

2019 16th International Conference on Ubiquitous Robots (UR 2019)

**Jeju, South Korea
24 – 27 June 2019**



**IEEE Catalog Number: CFP1928P-POD
ISBN: 978-1-7281-3233-4**

**Copyright © 2019 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:	CFP1928P-POD
ISBN (Print-On-Demand):	978-1-7281-3233-4
ISBN (Online):	978-1-7281-3232-7
ISSN:	2325-033X

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

An Algorithm of Hand-Eye Calibration for Arc Welding Robot	1
<i>Jiang Zeng, Guang-Zhong Cao, Wen-Bo Li, Bao-Chang Chen</i>	
Multi-Factor and Multi-Object Optimization for Foundation Brake Device in Railway Freight Car	7
<i>Zhaoxiang Li, Chao Xu, Jiamming Zhu, Bihong Lu</i>	
A Source Switching Planning Method for the Feed Support System of FAST	12
<i>Rui Yao, Jinghai Sun, Chun Sun</i>	
Design of Gibbon-Like Crawling Robot for High Voltage Transmission Line Inspection	16
<i>Pengcheng Zhu, Aibin Zhu, Qichen Zhang, Yingxu Wang, Xiaodong Zhang, Guang-Zhong Cao</i>	
Flexible Piezoelectric Sensor Array for Touch Sensing of Robot Hand	21
<i>Sohyun Kim, Hyunho Shin, Kahye Song, Youngsu Cha</i>	
Pose Estimation Technique of Scattered Pistons Based on CAD Model and Global Feature	26
<i>Tangfei Tao, Jiayu Xu, Xiang Zheng, Hua He, Sicong Zhang, Min Li, Guanghua Xu</i>	
Performance Evaluation of a "Switch-To-Target" Based Asynchronous SSVEP BCI Paradigm.....	32
<i>Yubin Zhang, Jun Xie, Guanghua Xu, Peng Fang, Guangjing Du, Xiaodong Zhang, Min Li, Sicong Zhang, Tangfei Tao, Hua Yuan</i>	
A New Brain-Computer Interface Paradigm Based on Steady-State Visual Evoked Potential of Illusory Pattern Motion Perception.....	38
<i>Haochong Wang, Guanghua Xu, Yifan Wu, Chengcheng Han, Sicong Zhang</i>	
Retrieving Objects from Clutter Using a Mobile Robotic Manipulator.....	44
<i>Kibeom Kim, Jinhwi Lee, Changwan Kim, Changjoo Nam</i>	
Vibration Characteristics Analysis of Human Riding Comfort for Transporting Posture of Elderly-Assistant and Walking-Assistant Robot.....	49
<i>Haipeng Xu, Xiaodong Zhang, Xiaoqi Mu</i>	
