2026 23rd International Conference on Ubiquitous Robots (UR 2026)

Ibaraki, Osaka, Japan
15-18 July 2026

IEEE Catalog Number: CFP26128-POD
ISBN: 979-8-3195-4208-3

IEEE
Advancing Technology for Humanity

Copyright © 2026, IEEE

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:	CFP26128-POD
ISBN (Print-On-Demand):	979-8-3195-4208-3
ISBN (Online):	979-8-3195-4207-6

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

DeGuV: Depth-Guided Visual Reinforcement Learning for Generalization and Interpretability in Manipulation 1
Tien Pham, Xinyun Chi, Khang Nguyen, Manfred Huber, Angelo Cangelosi

VCA: Vision-Click-Action Framework for Precise Manipulation of Segmented Objects in Target Ambiguous Environments 8
Donggeon Kim, Seungwon Jang, Hyeonjun Park, Daegyu Lim

Voice-Controlled Robotic Arm System for Tabletop Manipulation via Large Language Model and 3D Vision 15
Supakorn Thavornvong, Anapat Kitsommart, Mahannop Thabua, Chutiya Thanaluck, Sumeth Yuenyong

LNG cargo hold welding inspection robot design 21
Man Gi Lee, Seong Ho Park, Shin Kim, Cheol Hee Bae, Su Jeong Lee, Gun Rae Cho

Autonomous Soil Collection in Environments With Heterogeneous Terrain 25
Andrew Dudash, Beyonce Andrades, Ryan Rubel, Mohammad Goli, Nathan Clark, William Ewald

$70 to Work, Teach, and Play with Sub-mm Robots 32
Kyle Skelil, Jonathan Bacon, Maya M. Lassiter, Hannah Escritor, Jungho Lee, Maxim Veksler, Mark Yim David Blaauw, Marc Z. Miskin

Portable Laser Guiding Device with Self-Calibration for Path Projection on Planar Walls* 39
Huang Hexiang, Li Xin

Design of Mouth Retractor-mounted Suction Robot using Stackable Four-bar Mechanism 47
Taeyun Kim, Kyungtae Kim, Jejin Lee, Youngjin Choi

Interleaved LLM and Motion Planning for Scalable Multi-Object Collection in Large Scene Graphs 53
Ruochu Yang, Yu Zhou, Fumin Zhang, Mengxue Hou

Development of an Aerial Robotic Propulsion System for Armor Rod Installation on Overhead Power Lines 61
Nicolaj Haarhøj Malle, Hannibal Paul, Ricardo Rosales Martinez, Emad Ebeid, Kazuhiro Shimonomura

Autonomous Drone-Based Inspection of Photovoltaic Plants 67
Michele Moriconi, Giovanni Rocca, Lucrezia Grassi, Fabio Conti, Massimo Paolucci Carmine Tommaso Recchiuto, Antonio Sgorbissa

Optic Flow Guidance for Micro Air Vehicles (MAVs) based on Bio-mimetic Active Sensing 75
Ruiqi Ouyang, Matthew A. Garratt, Mandyam V. Srinivasan, Sridhar Ravi

Design of a Passive Tip Stabilization Mechanism for Vine Robots 83
Sukmin Hong, Sanghun Lee, Nam Gyun Kim, Jee-Hwan Ryu

Design of a Vision-Integrated Suction Cup for Drone Perching 89
Hyunki Park, Yoonjin Kim, Sungbin Park, Junwhi Cho, Minju Kim, Dayoung Yeom, Jung Kim

Basic Autonomous Systems for Environmental Feature Identification in Pilot Robot Applications 94
Ryan Locke, Kathryn Kasmarik, Shadi Abpeikar, Sridhar Ravi

Bird-Inspired Spatial Flapping Wing Mechanism via Coupled Linkages with Single Actuator 102
Daniel Huczala, Sun-Pill Jung, Frank C. Park

Data-Driven Compensation of Non-Geometric Joint Errors: A Comparative Study in Configuration and Task Spaces 107
Sahoon Ahn, TaeWon Seo, Joohyung Kim

Parametric Study of an Underwater Robot with Bio-inspired Continuous Elastic Undulatory Fins 113
Zhongkai Sun, Atsushi Kakogawa

