2018 WRC Symposium on Advanced Robotics and Automation (WRC SARA 2018)

Beijing, China 16 August 2018



IEEE Catalog Number: CFP18Q58-POD **ISBN:**

978-1-5386-7676-9

Copyright © 2018 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:	CFP18Q58-POD
ISBN (Print-On-Demand):	978-1-5386-7676-9
ISBN (Online):	978-1-5386-7675-2

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



Content List of WRC Symposium on Advanced Robotics and Automation 2018

ThPO	Foyer
Poster Session (Poster Sessions)	Ohiba bad af Tach
Chair: Wang, Zhidong Co-Chair: Xu, Jing	Chiba Inst. of Tech
10:30-11:00	Tsinghua Univ ThPO.1
	ntrol System Integrated with Real-Time Machine Vision, pp. 1-6.
Attachment	
Liu, Yanan	Univ. of Bristol
Hu, Tianliang	Shandong Univ
Ni, Hepeng	Shandong Univ
Zhang, Chengrui	Shandong Univ
Lin, Bao	Shandong Univ
Judd, Euan	Univ. of Bristol
10:30-11:00	ThPO.2
Table Tennis Robot Motion Modeling and Strikir	
Sun, Lishu	Jiangsu Univ. of Science and Tech
Gu, liwen	Jiangsu Univ. of Science and Tech
10:30-11:00	ThPO.3
Mechanical Design of Dexterous Bionic Leg with	Single-DOF Planar Linkage, pp. 14-21.
Zang, Hongbin	Univ. of Science and Tech. of China
Li, Dongyi	Univ. of Science and Tech. of China; Southwest Univ
Shen, Lianguan	Univ. of Science and Tech. of China
10:30-11:00	ThPO.4
The Effect of Different Scales on the Crawling R	Pate of Bionic Snake Robot, pp. 22-27.
Zhu, Nana	Southwest Univ. of Science and Tech
Zang, Hongbin	Univ. of Science and Tech. of China
Liao, Bing	Southwest Univ. of Science and Tech
liu, Dongsheng	Southwest Univ. of Science and Tech
Tuo, Jiangmin	Southwest Univ. of Science and Tech
Zhou, Tao	Southwest Univ. of Science and Tech
Wang, Qian	Southwest Univ. of Science and Tech
10:30-11:00	ThPO.5
Target Recognition and Optimal Grasping Based	d on Deep Learning, pp. 28-33.
Lin, Qingquan	Fuzhou Univ
Chen, Dan	Fuzhou Univ
10:30-11:00	ThPO.6
Analysis of Gait Stability Criterion Based on Cog	gnition of Human Walking Balance Mechanism, pp. 34-39.
Wu, Xiaoguang	Yanshan Univ. Qinhuangdao, Hebei 066004, China
Yang, Lei	Yanshan Univ. Qinhuangdao, Hebei
Liu, Shaowei	Yanshan Univ
Wang, Tingjin	Yanshan Univ. Qinhuangdao, Hebei 066004, China
Li, Yanhui	Yanshan Univ. Qinhuangdao, Hebei
Wei, Lei	Yanshan Univ. Qinhuangdao, Hebei 066004, China
10:30-11:00	ThPO.7
Motion Control for Biped Robot Via DDPG-Based	d Deep Reinforcement Learning, pp. 40-45.
Wu, Xiaoguang	Yanshan Univ. Qinhuangdao, Hebei 066004, China
Liu, Shaowei	Yanshan Univ
Zhang, Tianci	Yanshan Univ
Yang, Lei	Yanshan Univ. Qinhuangdao, Hebei
Li, Yanhui	Yanshan Univ. Qinhuangdao, Hebei
Wang, Tingjin	Yanshan Univ. Qinhuangdao, Hebei 066004, China
· ··	
10:30-11:00	ThPO.8

Technical Program for Thursday August 16, 2018

Cooperative Motion Planning of Dual Industrial Robots Via Offline Programming (I), pp. 46-51. Hu, Fuwen