Lessons Learned from the Development and Deployment of a Hotel Concierge Robot to Be Operated in a Real World Environment.....	55
<i>Min Sung Ahn, Daniel Sun, Hosik Chae, Itsui Yamayoshi, Dennis Hong</i>	
On the Number of Training Samples for Inverse Kinematics Solutions by Artificial Neural Networks.....	61
<i>Dongwon Lim, Yong Kwon Lee</i>	
Touch Gesture Recognition System Based on 1D Convolutional Neural Network with Two Touch Sensor Orientation Settings	65
<i>Joo-Hye Park, Juhwan Seo, Young-Hoon Nho, Dong-Soo Kwon</i>	
A Monitoring System to Support Home Health Care for the Elderly with Dementia by Detecting Going Out Activities Based on RGB-D Sensors	71
<i>Guhnoo Yun, Kijung Kim, Sung-Kee Park, Dong Hwan Kim</i>	
Visual Loop Closure Detection Over Illumination Change.....	77
<i>Seongwon Lee, Hyunggi Jo, Hae Min Cho, Euntai Kim</i>	
Stair-Mapping with Point-Cloud Data and Stair-Modeling for Quadruped Robot	81
<i>Seungjun Woo, Jinjae Shin, Yoon Haeng Lee, Young Hun Lee, Hyunyong Lee, Hansol Kang, Hyouk Ryeol Choi, Hyungpil Moon</i>	
Improved Adaptive PID Control Using Time-Delay Estimation for Robot Manipulators.....	87
<i>Junyoung Lee, Sang Hyun Park, Pyung Hun Chang, Jin-Ho Suh, Kap-Ho Seo, Maolin Jin</i>	
Online Panorama Image Generation for a Disaster Rescue Vehicle	92
<i>Kanat Sovetov, Jun-Sik Kim, Doik Kim</i>	
UWB-Based Indoor Localization Using Ray-Tracing Algorithm	98
<i>Jieum Hyun, Taekjun Oh, Hyungtae Lim, Hyun Myung</i>	
Convolutional Neural Network for Raindrop Detection	102
<i>In-Gyu Bae, Seongbae Bang, Wonha Kim</i>	
A Deep Learning Based Submerged Body Classification Using Underwater Imaging Sonar	106
<i>Sejin Lee, Byungjae Park, Ayoung Kim</i>	
Grasping Method in a Complex Environment Using Convolutional Neural Network Based on Modified Average Filter	113
<i>Da-Wit Kim, Hyunjun Jo, Jae-Bok Song</i>	
Multi-Rotor Robot Learning to Fly in a Bio-Inspired Way Using Reinforcement Learning	118
<i>Amir Ramezani Dooraki, Deok-Jin Lee</i>	
Odometry Estimation CNN Using Sparse LiDAR Data	124
<i>Hae Min Cho, Hyunggi Jo, Seongwon Lee, Euntai Kim</i>	

