I (Automation Technology)

	. Late-news (Automation rechnology)	
	Path planning for machining on surface of a blade Kaiming Zhang, Guodong Zhu, Shuang Liu, Bo Qian, Xiancheng Zhang	2093
	Obstacle Avoidance Flight and Shape Estimation Using Catenary Curve for Manipulation of a Cable Hanged by Aerial Robots Satoko Abiko, Atsushi Kuno, Shota Narasaki, Atsushi Oosedo, Shohei Kokubun, Masaru Uchiyama	2099
	Dynamic Modeling and Analysis of Docking the GEO Satellite Interface Ring Huang Jianbin, Li Zhi, Meng Bo, Han Xu, Pang Yujia, Huang Longfei	2105
	Experimental Investigation on Drilling Efficiency of a Percussive Ultrasonic Drill Deen Bai, Zhijun Zhao, Qingqing Wei, Yubao Cao, Qiquan Quan, He Li, Zongquan Deng	2111
	Optimized scheduling in reentrant robotic cell with dual-gripper robot and parallel lines Chuyuan Wang, Chongdang Liu, Linxuan Zhang, Heqing Sun, Liwei Qi	2117
	Parameter Optimization and Trajectory Planning of 3P-Delta Parallel Mechanism Qiang Cheng, Ruiqin Li, George Zhang	2123
FrB1	Mechatronic Systems II	
	Concept and Mechanism of the Tendon Actuated Versatile Debris Gripper Nobutaka Tanishima, Daichi Hirano, Toshimichi Tsumaki, Hiroki Kato	2129
	Automatically Generated Kinematics and Control Engine for Modular and Reconfigurable Robot Hyunmin Do, Taeyong Choi, Dongil Park, Doohyeong Kim, Youngsu Son	2136
	Force Modeling of the Cutting Disc in Rock Sawing for Anchoring and Sampling in Asteroid Exploration Jun Zhang, Chengcheng Dong, Aiguo Song	2142
	Retrofitting of Asea IRB2-S6 Industrial Robot Using Numeric Control Technologies Based on LinuxCNC and Mach3-MatLab Juan Sebastian Toquica Arenas, Alberto Alvares, Marcelo Bomfim, Eduardo Lima II	2148
FrB2	: Trajectory and Motion Planning II	
FrB2	: Trajectory and Motion Planning II A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding	2154
FrB2	A Multi-Strategy Path Planner Based on Space Accessibility	2154 2162
FrB2	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot	
FrB2	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot Hiroki Nozaki, Ryuma Niiyama, Takuro Yonezawa, Jin Nakazawa A study on path planning for small mobile robot to move in forest area Katsuaki Tanaka, Yuya Okamoto, Hiroyuki Ishii, Disuke Kuroiwa, Hiroya Yokoyama, Sho Inoue, Satoshi	2162
FrB2	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot Hiroki Nozaki, Ryuma Niiyama, Takuro Yonezawa, Jin Nakazawa A study on path planning for small mobile robot to move in forest area Katsuaki Tanaka, Yuya Okamoto, Hiroyuki Ishii, Disuke Kuroiwa, Hiroya Yokoyama, Sho Inoue, Satoshi Okabavashi. Qing Shi. Yusuke Sugahara. Atsuo Takanishi Simulations for Time-Optimal Trajectory Planning along Parametric Polynomial Lane-Change Curves for a Unicycle	2162 2167
	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot Hiroki Nozaki, Ryuma Niiyama, Takuro Yonezawa, Jin Nakazawa A study on path planning for small mobile robot to move in forest area Katsuaki Tanaka, Yuya Okamoto, Hiroyuki Ishii, Disuke Kuroiwa, Hiroya Yokoyama, Sho Inoue, Satoshi Okabayashi, Qing Shi. Yusuke Sugahara. Atsuo Takanishi Simulations for Time-Optimal Trajectory Planning along Parametric Polynomial Lane-Change Curves for a Unicycle Chien-Sheng Wu, Zih-Yun Chiu, Jing-Sin Liu Optimal Motion Planning for Minimizing Energy Consumption of Wheeled Mobile Robots Roger DATOUO, Melingui Achille, ismail BENSEKRANE, Frédéric BIYA MOTTO, Bernard ESSIMBI ZOBO,	2162 2167 2173