Towards Payload Distribution Analysis for Quadruped Robots Through Systematic Experimental Design and Evaluation 117
Manav Mistry, Brendan Donoghue, Adam Norton, Reza Azadeh

Real-time Sensor Diagnosis and Behavior Tree-based Fault Handling Framework using ROS2 CDR Data Parsing 122
Tae Wook Eum, Jun Hyeon Choi, Ye Chan An, Tae Yong Kuc

Efficient Reconfiguration of Multi-Robot Formations on Ptolemaic Topologies: Linear-Time Feasibility and Exact Optimization 128
Shira Zucker, Yuval Ben-Abu

Effects of eBPF-based sched_ext Dynamic Scheduling on ROS2 Robot Workloads 134
Jin-Ho Kim, Dong-Hyoun Son, Byeong-Jun Kim, Yong-Hyeon Song, Jun-Hyeon Choi, Tae-Yong Kuc

Communication Data Categorization and Performance Analysis in Weak Electric Field Environments for Local 5G-based Robot Systems 140
Nobuhiko Miyamoto, Koji Yoshida, Noriaki Ando, Kazuyoshi Wada

Reinforcement Learning-based Impact Forces-Optimized Gait Control for Humanoid Locomotion: Toward Smooth and Quiet Walking 145
Hyeonseok Jeong, Yunsoo Kim, Changeui Shin, Joonkeol Song, Woong Jeong

Design of Tensegrity-based Humanoid Robot 150
Kyungtae Kim, Junsik Kim, Geun Young Hong, Geon Lee, Youngjin Choi

Hierarchical Gating Action Chunking Transformer for Joint Waist-Arm Humanoid Manipulation 157
Hyunjin Cho, Kangmin Kim, Geonhyup Lee, Kyoobin Lee

Fast and Robust Localization for Humanoid Soccer Robot via Iterative Landmark Matching 163
Ruochen Hou, Mingzhang Zhu, Hyunwoo Nam, Gabriel I. Fernandez, Dennis W. Hong

Movement Log Generation Using a Robotic Arm for Preventing Forgotten Objects 171
Kaito Kawai, Yuya Hosoda, Joo-Ho Lee

Natural Language-Based Retrieval of Previously Observed Objects Using LLMs 177
Shunya Ishida, Yasuyuki Fujii, Nobutaka Shimada

GORI: Image-Guided Selective 3D Object Re-Association for 3D Scene Graphs and Task Planning 183
Jei Kong, Seungjae Lee, Jeewon Kim, Hyun Myung

Enhancing Zero-Shot Object Navigation via LLM-Inferred Co-occurring Objects 189
Sangmin Park, Minhwan Ko, Kyoobin Lee

Data-Driven Pose Estimation for Robotic Connector Assembly: A Transformer-Based Approach using Force/Torque Time-Series 194
Joonho Lee, Minjae Jung, Jirou Feng, Junhwan Choi, Hwisoo Kim, Jeongdo Ahn, Dong Il Park Jin-Gyun Kim, Jung Kim

Vision Based Pick and Place of Randomly Stacked Jenga Blocks Using a Single RGB-D Sensor 199
Dongwoon Song, Yeri Park, Minseoung Jo, Wonje Hwang, Seung-Joon Yi

Continuous Mobile Manipulation for Wheeled Humanoid Robots via Head-Mounted Egocentric Vision 206
Seonil Lee, Dongwoon Song, Taewoong Kang, Gijae Ahn, Joonyoung Kim, Minseong Jo, Nasrat Shady Seung-joon Yi

Similarity-Driven Coarse Relative Localization and Target-Driven Navigation for Robotic Ultrasound 212
Runyu Liu, Jianqiang Huang, Zhuoqing Chen, Nak Young Chong

Early Recognition and Temporal Stability in Three-Channel Low-Density EMG: Impact of Segmentation Strategies for Real-Time Myoelectric Interfaces 218
Angga Rahagiyanto, Yuya Hosoda, Joo-Ho Lee

Pain Expression Generation with PainDiffusion: A Lightweight Study of Inference Hyperparameters and Subjective Naturalness 224
Hangxiu Chen, Nguyen Tri Tung Nguyen, Yuya Hosoda, Joo-Ho Lee