Experimental Verification of Nonlinear Characteristics with Hysteresis in Variable Stiffness Robotic Joint	128
<i>Tatsuya Ohe, Jae Hoon Lee, Shingo Okamoto</i>	
Design and Development of a Portable Machining Robot with Parallel Kinematics	133
<i>Xin-Jun Liu, Zenghui Xie, Fugui Xie, Jinsong Wang</i>	
Operation Mode Comparison of Three 1T2R Parallel Mechanisms Based on Geometric Constraints	137
<i>Kai Liu, Jingjun Yu, Xinjun Liu</i>	
Review of Dimension Inhomogeneity in Robotics	143
<i>Long Kang, Sang-Hwa Kim, Whee Kuk Kim, Byung-Ju Yi</i>	
Friction Model of a Robot Manipulator Considering the effect of Gravitational torque	154
<i>Tae-Jung Kim, Kuk Hyun Ahn, Jae-Bok Song</i>	
End-To-End Robot Manipulation Using Demonstration-Guided Goal Strategies	159
<i>Cheol-Hui Min, Jae-Bok Song</i>	
6-DOF Robotic Obstacle Avoidance Path Planning Based on Artificial Potential Field Method	165
<i>Shengnan Gai, Rui Sun, Shujun Chen, Shuting Ji</i>	
Mobile Manipulation for the HSR Intelligent Home Service Robot	169
<i>Jae-Bong Yi, Seung-Joon Yi</i>	
Integration to Deep Learning-Based Object Detection and Robot Manipulator for Grasping Objects	174
<i>Hyunsoo Shin, Hwang Hyunho, Hyunseok Yoon, Sungon Lee</i>	
Deep Learning Based Real-time Daily Human Activity Recognition and Its Implementation in a Smartphone	179
<i>Tsige Tadesse Alemayoh, Jae Hoon Lee, Shingo Okamoto</i>	
Impedance Control of Series Elastic Actuators in Exoskeleton Using Recurrent Neural Network	183
<i>Qichen Zhang, Aibin Zhu, Yuexuan Wu, Pengcheng Zhu, Xiaodong Zhang, Guang-Zhong Cao</i>	
Neural Network-Based Long-Term Place Recognition from Omni-Images	189
<i>Jongwon Lee, Ayoung Kim</i>	
Autonomous Coverage Path Planning and Navigation Control System for Search Operations Using a UAV	194
<i>Francisco Renteria Rochin, Hirotake Yamazoe, Joo-Ho Lee</i>	
LPS: A Local Positioning System for Homogeneous and Heterogeneous Robot-Robot Teams, Robot-Human Teams, and Swarms	200
<i>Chris Taylor, Colin Ward, Donald Sofge, Daniel Lofaro</i>	
Toward Autonomous Bridge Inspection: A Framework and Experimental Results	208
<i>Sungwook Jung, Seungwon Song, Sang-Hyeon Kim, Junho Park, Jongbeom Her, Kyungshik Roh, Hyun Myung</i>	
Trajectory Tracking of End Effector on Mobile Robot with Multiple Onboard Cameras	212
<i>Sungpyo Lee, Dongwoo Ko, Byungkwan Jung, Minji Lee, Hyeonseong Kim, Sangok Seok</i>	
A Cooperative Control Method for a Mobile Manipulator Using the Difference the Manipulation with a Robot Control Device	219
<i>Yuta Naito, Nobuto Matsuhira</i>	
Employing Robots in a Museum Environment: Design and Implementation of Collaborative Robot Network	224
<i>Satoshi Okano, Nobuto Matsuhira, Eri Sato-Shimokawara, Toru Yamaguchi, Masahiko Narita</i>	
Effects of Hyper-Parameters for Deep Reinforcement Learning in Robotic Motion Mimicry: A Preliminary Study	228
<i>Taewoo Kim, Joo-Haeng Lee</i>	
Estimating Indoor Behavior Using Sensor Fusion with BLE Beacons and Wearable Devices for Information Presentation	236
<i>Shun Muramatsu, Erina Kasano, Yukiharu Motohashi, Eri Sato-Shimokawara, Rosanna Yuen-Yan Chan, Toru Yamaguchi</i>	
Development of a Compatible Exoskeleton (Co-Exos II) for Upper-Limb Rehabilitation	240
<i>Leiyu Zhang, Jianfeng Li, Mingjie Dong, Ying Cui, Xi Rong</i>	
The Robots Are the Same, the Children Are Not	254
<i>Craig Sutherland</i>	
Elderly Care Training Using Real-Time Monitoring System with Care Training Assistant Elbow Robot (CaTARo-E)	259
<i>Miran Lee, Hirotake Yamazoe, Joo-Ho Lee</i>	
RoboLang: A Simple Domain Specific Language to Script Robot Interactions	265
<i>Craig Sutherland, Bruce Macdonald</i>	
Online Social Touch Pattern Recognition with Multi-Modal-Sensing Modular Tactile Interface	271
<i>Hyunjin Ku, Jason J. Choi, Sunho Jang, Wonkyung Do, Soomin Lee, Sangok Seok</i>	
End-To-End Dialogue System with Multi Languages for Hospital Receptionist Robot	278
<i>Eui Jun Hwang, Bruce Macdonald, Ho Seok Ahn</i>	