	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot Hiroki Nozaki, Ryuma Niiyama, Takuro Yonezawa, Jin Nakazawa A study on path planning for small mobile robot to move in forest area Katsuaki Tanaka, Yuya Okamoto, Hiroyuki Ishii, Disuke Kuroiwa, Hiroya Yokoyama, Sho Inoue, Satoshi Okabavashi. Qing Shi. Yusuke Sugahara. Atsuo Takanishi Simulations for Time-Optimal Trajectory Planning along Parametric Polynomial Lane-Change Curves for a Unicycle Chien-Sheng Wu, Zih-Yun Chiu, Jing-Sin Liu Optimal Motion Planning for Minimizing Energy Consumption of Wheeled Mobile Robots Roger DATOUO, Melingui Achille, ismail BENSEKRANE, Frédéric BIYA MOTTO, Bernard ESSIMBI ZOBO, Rochdi MERZOUKI	2162 2167 2173
	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot Hiroki Nozaki, Ryuma Niiyama, Takuro Yonezawa, Jin Nakazawa A study on path planning for small mobile robot to move in forest area Katsuaki Tanaka, Yuya Okamoto, Hiroyuki Ishii, Disuke Kuroiwa, Hiroya Yokoyama, Sho Inoue, Satoshi Okabavashi. Qing Shi. Yusuke Sugahara. Atsuo Takanishi Simulations for Time-Optimal Trajectory Planning along Parametric Polynomial Lane-Change Curves for a Unicycle Chien-Sheng Wu, Zih-Yun Chiu, Jing-Sin Liu Optimal Motion Planning for Minimizing Energy Consumption of Wheeled Mobile Robots Roger DATOUO, Melingui Achille, ismail BENSEKRANE, Frédéric BIYA MOTTO, Bernard ESSIMBI ZOBO, Rochdi MERZOUKI : Manipulator Design and Control IV Corner Detection Based Real-Time Workpiece Recognition for Robot Manipulation	2162 2167 2173 2179
	A Multi-Strategy Path Planner Based on Space Accessibility Meng Hang, Mengxiang Lin, Shangzhe Li, Zhixin Chen, Rong Ding Shape Changing Locomotion by Spiny Multipedal Robot Hiroki Nozaki, Ryuma Niiyama, Takuro Yonezawa, Jin Nakazawa A study on path planning for small mobile robot to move in forest area Katsuaki Tanaka, Yuya Okamoto, Hiroyuki Ishii, Disuke Kuroiwa, Hiroya Yokoyama, Sho Inoue, Satoshi Okabavashi. Qing Shi, Yusuke Sugahara. Atsuo Takanishi Simulations for Time-Optimal Trajectory Planning along Parametric Polynomial Lane-Change Curves for a Unicycle Chien-Sheng Wu, Zih-Yun Chiu, Jing-Sin Liu Optimal Motion Planning for Minimizing Energy Consumption of Wheeled Mobile Robots Roger DATOUO, Melingui Achille, ismail BENSEKRANE, Frédéric BIYA MOTTO, Bernard ESSIMBI ZOBO, Rochdi MERZOUKI Manipulator Design and Control IV Corner Detection Based Real-Time Workpiece Recognition for Robot Manipulation Kewen Tang, Fan Hu, Wentao Liu, yian deng, Xihong Wu, Dingsheng Luo Configuration Bifurcation and Uncontrolled DOF Analysis of 2(3HUS+S) Parallel Manipulator	2162 2167 2173 2179 2185

	Numerical Investigation on a Cable-Driven Flight Simulator with High-G Acceleration Capability XIAOGUANG WANG, QI LIN	2212