10:30-11:00	ThPO.9
Object Detection for Soft Robotic Manipulation Based	on RGB-D Sensors (I), pp. 52-58. North China Univ. of Tech
Hu, Fuwen 10:30-11:00	ThPO.10
An Efficient Layered Robot Path Planning Approach Ba	
Wu, Han	Fudan Univ
Shang, Huiliang	Fudan Univ
10:30-11:00	ThPO.11
Review of the Research of Free-Flying Vehicle in Space	
Zhang, Chen	Univ. of Chinese Acad. of Sciences
Li, Zongfeng	Tech. and Engineering Center for Space Utilization Chinese
	· · ·
10:30-11:00	ThPO.12
Robot Path Planning Based on Improved Ant Colony A	
Jia, Yunhui Wang, Tao	Tianjin Univ. of Tech Tianjin Univ. of Tech
Zhao, Lianyu	Tianjin Univ. of Tech
Wang, Jutao	Tianjin Univ. of Tech
	· · ·
10:30-11:00	ThPO.13
Flight Trajectory Simulation of Robotic Throwing Shut	
Hu, Fuwen	North China Univ. of Tech
10:30-11:00	ThPO.14
A Soft Flytrap-Like Manipulator with Single Airbag Sh	
Liu, Dongsheng	Southwest Univ. of Science and Tech
Zang, Hongbin	Univ. of Science and Tech. of China
Tuo, Jiangmin	Southwest Univ. of Science and Tech
Zhu, Nana	Southwest Univ. of Science and Tech
Liao, Bing	Southwest Univ. of Science and Tech
He, Tao	Southwest Univ. of Science and Tech
Hu, Lei	SWUST
10:30-11:00	ThPO.15
System Design and Experiment of Bionics Robotic Arr	
Liao, Bing Zang, Hongbin	Southwest Univ. of Science and Tech Univ. of Science and Tech. of China
Zhu, Nana	Southwest Univ. of Science and Tech
	Southwest Univ. of Science and Tech
liu, Dongsheng Tuo, Jiangmin	Southwest Univ. of Science and Tech
Hu, Lei	Southwest only. Of Science and rech
He, Tao	Southwest Univ. of Science and Tech
Yang, Zheng	Southwest Univ. of Science and Tech
10:30-11:00	ThPO.16
Discrete Element Simulation of Mechanics Properties	of Single Edge Notched Hydrogel-A New Material for Soft Robot
and Sensor, pp. 96-101.	A man
Gao, Tianyun	Anhui Medical Univ
Li, Didi	Anhui Medical Univ
Jin, Guoqing	Soochow Univ
Liang, Haiyi Yang, Runhuai	Harvard Univ Anhui Medical Univ
·	
10:30-11:00	ThPO.17
	ask Allocation Problem with Time Constraints, pp. 102-107.
Chen, Xinye	South China Univ. of Tech
Zhang, Ping	South China Univ. of Tech
Li, Fang	South China Univ. of Tech
Du, Guanglong	South China Univ. of Tech