Evaluating Pre-Trained Predictor Models of Pedestrian Destinations for a Voice Guidance Robot	284
<i>Asami Ohta, Satoshi Okano, Nobuto Matsuhira, Yuka Kato</i>	
Designing Social Dialogue Model for Human-Robot Interactions.....	290
<i>Seo-Young Lee, Gyeore Lee, Jongsuk Choi, Yoonseob Lim</i>	
Estimation of Speaker's Confidence in Conversation Using Speech Information and Head Motion	294
<i>Erina Kasano, Shun Muramatsu, Akihiro Matsufuji, Eri Sato-Shimokawara, Toru Yamaguchi</i>	
Image-Based Hysteresis Compensator for a Flexible Endoscopic Surgery Robot	299
<i>Donghoon Baek, Juhwan Seo, Joonhwan Kim, Dong-Soo Kwon</i>	
Ergonomic Design Process of Minimally Invasive Surgery Instrument Hand-Held Manipulator with Kinematic, Psychologic Analysis	306
<i>Hyung Taeg Han, Seong-Il Kwon, Chunwoo Kim</i>	
Development of Prosthetic Finger with Actuator.....	313
<i>Wooseok Ryu, Daeho Kim, Youngjin Choi, Sungon Lee</i>	
A 3D-Printed Soft Hand Exoskeleton with Finger Abduction Assistance.....	319
<i>Min Li, Yueyan Zhuo, He Bo, Ziting Liang, Guanghua Xu, Jun Xie, Sicong Zhang</i>	
Remote Upper Limb Exoskeleton Rehabilitation Training System Based on Virtual Reality	323
<i>Fangquan Liu, Xu Han, Mingxing Lin, Xiaojian Wu, Qiang San Sun, Aiqin Song</i>	
Motion Assistance and Resistance Using Pseudo-Haptic Feedback for Upper-Limb Rehabilitation	328
<i>Min Li, Wenliang Guo, He Bo, Guanghua Xu, Hua Yuan, Jun Xie, Tangfei Tao</i>	
Imitation of Human Upper-Body Motions by Humanoid Robots	334
<i>Emre Cemal Gonen, Yujung Chae, Changhwan Kim</i>	
Many Faced Robot - Design and Manufacturing of a Parametric, Modular and Open Source Robot Head.....	342
<i>Metodi Netzev, Quentin Houbre, Eetu Oskari Airaksinen, Alexandre Angleraud, Roel S. Pieters</i>	
Development and Validation of Pneumatic Muscle Based Back Assistance Exoskeleton.....	349
<i>Wonseok Shin, Gunhee Park, Yul Kim, Jooyoung Lee, Jung Kim</i>	
Personalizing the Prediction: Interactive and Interpretable Machine Learning	354
<i>Seunghun Koh, Hee Ju Wi, Byung Hyung Kim, Sungho Jo</i>	
Design of a Moving Substructure for an Armored Robot for Complex Disasters.....	478
<i>Jaeho Jang, Jin-Ho Suh, Hyun Chul Kong, Sang-Il Lee, Kim Dongmin</i>	
Development of a Robot Simulator for Remote Operations for Nuclear Decommissioning.....	501
<i>Kuniaki Kawabata, Kenta Suzuki</i>	
Development of Robot Restaurant Simulator	597
<i>Hideharu Ouchi, Ryosuke Ueno, Anna Abe, Eri Yoshida, Toshiyuki Masuda, Xiaoyu Liu, Sachiko Nakagawa, Masahiko Narita</i>	
Understanding Work Environment of Therapists to Incorporate Robots into Education for Children with Developmental Disorders.....	603
<i>Min-Gyu Kim, Myeongjun Park, Yeonseo Choi, Kyoung-Ho Kim, Na-Hyun Lee, Dongseop Sohn</i>	
Physical Properties of Service Robot with Reference to Joruri Puppets and Home Appliance Design - Enhancement of Robot Service Platform for Non-Experts -	609
<i>Masahiko Narita, Jun Uchiyama, Yoshio Kondo, Yosuke Tsuchiya, Sachiko Nakagawa</i>	
Reconfigurable Colloidal Microrobotic Swarm for Targeted Delivery.....	615
<i>Jiangfan Yu, Li Zhang</i>	
Kinematic and Dynamic Modeling and Analysis of a Lower Extremity Exoskeleton.....	625
<i>L. J. Yan, Q. M. Shen, D Yang, J. M. Qiao, P Datseris</i>	
Research of the Brake Pad Eccentric Wear Simulation of Medium-Low Speed Maglev Train Based on RecurDyn.....	631
<i>Jiefu Sun, Jianting Zhu, Bihong Lu</i>	
Failure Analysis and Finite Element Simulation for Structural Systems in an Unmanned Aerial Vehicle	636
<i>Bing Wang, Nicholas Poh Huat Ng, Basman Elhadidi, Hui Shan Ang, Seung Ki Moon</i>	
An Adaptive Backstepping Terminal Sliding Mode Control for Stewart Platforms	641
<i>Hyungpil Moon, Anh Tuan Luong, Sungwon Seo, Hyouk Ryeol Choi, Ja Choon Koo</i>	
Detection of Damaged Infrastructure on Disaster Sites Using Mobile Robots	648
<i>Jingdao Chen, Yong Kwon Cho</i>	
A Multi-body Simulation Framework for Live Motion Tracking and Analysis within the Unity Environment	654
<i>John Abella, Emel Demircan</i>	
Splash: A Graphical Programming Framework for an Autonomous Machine	660
<i>Soonhyun Noh, Seongsoo Hong</i>	