	Projection Function and Hand Pointer for User-Interface of Daily Service Robot Yujin Wakita, Hideyuki Tanaka, Yoshio Matsumoto	2218
FrB4:	Control Theory and Application IV	
	Adaptive Control for Multirotor Systems with Completely Uncertain Dynamics Bingguo Mu, Ee Huei Ng, Pakpong Chirarattananon	2225
	GEO Debris Towing Removal Using Reel Control of Tethered Space Robots Zhongjie Meng	2231
	Estimation of Ankle Dorsiflexion Torque during Loading Response Phase for Spring Coefficient Identification Jing-Chen Hong, Yuta Fukushima, Shigeru Suzuki, Kazuhiro Yasuda, Hiroki Ohashi, Hiroyasu Iwata	2237
	Verification of Effectiveness and Construction of the Driver Turning Operation Model Introducing Feedback Control Kenta Mizutani, Soichiro Hayakawa, Ryojun Ikeura	2243
	Minimum-Jerk Trajectory Generation and Global Optimal Control for Permanent Magnet Spherical	2249
	Actuator Liu Jingmeng, Cai Shaoxiong, Weihai Chen, I-Ming Chen	
	A Robotic Hi-Lite Bolts/Collars Assembly System and Control Strategy Manxian Liu, Xuegang Liang, Changfa Wang, Cheng Zou, Wen Huang, Jian Wang, Yuyuan Chen	2255
FrB5:	Late-news II (Intelligent Systems I)	
	A Supervisory Hierarchical Control Approach for Text to 2D Scene Generation Yu Cheng, Zhiyong Sun, Sheng Bi, Congjian Li, Ning Xi	2261
	Autonomous Overtaking Decision Making of Driverless Bus Based on Deep Q-Learning Method Lingli Yu, Xuanya Shao, Xiaoxin Yan	2267
	From Cellular Automation to Renormalization: Looking into How Smart Cars Enhance the Roads Capacity Miaofeng Liu, Chaohan Cui, Wenjun Lv, Yu Kang	2273
	A Novel Method to Improve Transfer Learning Based on Mahalanobis Distance Chang'an Yi, Jiangjie Zhen, Yang Li, Yang Yi, Pengshuai Yin, Huaqing Min	2279
	Seeking true intelligence from the ground up: Evolutionary origins of cognition <i>Tyler Ray, Jerald Kralik</i>	2284
	Speech Classification Based on Compressive Sensing Measurement Sequence Guofei Zheng, Sheng Bi, Huaqing Min, Min Dong, Kaihong Yang	2292
FrB6:	Late-news III (Medical and Rehabilitation Robots I)	
	Hybrid Actuator Design for a Gait Augmentation Wearable Fang Wan, Zheng Wang, Brooke Franchuk, Xinyao Hu, Zhenglong Sun, Chaoyang Song	2298
	Modeling of Extensible Pneumatic Actuator with Bellows (EPAB) for Continuum Arm Taigo Yukisawa, Yasuaki Ishii, Satoshi Nishikawa, Ryuma Niiyama, Yasuo Kuniyoshi	2303
	NON-INVASIVE ACTIVE CAPSULE ENDOSCOPE INTEGRATED TARGETING BIOPSY FUNCTION BASED ON ELECTRO-MANGETIC ACTUATION SYSTEM VIET HA LE, Byungjeon Kang, Jayoung Kim, Kyungmin Lee, Manh Cuong Hoang, Van Du Nguyen, Eunovo Choi. Chana-Sei Kim. Jona-Oh Park	2309
	Respiratory Simulator for Robotic Respiratory Tract Treatments Maria Elena Giannaccini, Keren Yue, James Graveston, Martin Birchall, Andrew Conn, Jonathan Rossiter	2314
FrB7:	Late-news IV (Modeling and Control I)	
	Dynamic Modeling of Robot based on Neural Network with Incomplete State Observations Changjun Li, Fei Zhao, Tao Tao, Xuesong Mei	2320
	Euler-Lagrangian Modeling and Exact Trajectory Following Controlling of Ballbot-Like Robot <i>Baiquan Su, Yi Gong</i>	2325
	Implementation and Depth Control of an Active-and-compliant Propelled Robot Fish Yong Zhong, Fengran Xie, Jialei Song, Ruxu Du	2331