10:30-11:00	ThPO.18
A Human-Swarm Interaction Method Based on A	Augmented Reality, pp. 108-114.
Chen, Mingxuan	South China Univ. of Tech
Zhang, Ping	South China Univ. of Tech
Chen, Xiaodan	South China Univ. of Tech
Zhou, Yuliang	South China Univ. of Tech
Li, Fang	South China Univ. of Tech
Du, Guanglong	South China Univ. of Tech
10:30-11:00	ThPO.19
Automatic Grasp Planning Using Depth Image fo	or Robotic Manipulator, pp. 115-122.
Zhang, Bo	South China Univ. of Tech
Du, Guanglong	South China Univ. of Tech
Zhang, Ping	South China Univ. of Tech
Li, Fang	South China Univ. of Tech
Chen, Xinye	South China Univ. of Tech
10:30-11:00	ThPO.20
Design of Inspection System for Railway Engine	Room Based on Visual Detection, pp. 123-128.
Hao, Junzheng	China Railway Jinan Group Co., Lto
Dai, Meng	China Railway Jinan Group Co., Lto
Zong, Xiaopeng	Jiaxun Feihong Intelligent Tech. Ins
10:30-11:00	ThPO.2
Cooperative Control of Robotic Swarm Based on	Self-Organized Method and Human Swarm Interaction, pp. 129-134.
Wang, Linna	China Acad. of Launch Vehicle Tech
Dai, Jing	China Acad. of Launch Vehicle Tech
Cheng, Qifeng	Liaoning Tech. Univ
Guan, Qixue	Shenyang Ligong Univ
10:30-11:00	ThPO.22
Research and Realization of Robot Experiment S	ystem Based on Virtuality and Actuality, pp. 135-140.
Yang, Zelin	Beijing Inst. of Precision Mechanical and Electrica
Li, Tongtong	Beijing Inst. of Precision Mechanical and Electrica
Yang, Tao	Beijing Inst. of Precision Mechanical and Electrica
Wang, Yanbo	Beijing Res. Inst. of Precise Mechatronics and Controls
Deng, Tao	Beijing Res. Inst. of Precise Mechatronics and Controls
10:30-11:00	ThPO.23
Multi-Moving Target Detection Based on the Con Difference Algorithm, pp. 141-146.	nbination of Three Frame Difference Algorithm and Background
He, Hong	Tianjin Univ. of Tech
Ma, Shichao	Tianjin Univ. of Tech
Sun, Lei	Tianjin Univ. of Tech
10:30-11:00	ThPO.24
	Sensor Fault of Wheel Legged Robot Based on Deep Learning, pp.
Gao, Zhou	Beijing Inst. of Tech
Ma, Liling	Beijing Inst. of Tech
Wang, Junzheng	Beijing Inst. of Tech
6, 0	ThPO.2
10:30-11:00	
10:30-11:00 Improved Monocular ORB-SLAM2 Inspired by th	e Optical Flow with Better Accuracy. pp. 153-158.
Improved Monocular ORB-SLAM2 Inspired by the	
Improved Monocular ORB-SLAM2 Inspired by the Wang, Yifan	Fudan Univ
Improved Monocular ORB-SLAM2 Inspired by the Wang, Yifan Shang, Huiliang	Fudan Univ Fudan Univ
Improved Monocular ORB-SLAM2 Inspired by the Wang, Yifan Shang, Huiliang 10:30-11:00	Fudan Univ Fudan Univ ThPO.26
Improved Monocular ORB-SLAM2 Inspired by the Wang, Yifan Shang, Huiliang 10:30-11:00 Pose Estimation of Flying Object Based on Mono	Fudan Univ Fudan Univ ThPO.26 cular Camera Feature Point Detection, pp. 159-164.
Improved Monocular ORB-SLAM2 Inspired by the Wang, Yifan Shang, Huiliang 10:30-11:00	Fudan Univ Fudan Univ ThPO.26