Streaming Statistics-Based Input Normalization for Online EMG-Based Hand Gesture Classification 229
Siwoo Kim, Wonseok Shin, Bummo Ahn, Suncheol Kwon

Prior-Guided 3D Gaussian Splatting for Data Augmentation in Endoscopic Monocular Depth Estimation 235
Jacinto Colan, Ana Davila, Yasuhisa Hasegawa

A Wire-Driven Robotic Hand with Reduced Path Dependency for Dexterous Manipulation 241
Jeongseok Choi, MinSu Lee, WooSeong Shin, TaeWon Seo

WHED: A Wearable Hand Exoskeleton for Natural, High-Quality Demonstration Collection 246
Mingzhang Zhu, Alvin Zhu, Jose Victor S. H. Ramos, Beom Jun Kim, Yike Shi, Yufeng Wu, Ruochen Hou Quanyou Wang, Eric Song, Tony Fan, Yuchen Cui, Dennis W. Hong

Development of a Camera-Angle-Adjustable Gripper for Visual and Visuotactile Sensing under a Shared View 253
Koh Ebihara, Yoshiki Mori, Keita Atsuumi, Kazuhiro Matsui, Hiroaki Hirai, Nobutaka Shimada Atsushi Nishikawa

Extending Planar Orientation Control Range of Grasped Objects Using Selective Actuation in a Redundant Parallel-Driven Soft Gripper 259
Keitaro Sakai, Yoshiki Mori, Keita Atsuumi, Kazuhiro Matsui, Hiroaki Hirai, Atsushi Nishikawa

TRUNK-Gripper: A Soft Multi-modal Gripper for Complex Objects 265
Menglong Zhou, Chenghao Li, Zhi An, Jianqiang Huang, Yuntao Kong, Tao Wang, Nak Young Chong

From Perception to Persistent Knowledge: Memory-Aware Environmental Abstraction for Cooperative Autonomous Robot Systems 273
Catharina Helten, Patrick Wolf

Navigation Using Architectural CAD Drawings as Weak Spatial References 281
Takumi Hanada, Masaya Seki, Kazuyuki Morioka

Development of a Road Geometry-Based Navigation System for Autonomous Weeding Robots 287
Ryuji Okada, Yuki Matsusita, Yuya Hosoda, Joo-Ho Lee

Vision-Based Tree Localization and Closed-Loop Circular Motion Control for Agricultural Mobile Robots 293
Fareez Bin Ahmad Taupiq Nasri, Wan Nurshazwani Wan Zakaria, Mohd Nor Azmi Ab Patar

Domain Adaptive Weakly Supervised Learning Based Drivable Area Detection in Snowy Environments via Ego-Trajectory 299
Jeong-Woo Lee, Pil-Eun Kim, Yonghoon Ji

Physics-Informed Gaussian Process for Pressure-Based Multi-Robot Localization 307
Daiyannan Chen, Yonghoon Ji

TD3-Based Adaptive Acceleration-Level Integral Sliding Mode Control for Heterogeneous Dual-Robot Collaboration 313
Yu-Zhe Cai, Sajid Hussain, Li-Yeh Chen, Nien-Tsu Hu, Chin-Sheng Chen, Chia-Jen Lin

A Visitation Grid for Complete Coverage Foraging in Robot Swarms 321
Arturo Gonzalez, Yifeng Gao, Li Zhang, Qi Lu

Auction-Consensus Algorithm with Learned Bidding Scheme for Multi-Robot Systems 329
Jose Rodriguez, Constantine Tarawneh, Sven Koenig, Wenjie Dong, Qi Lu

HORUS: A Mixed Reality Interface for Managing Teams of Mobile Robots 335
Omotoye Shamsudeen Adekoya, Antonio Sgorbissa, Carmine Tommaso Recchiuto

Breaking the Resource Barrier: Parameter-Efficient Hierarchical VLA Fine-Tuning via Single-View Semantic Reasoning 343
Woojin Jeong, Yongwoo Gu, June-Sup Yi, Hyoung-Rock Kim

SPaRL: Spatially-aware Reinforcement Learning with Language 347
Jeyoung Lee, Jaewon Lee, Jangwon Oh, Minseong Park, Euntai Kim

Sample-Efficient Robot Preference Learning under Forced-Choice Feedback 355
Chanwoo Kim, Hyeonseong Kim, Minyoung Hwang, Sungjoon Choi, Kyungjae Lee