	Optimal Control of Robot Manipulators via Double Generating Functions Dijian Chen, Binrui Wang, Ling Wang	2337
	Orientation Planning in Task Space Using Quaternion Polynomials Mohammad Shahbazi, Navvab Kashiri, Darwin Caldwell, Nikolaos Tsagarakis	2343
	A New Intelligent Method for the Attitude Control of Inverted Pendulum Xiaoping Zhang, Xiaogang Ruan, Jing Huang	2349
FrP1:	Poster Session III	
	Translational and Tumbling Gaits for Trinal-branch Robots Zhao Jingdong, Han Junguang, Gu Yikun, Zhao Liangliang, Ni Fenglei, sun yongjun, fan shaowei, Liu Hong	2354
	Fast initialization method for monocular SLAM based on indoor model jisheng huang, ruyu liu, jianhua zhang, shengyong chen	2360
	Real-time Stereo-Vision Localization System for Safe Landing of Unmanned Aerial Vehicles Weiwei Kong, Tianjiang HU, jianwei zhang	2366
	Flocking Control of Amigobots with Newton's Method Cheng Jin, Wang Bin, Xu Yuan	2372
	Global Localization of a Mobile Robot Using Lidar and Visual Features Zerong Su, Xuefeng Zhou, Taobo Cheng, Hong Zhang, Baolai Xu, Weinan Chen	2377
	System Design of A Novel Wearable Hand Rehabilitation Robot Yang Zhang, Jian Zhao, Chunyu Pan, Hong Chang	2384
	Towards Robust and Optimal Image Stitching for Pavement Crack Inspection and Mapping Haifeng Li, Yu Liu, Longfei Fan, Xinwei Chen	2390
	CSDM: Fusion of Orthographic Contour Signature and Distribution Matrix for 3D Object Global Representation and Object Recognition Mingliang Fu, Haitao Luo, Weijia Zhou	2395
	Compression Based Distributed Dynamic Task Assignment Algorithms for Heterogeneous Multiple Unmanned Aerial Vehicles <i>Li Wang, Qiao Guo</i>	2401
	Railway Running Smoothness Monitoring Based on Visual Motion Parallax Peng Tang, Weidong Jin	2407
	Robot portrait rendering based on multi-features fusion method inspired by human painting <i>Tao Xue, Yong Liu</i>	2413
	UAV Formation Decision Making Algorithm Based on Knowledge Structure PGG Wei Zu, Haitao Zeng, Hongxing Chang, Yang Gao, Yao Ma, Jie Zhang, Yesheng Zhang	2419
	The ICP-based Controllability Criterion and Its Application to Bipedal Walking Control Yucheng Kang, Zhongyuan Tian, Mingguo Zhao	2425
	Quadruped robot's efficiency comprehensive evaluation based on modified projection pursuit Liming Li, Jing Zhao, Weijian Hu	2433
	Walking recognition method for physical activity analysis system of child based on wearable accelerometer Cheche Xie, Sheng Bi, Min Dong, Lan Li, Sunhuang Chi	2439
	INDOOR MAPPING USING GMAPPING ON EMBEDDED Lin Qinjie, Zhaowu Ke, Sheng Bi, Sirui Xu, Yuhong Liang, Fating Hong, Liqian Feng	2444
	Continuous Reinforcement Learning From Human Demonstrations With Integrated Experience Replay for Autonomous Driving Sixiang Zuo, Zhiyang Wang, Xiaorui Zhu, Yongsheng Ou	2450
	Three dimensional point cloud hole repairing strategy for binocular stereo reconstruction erjie nie, Jie Li, Rumei Zhang, Lei Cao, Liangliang Sun, Hao Liu	2456
	Research on Elastic Deformation Modeling of Collaborative Robots Mingwei Hu, Hongguang Wang, Xinan Pan, Yong Tian	2462