10:30-11:00	ThPO.27
WiFi Localization Methods for Autonomous Robots, pp. 165-171.	
Jia, Yunhui	Tianjin Univ. of Tec
Wang, Tao	Tianjin Univ. of Tec
Zhao, Lianyu	Tianjin Univ. of Tec
Wang, Jutao	Tianjin Univ. of Tecl
10:30-11:00	ThPO.28
A SLAM Algorithm of Fused EKF and Particle Filter, pp. 172-177.	
He, Hong	Tianjin Univ. of Tec
Wang, Kai	Tianjin Univ. of Tec
Sun, Lei	Tianjin Univ. of Tecl
10:30-11:00	ThPO.2
Global Localization Using Object Detection in Indoor Environment, pp.	
Dong, Hongyi	Beihang Uni
Chou, Wusheng	Beihang Uni
Jiao, Ran	Beihang Uni
Xu, Song	Beihang Uni
Yu, Hao	Beihang Uni
10:30-11:00	ThPO.3
Multi-Sensor Fusion Glass Detection for Robot Navigation and Mappin	
Wei, Hao	Chinese Acad. of Science
Li, Xue-en	Chinese Acad. of Sciences
Shi, Ying	Chinese Acad. of Science
You, Bo	Chinese Acad. of Science
Xu, Yi	Chinese Acad. of Science
Th1AB Advanced Industrial Robots, Mechanisms and Control (Regular Sessions)	
	Shenzhen Acad. of Robotics
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15	Room AE Shenzhen Acad. of Robotics National Cheng Kung Univ Th1AB.
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB.
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194.	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKL
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB.
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB.
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB.
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKU Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKL Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of China Univ. of Science and Tech. of China
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Univ. of Science and Tech. of China Univ. of Science and Tech. of China
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45 A Robotic Additive Manufacturing Process Simulation and Implementa Zhang, George	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni Notking Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45 A Robotic Additive Manufacturing Process Simulation and Implemental	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni Notking Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45 A Robotic Additive Manufacturing Process Simulation and Implementa Zhang, George 11:45-12:00	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni Notking Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45 A Robotic Additive Manufacturing Process Simulation and Implementa Zhang, George 11:45-12:00 Research on Numerical Control System of the Mobile Robotic Equipmental Research on Numerical Control System of the Mobile Robotic Equipmental Research on Numerical Control System of the Mobile Robotic Equipmental Research on Numerical Control System of the Mobile Robotic Equipmental Research on Numerical Control System of the Mobile Robotic Equipmental Research on Numerical Control System of the Mobile Robotic Equipmental Chen, Science Scie	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45 A Robotic Additive Manufacturing Process Simulation and Implementa Zhang, George 11:45-12:00 Research on Numerical Control System of the Mobile Robotic Equipmon Zhao, Changxi	Shenzhen Acad. of Robotic National Cheng Kung Uni Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Uni National Cheng Kung Uni NCKI Th1AB. Oper, pp. 195-201. Univ. of Science and Tech. of Chin Univ. of Science and Tech. of Chin
Advanced Industrial Robots, Mechanisms and Control (Regular Sessions) Chair: Zhang, George Co-Chair: Liu, Chih-Hsing 11:00-11:15 Topology Synthesis, Prototype, and Test of an Industrial Robot Grippe Handling of Fragile Objects, pp. 189-194. Liu, Chih-Hsing Chen, Ta-Lun Pai, Tzu-Yang Chiu, Chen-Hua Peng, Wei-Geng Hsu, Mao-Cheng 11:15-11:30 An Automatic Grasp System with Sensor Feedback Based on Soft Grip Wu, Peichen Lin, Nan Duan, Yifan Lei, Ting Chai, Lei Chen, Xiaoping 11:30-11:45 A Robotic Additive Manufacturing Process Simulation and Implementa Zhang, George 11:45-12:00 Research on Numerical Control System of the Mobile Robotic Equipma Zhao, Changxi Wen, Ke	Shenzhen Acad. of Robotics National Cheng Kung Univ Th1AB. er with 3D Printed Compliant Fingers for National Cheng Kung Univ National Cheng Kung Univ NCKU Th1AB.2 Oper, pp. 195-201. Univ. of Science and Tech. of China Univ. of Science and Tech. of China