Effective Strategies for Improving Mobility Efficiency and Keeping Numerical Superiority in AI Worldcup.....	667
<i>Seung Hee Lee, Hyunjun Lim, Yeeun Kim, Hyun Myung</i>	
Perception Accuracy of Vibrotactile Feedback During Locomotion.....	673
<i>Emel Demircan, Elliot Recinos, John Abella, I-Hung Khoo, Hsiang-Ling Teng, Willbur Wu</i>	
Control of Lower Limb Rehabilitation Exoskeleton Robot Based on CPG Neural Network.....	678
<i>Yingxu Wang, Aibin Zhu, Hongling Wu, Pengcheng Zhu, Guang-Zhong Cao, Xiaodong Zhang</i>	
Real Time Adaptive Filter Based EMG Signal Processing and Instrumentation Scheme for Robust Signal Acquisition Using Dry EMG Electrodes.....	683
<i>Muhammad Zahak Jamal, Dong-Hyun Lee, Dong Jin Hyun</i>	
Optimal Impedance Modulation and Intention Angle of Elbow Assistive Robots: Load Uncertainties and Final Velocity Effects	689
<i>Mohamad Mosadeghzad, Behnam Miripour Fard, Setareh Yazdkhasti</i>	
Energy-Optimal Trot Gait Planning for Quadruped Robot Via Double Generating Functions	696
<i>Yizhan Xu, Dijian Chen, Binrui Wang, Shenglong Xie, Xiaohong Cui</i>	
Statistically Based On-Target Optimization in Micro-Milling of Titanium Alloy	702
<i>Xiang Zhang, Xudong Pan, Guanglin Wang</i>	
Analysis and Noise Modeling of the Intel RealSense D435 for Mobile Robots	707
<i>Min Sung Ahn, Hosik Chae, Donghun Noh, Hyunwoo Nam, Dennis Hong</i>	
Kinematic Parameter Calibration for Humanoid Robot Using Relative Pose Measurement in Walking Motion.....	712
<i>Jee-Eun Lee, Jaeheung Park</i>	
Development of an Automatic Grinding System for Servo Valve Spool Throttling Edge	718
<i>Hua Guo, Peng Lin, Xudong Pan, Guanglin Wang, Honglei Zhang, Qingyu Zhang</i>	
Design of a Passive Shoulder Lifting Exoskeleton of Human-Machine Multi-Link.....	723
<i>Aibin Zhu, Zhitao Shen, Huang Shen, Yao Tu, Han Mao, Xiaodong Zhang, Guang-Zhong Cao</i>	
Tensegrity Wrist Mechanism Using Three Layers of Rigid Bodies and Strings	728
<i>Geun Young Hong, Youngjin Choi</i>	
A Parallel-Axis Grinding Method for Large Aspect Ratio Internal Threads.....	734
<i>Guicheng Wu, Yuefeng Li, Zenghui Yang, Guanglin Wang, Zhongyu An</i>	
Motion Design for a Walking-Promotion Robot and an Evaluation of the Effects on Walking Motivation	739
<i>Yume Matsushita, Miki Kenta, Takuya Imazaike, Hirotake Yamazoe, Joo-Ho Lee</i>	
Fuzzy-Adaptive Impedance Control of Upper Limb Rehabilitation Robot Based on SEMG	745
<i>Gaige Shi, Guanghua Xu, Haochong Wang, Nan Duan, Sicong Zhang</i>	
An Intensity-Modulated Fiber Optic Pressure Sensor for Hand-Exoskeleton Interactive Force Detection.....	750
<i>He Bo, Min Li, Jiazhou Chen, Wenliang Guo, Guanghua Xu, Jun Xie</i>	
Prediction of Human Dynamic Ankle Moment Based on Surface Electromyography Signals	755
<i>Aibin Zhu, Huang Shen, Zhitao Shen, Ying Li, Han Mao, Xiaodong Zhang, Guang-Zhong Cao</i>	
A Novel Robot Joint Bearing Fault Diagnosis Method Based on VMD in BP Neural Network.....	760
<i>Mengchen Shan, Wenyi Liu, Xin Wang</i>	
Biomechanical Simulation Analysis of Human Lower Limbs Assisted by Exoskeleton	765
<i>Yuexuan Wu, Aibin Zhu, Huang Shen, Zhitao Shen, Xiaodong Zhang, Guang-Zhong Cao</i>	
Nonlinear Model Predictive Control of an Autonomous Underwater Vehicle for Terrain Profile Tracking	771
<i>Changyu Lee, Jinwhan Kim</i>	
A Soft Linear Actuator with Gentle Manipulation Mechanism.....	775
<i>Cho Won Lee, Dae-Seong Go, Manhong Heo, Dong-Wook Lee, Han Ul Yoon</i>	
Control of 3-DOF Robotic Manipulator by Neural Network Based Fuzzy-PD	779
<i>Shikai Zhang, Yudong Zhao, Jangmyung Lee</i>	
Fuzzy-PD Controller with Online Gravity Compensation for 3 DOF Manipulator	787
<i>Yueyuan Zhang, Yudong Zhao, Jangmyung Lee</i>	
Author Index	