	Static Stiffness Modeling of the Prismatic Joint of a Modular Reconfigurable Robot Xinan Pan, Hongguang Wang, Mingwei Hu, Yong Tian	2468
	Drop Test for Evaluating Effect of Cushioning Material and Servo Gain on Parachute Landing Impact Using a Small One-Legged Robot Teppei Tsujita, Tadamasa Kitahara, Ryoya Tahara, Satoko Abiko, Atsushi Konno	2474

	Development of a Fishhook-Type Robot Hand: EEL-Hand Yang Liu, Akio NAMIKI, Seiichi TESHIGAWRA, Kazuteru TOBITA	2480
	Circular Distribution Multiple Electrodes for Differentiation and Control of C2C12 for Bio-syncretic Robots	N/A
	Chuang Zhang, Wenxue Wang, Ning Xi, Yuechao Wang, Lianqing Liu	
	A Review of Different Swimming Modes of Underwater Biomimetic Robot in Multiscales Wenjun Tan, Chuang Zhang, Lianging Liu	N/A
	Research and Implementation of Robot Arm Task Imitation System Based on RNN Jianjun Yu, Pengshen Wu, Naigong Yu, Guoyu Zuo, Yuan Zhang	2484
	Development of an Image-guided Surgical Robot for Bone Tumor Resection Lingzhi Kong, Lei Cao, Yuanyuan Zhou, Yanjun Pei, Shuo Guo, Jun Fu, Lianqing Liu, Zheng Guo, Hao Liu	2490
	UAV-Based SLAM and 3D Reconstruction System Tianwei Li, Steve Hailes, Simon Julier, Ming Liu	2496
FrC1:	Late-news V (SLAM and Navigation)	
	A Decentralized Algorithm for Collision-Free Search Tasks by Multiple Robots in 3D Areas Xiaotian Yang	2502
	An Indoor Navigation Algorithm Incorporating Representation of Qusai-State Environmental Object an Glass Surface Detection using LRF Sensor <i>Takuya Shiina, Zhidong Wang</i>	2508
	GPS/INS Integrated Navigation with BP Neural Network and Kalman Filter Yimin Zhou, Jiao Wan, Zhifei Li, Zhibin Song	2515
	Simultaneous Clustering Classification and Tracking on Point Clouds using Bayesian filter Sukai Wang, Ming Liu	2521
	Sensor Fault Diagnosis of GPS/INS Tightly Coupled Navigation System Based on State Chi-square Test and Improved Simplified Fuzzy ARTMAP Neural Network <i>Chang Liu, Honglun Wang, Na Li, Yue Yu</i>	2527
FrC2:	Late-news VI (Sensing)	
FrC2:	Late-news VI (Sensing) An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng	2533
FrC2:	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks	2533 2540
FrC2:	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model	
FrC2:	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot	2540
FrC2:	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots	2540 2548
FrC2:	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots Daniel Frank, Jimmy Chhor, Robert Schmitt Dynamic Posture Sensing Module Based on Micro IMU and Adaptive Filter Algorithm	2540 2548 2555
	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots Daniel Frank, Jimmy Chhor, Robert Schmitt Dynamic Posture Sensing Module Based on Micro IMU and Adaptive Filter Algorithm Mingyue Liu, Liang Xu, Weimin Zhang, Jie Cao, Guangyi Shi, Uche Wejinya Relative Posture-based Kinematic Calibration of a 6-RSS Parallel Robot by Using a Monocular Vision System	2540 2548 2555 2562
	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots Daniel Frank, Jimmy Chhor, Robert Schmitt Dynamic Posture Sensing Module Based on Micro IMU and Adaptive Filter Algorithm Mingyue Liu, Liang Xu, Weimin Zhang, Jie Cao, Guangyi Shi, Uche Weijnya Relative Posture-based Kinematic Calibration of a 6-RSS Parallel Robot by Using a Monocular Vision System Peng Cheng Li, Rui Zeng, Xiao Ming Zhang, Wen-Fang Xie	2540 2548 2555 2562