12:00-12:15	Th1AB.5
Direct Kinematics for a Novel Robotic System Used As External I	
Akçalı, İbrahim Deniz	Cukurova Univ
Avşar, Ercan	Cukurova Univ
Mutlu, Hüseyin	Mersin Univ
Aydın, Ahmet	Cukurova Univ
2:15-12:30	Th1AB.6
Semi-Parametric Decentralised Adaptive Control of Discrete-Tim	
Li, Shan	Beijing Inst. of Tech. Normal Univ
Ma, Hongbin	Beijing Inst. of Tech
Wang, Xin	Beijing Inst. of Tech
Li, Zhuang	Beijing Inst. of Tech
Th2AB	Room AB
Biomimetic Robots and Systems (Regular Sessions)	
Chair: Evangelista, Guillermo	Univ. Privada Antenor Orrego
Co-Chair: Mousa, Abdulrahman	Beihang Univ. of Aeronautics and Astronautics
13:45-14:00	Th2AB.1
Gliding Pitch Control Model of Bionic Flying Squirrel Robot, pp. 22	
Wang, Linqing	Beihang Univ
Wang, Wei	Beihang Uni
Li, Xuepeng	Beihang Univ
Zhao, Fei	Beihang Uni
Quan, Hualin	Beihang Univ
14:00-14:15	Th2AB.2
Analysis and Research on Multi-Joint Power-Assisted Exoskeleton	
Zhou, Feng	Univ. of Electronic Science and Tech. of China
4:15-14:30	Th2AB.3
Fully-Pipelined CORDIC-Based FPGA Realization for a 3-DOF Hex	kapod-Leg Inverse Kinematics Calculation, pp. 237-242.
Evangelista, Guillermo	Univ. Privada Antenor Orrego
Olaya Reyes, Carlos Roger	Univ. Privada Antenor Orrego
Rodríguez Dávila, Erick Jesús	Univ. Privada Antenor Orrego
4:30-14:45	Th2AB.4
Self-Driving 3-Legged Crawling Prototype Capsule Robot with Or 243-248.	rientation Controlled by External Magnetic Field, pp.
Mousa, Abdulrahman	Beihang Univ. of Aeronautics and Astronautics
Feng, Lin	Beihang Univ
-	
Dai, Yuguo	Beihang Uni
Dai, Yuguo Tovmachenko. Oksana	Beihang Univ. of Aeronautics and Astronautics
Tovmachenko, Oksana	Beihang Univ. of Aeronautics and Astronautic
Tovmachenko, Oksana 14:45-15:00	Beihang Univ. of Aeronautics and Astronautic Th2AB.
Tovmachenko, Oksana 14:45-15:00	Beihang Univ. of Aeronautics and Astronautics Th2AB. pp. 249-254.
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag,	Beihang Univ. of Aeronautics and Astronautics Th2AB. pp. 249-254. Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, Tuo, Jiangmin	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China
Tovmachenko, Oksana 14:45-15:00 A <i>Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag</i> , Tuo, Jiangmin Zang, Hongbin	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, Tuo, Jiangmin Zang, Hongbin Shu, Yanxin	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, J Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana	Beihang Univ. of Aeronautics and Astronautics Th2AB.9 pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, J Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing	Beihang Univ. of Aeronautics and Astronautics Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, J Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, [Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian 15:00-15:15	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tec Univ. of Science and Tech. of Chin Southwest Univ. of Science and Tec Southwest Univ. of Science and Tec
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, J Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian 15:00-15:15	Beihang Univ. of Aeronautics and Astronautics Th2AB.9 pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, I Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian 15:00-15:15 Design and Control of a Soft Combined Actuator, pp. 255-26	Beihang Univ. of Aeronautics and Astronautic Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech Univ. of Science and Tech. of China
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, p Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian 15:00-15:15 Design and Control of a Soft Combined Actuator, pp. 255-26 Lin, Nan	Beihang Univ. of Aeronautics and Astronautics Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Southwest Univ. of Science and Tech Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Univ. of Science and Tech. of China
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, I Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian 15:00-15:15 Design and Control of a Soft Combined Actuator, pp. 255-26 Lin, Nan Wu, Peichen Menghao, Wang	Beihang Univ. of Aeronautics and Astronautics Th2AB. pp. 249-254. Southwest Univ. of Science and Tech Univ. of Science and Tech Southwest Univ. of Science and Tech Univ. of Science and Tech. of China Univ. of Science and Tech. of China Univ. of Science and Tech. of China
Tovmachenko, Oksana 14:45-15:00 A Peristaltic Bionic Robot Controlled by a Single Elastic-Gasbag, I Tuo, Jiangmin Zang, Hongbin Shu, Yanxin Liu, Dongsheng Zhu, Nana Liao, Bing Zhou, Tao Wang, Qian 15:00-15:15 Design and Control of a Soft Combined Actuator, pp. 255-26 Lin, Nan Wu, Peichen	Beihang Univ. of Aeronautics and Astronautics Th2AB.

Th3AB Vision and Robotic Sensing (Regular Sessions)	Room AE
Chair: Yuan, Shuai	Shenyang Jianzhu Univ
Co-Chair: Huang, Kai	Sun Yat-Sen Uni
15:20-15:35	Th3AB.
A Comparison of Methods of Facial Expression Recognition	
Chen, Yingjie	Peking Uni
Wu, Han	Peking Uni
Wang, Tao	Peking Uni
Wang, Yizhou	Peking Uni
15:35-15:50	Th3AB.
Image Defogging Algorithm Based on Image Bright and	
Wen, Shuhuan	Yanshan Uni
Zhao, Yanfang	Yanshan Uni
Ma, Jinrong	Yanshan Uni
Lam, Hak-Keung	King's Coll. Londo
Wang, Hongbin	Yanshan Uni
	Th3AB.
15:50-16:05 Human Posture Recognition Using Skeleton and Depth II	
Cao, Bo	Beijing Univ. of Aeronautics and Astronautic
Bi, Shusheng	Beihang Uni
Jingxiang, Zheng Yang, Dongsheng	Beihang Uni Beihang Uni
0 0 0	· · ·
16:05-16:20	Th3AB.
Kinect-Based Human Body Tracking System Control of M	
Long, Yanran	Shanghai Uni
16:20-16:35	Th3AB.
Calibration of Event-Based Camera and 3D LiDAR, pp. 28	
Song, Rihui	Sun Yat-Sen Univ. Guangzhou, Chin
Jiang, Zhihua	Sun Yat-Sen Uni
Li, Yanghao	Sun Yat-Sen Uni
Shan, Yunxiao	Sun Yat-Sen Uni
Huang, Kai	Sun Yat-Sen Uni
16:35-16:50	Th3AB.
DSmT Based Detection Model of the Ultrasonic Sensor fo	
Han, Xiaoying	Shenyang Jianzhu Uni
Yuan, Shuai	Shenyang Jianzhu Uni
Yan, Xue	Shenyang Jianzhu Uni
wang, peifu	Shenyangjianzhu Uni
MAO, HongMin	ShenYangJianZhu Uni
Th4AB	
Space and Underwater Robotic Applications (Regular Sessio	
Chair: Huang, Haibin	Harbin Inst. of Tech. Weiha
Co-Chair: Lin, Jun	Engineering Services In
16:55-17:10	Th4AB.
Development of a Terrain Adaptive Tracked Vehicle and	
Lin, Jun	Engineering Services In
17:10-17:25 The December of an Association Mathed for a Space Mia	Th4AB.
The Research of an Acceleration Method for a Space Mic	
Deng, songbo	Beijing Res. Inst. of Precise Mechatronics and Control
	Beijing Res. Inst. of Precise Mechatronics and Control
cai, he	
cai, he li, ke	Beijing Res. Inst. of Precise Mechatronics and Control
cai, he	

17:25-17:40	Th4AB.3
Autonomous Underwater Vehicle Docking System Based	on Wired Transmission, pp. 314-319.
Guo, Jingqian	Northeastern Univ
Zheng, Rong	Shenyang Inst. of Automation Chinese Acad. of Sciences
Yu, Xiaolei	Northeastern Univ
Wei, Aobo	Univ. of Chinese Acad. of Sciences
Yang, Bo	Shenyang Inst. of Automation, the Chinese Acad. of Science
17:40-17:55	Th4AB.4
V-Shaped Wing Design and Hydrodynamic Analysis Base	ed on Moving Base for Recovery AUV, pp. 320-325.
Bai, Guiqiang	Univ. of Chinese Acad. of Sciences
Gu, Haitao	Chinese Acad. of Sciences
Zhang, Haiting	Shenyang Inst. of Automation
Meng, Lingshuai	Univ. of Chinese Acad. of Sciences
Tang, Dongsheng	Shenyang Inst. of Automation
17:55-18:10	Th4AB.5
Line-Of-Sight Path Following of an Underactuated USV E 326-333.	xposed to Ocean Currents Using Cascaded Theorem, pp.
Huang, Haibin	Harbin Inst. of Tech. Weihai
Li, Yanan	Harbin Inst. of Tech
zhuang, Yufei	Harbin Inst. of Tech. Weihai
Gong, Mian	Harbin Inst. of Tech
Sharma, Sanjay	Univ. of Plymouth
Xu, Dianguo	Harbin Inst. of Tech
18:10-18:25	Th4AB.6
AUV Vertical Motion Control Based on Kalman Filtering, p	pp. 334-339.
Wei, Aobo	Univ. of Chinese Acad. of Sciences
Zheng, Rong	Shenyang Inst. of Automation Chinese Acad. of Sciences
Guo, Jingqian	Northeastern Univ