	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots Daniel Frank, Jimmy Chhor, Robert Schmitt Dynamic Posture Sensing Module Based on Micro IMU and Adaptive Filter Algorithm Mingyue Liu, Liang Xu, Weimin Zhang, Jie Cao, Guangyi Shi, Uche Wejinya Relative Posture-based Kinematic Calibration of a 6-RSS Parallel Robot by Using a Monocular Vision System Peng Cheng Li, Rui Zeng, Xiao Ming Zhang, Wen-Fang Xie Late-news VII (Humanoid Robots) Multi-parameter Optimization for Humanoid Robot Climbing Stairs	2540 2548 2555 2562 2567
	An Autonomous Elevator Button Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots Daniel Frank, Jimmy Chhor, Robert Schmitt Dynamic Posture Sensing Module Based on Micro IMU and Adaptive Filter Algorithm Mingyue Liu, Liang Xu, Weimin Zhang, Jie Cao, Guangyi Shi, Uche Wejinya Relative Posture-based Kinematic Calibration of a 6-RSS Parallel Robot by Using a Monocular Vision System Peng Cheng Li, Rui Zeng, Xiao Ming Zhang, Wen-Fang Xie Late-news VII (Humanoid Robots) Multi-parameter Optimization for Humanoid Robot Climbing Stairs Yang Yang, Yunda Liu, Yingjie Zhang, Siyu Wang, Sheng Bi, Jialiang Huang, Jiawei Zhang A Novel Self-adaptive Bionic Robot Hand With Flexible Fingers	2540 2548 2555 2562 2567 2573
	An Autonomous Elevator Buttor Buttor Recognition System Based on Convolutional Neural Networks Zijian Dong, Delong Zhu, Max QH. Meng Ask the OWL: Object Detection Constrained by a Probabilistic Ontological Model Georges Chahine, Daniel Asmar, Maya Antoun, Elie Shammas, Imad Elhajj Classification-lock Tracking Approach Applied on Person Following Robot Shenlu Jiang, Meng Hang, Tae-Yong Kuc, Sung-Hyeon Joo, Seon-Je Yang, Zhonghua Hong Stereo-vision for autonomous industrial inspection robots Daniel Frank, Jimmy Chhor, Robert Schmitt Dynamic Posture Sensing Module Based on Micro IMU and Adaptive Filter Algorithm Mingyue Liu, Liang Xu, Weimin Zhang, Jie Cao, Guangyi Shi, Uche Wejinya Relative Posture-based Kinematic Calibration of a 6-RSS Parallel Robot by Using a Monocular Vision System Peng Cheng Li, Rui Zeng, Xiao Ming Zhang, Wen-Fang Xie Late-news VII (Humanoid Robots) Multi-parameter Optimization for Humanoid Robot Climbing Stairs Yang Yang, Yunda Liu, Yingjie Zhang, Siyu Wang, Sheng Bi, Jialiang Huang, Jiawei Zhang A Novel Self-adaptive Bionic Robot Hand With Flexible Fingers Xiaohua Zhang, Ye Tian, Jinying Zhu, Haotian She, Xin Li, Wentao Sun Humanoid Running Based on Centroidal Dynamics and Heuristic Foot Placement	2540 2548 2555 2562 2567 2573 2573

### FrC4: Late-news VIII (Legged Robots)

	Design and Control of Robot Legs with Bi-articular Muscle-tendon Complex Ryuki Sato, Eiki Kazama, Aiguo Ming, Makoto Shimojo, Fei Meng, Huaxin Liu, Xuxiao Fan, Xuechao Chen, Zhanaauo Yu. Qiana Huana	2605
	Hexapod Robot Kinematics Modeling and Tripod Gait Design Based on the Foot End Trajectory Jianbo Sun, Jie Ren, Yinglian Jin, Binrui Wang, Dijian Chen	2611
	Leg Design For Running and Jumping Dynamics Daniel Blackman, John Nicholson, Jason Pusey, Max Austin, Charles Young, Jason Brown, Jonathan Clark	2617
	Maximize-perturb-minimize: a fast and effective heuristic to obtain sets of locally optimal robot postures	2624
	Martim Brandao, Kenji Hashimoto, Atsuo Takanishi	
	Sensor-Based Legged Robot Homing Using Range-Only Target Localization Vasileios Vasilopoulos, Omur Arslan, Avik De, Daniel E. Koditschek	2630
	Weak Actuators Generate Adaptive Animal Gaits without a Brain Yoichi Masuda, Keisuke Naniwa, Masato Ishikawa, Koichi Osuka	2638
FrC5:	Late-news IX (Intelligent Systems II)	
	Learning Complex Assembly Skills from Kinect based Human Robot Interaction xiao li, Hongtai Cheng, guangfei Ji, jiaming Chen	2646
	HyperNEAT-based flipper control for a crawler robot motion in 3D simulation environment Maxim Sokolov, Ilya Afanasyev, Alexandr Klimchik, Nikolaos Mavridis	2652
	Intrusion Detection Research of Control System Based on Robot Arm Zhang Lei, lun xie	2657
	Learning Object Recognition based on Compressive Sampling Congjian Li, Yu Cheng, Sheng Bi, Yingfeng Cai, Ning Xi	2663
	A Novel Swarm Robot Simulation Platform for Warehousing Logistics Yandong Liu, Lujia Wang, Huaiyang Huang , Ming Liu, Cheng-zhong Xu	2669
FrC6:	Late-news X (Medical and Rehabilitation Robots II)	
	A Close-loop EMG Model for Continuous Joint Movements Estimation of a Rehabilitation Robot Fei WANG, Chengdong Wu	2675
	A New Type of Soft Pneumatic Elbow Xifeng Gao, Yao Sun, Lina Hao, Chaoqun Xiang, Hongtai Cheng	2681
	Active tracking movements of flexion and extension on the elbow joint for an initial prototype of EMG-driven assistant exoskeleton <i>Ping Wang, yabo wang, Qian Zhang, Feng Ru</i>	2687
	Bio-inspired Wearable Soft Upper-Limb Exoskeleton Robot for Stroke Survivors Ning Li, Peng Yu, Tie Yang, Liang Zhao, Ziwen Liu, Ning Xi, Lianqing Liu	2693
	Development of a Smart Insole Device for Lower Limb Postoperative Rehabilitation Training Shaolong Kuang, Yinfang Fang, Xiao Cheng, Fangxia Li, Liansen Sha, Wen Zhao	2699
	Prescribed Performance Velocity Field Control of Robotic Exoskeletons with Neural Network Hamed Jabbari Asl, Tatsuo Narikiyo, Michihiro Kawanishi	2704
FrC7:	Late-news XI (Modeling and Control II)	
	Adaptive neural network tracking control of snake-like robots via a deterministic learning approach Limei Zhao, Qing Xiao, Zhengcai Cao, Ran Huang, Yili Fu	2710
	Smooth transition of the CPG-based controller for snake-like robots Dong Zhang, Qing Xiao, Zhengcai Cao, Ran Huang, Yili Fu	2716
	Finite-time Decoupling Direct Control for Hypersonic Reentry Vehicle with Multiple Disturbances via Second-order ADRC Yue Yu, Honglun Wang, Na Li, Huiping Zhang, Chang Liu	2722
	Pareto-Front Analysis of a Monotonic PI Control Law for Slip Suppression in a Robotic Manipulator Anna Prach, John-John Cabibihan, Nitish V. Thakor, Dennis S. Bernstein	2728
	Bilateral Teleoperation System for a Musculoskeletal Robot Arm using a Musculoskeletal Exoskeleton	2734
	Xi Chen, Satoshi Nishikawa, Kazutoshi Tanaka, Ryuma Niiyama, Yasuo Kuniyoshi	