Physical Reasoning VLA Models for Enhancing Robotic Manipulation 363
Kangmin Kim, Geonhyup Lee, Sangbeom Lee, Kyoobin Lee

A Multitask Reinforcement Learning Method for Robots with Heterogeneous Morphologies Towards Modular Robot Control 369
Ryuki Kinuya, Satoshi Yagi, Sho Takeda, Satoshi Yamamori, Jun Morimoto

Robust Assistive Mobile Manipulation via Structured LLM Programs, Confirmation Loops, and Hierarchical Skill Recovery * 376
Trung Minh Bui, Youngouk Kim, Jongsul Moon, Min-Young Cho, Myeongin Seo, Dongin Shin

Hand Motion-Based Interaction with Miniature Autonomous Blimps 384
Minen Lyu, Tianfu Wu, Fumin Zhang

A Unified Framework for Normative-Imitative Trajectory Learning from Demonstration 390
Reza Azadeh

Generation of Object Alignment Behavior Based on VLM Proposal and Verification Considering a Human-Robot Collaboration Interface 397
Shunki Sonohara, Yasuyuki Fujii, Yoshiki Mori, Nobutaka Shimada

Stack-Aware Rearrangement of Objects in Confined Environments 403
Minseok Bae, Jonghyeon Kim, Kyungjae Lee, Eunwoo Kim

Adaptive Rejection of Low-Confidence Samples in Learning-Guided RRT Path Planning 411
Jorge Ocampo-Jimenez, Wael Suleiman

Real-Time Dynamic Optimization Strategy for Multi-Camera Flying Trigger in a Coupled Line-Scan / Area-scan Automated Optical Inspection Gantry Systems 417
Po-Yuan Cheng, Chin-Sheng Chen, Li-Yeh Chen, Shih-Yu Li, Yu-Jung Chen, Jung-Ching Liou

Adversarial Geometric Traps: A DRL-Driven ROS 2 Framework for Robust Mapless Navigation in Dead-End Scenarios 425
Ardiansyah Al Farouq, Yuya Hosoda, Joo-Ho Lee

A Novel Hybrid Control Framework for Chattering-Reduced and Vibration-Suppressed Motion Control in Service Robot 431
Thien Bao Tran, The Tri Bui, Huu Tran Nhat Le, Ha Quang Thinh Ngo

Laying and raising movement of a half-drone wheeled inverted-pendulum robot 437
Hector Gautier, Shoichi Maeyama

Structural Redesign of a Ceiling-Climbing Robot for Faster and More Stable Locomotion 444
Aina Fujii, Fumihiro Shimizu, Yuya Hosoda, Joo-Ho Lee

Development of a Delivery Robot with Switchable Locomotion Mechanisms for Traversal of Step-like Discontinuities 450
Yuki Matsushita, Yusuke Suzuki, Yuya Hosoda, Joo-Ho Lee

T-Spoke Wheel Design and Reinforcement Learning-Based Locomotion for Stair-Climbing Mobile Robots 456
Seungmin Kim, Ferenc Szendrei, Minhyoung Jeoung, Youjin Kim, Donggi Choi, Young-Eun Song

Integrated Opposite-Phase Kinematics, Hybrid-A* Planning, and MPPI Control for Autonomous Navigation in Agricultural Environment 462
Andrés Alamo, Ricardo Jesus Huaman Kemper, Sixto Ricardo Prado Gardini

Uncertainty-Aware Bathymetric SLAM via Learning-Based Covariance Estimation for Underwater Navigation 470
Seunghyuk Choi, Jin-Yeong Park, Hyuk Baek, Youngchol Choi, Jongdae Jung

Underwater Actor-Critic Differentiable Model Predictive Control System for Robust Underwater Structure Safety Inspection using Underwater Robot 478
Minjong Kim, Bonchul Ku, Dongsub Kim, Young-Woon Song, Son-Cheol Yu

Gaussian Process-based Underwater Geomagnetic Mapping under Inertial Navigation Drift 486
Dongwook Lee, Hyunkeun Cho, Jinwhan Kim

Language-Guided Adaptive Mission Synthesis for Autonomous Water Quality Monitoring 492
Sadman Islam, Tauhidul Alam, Sufi N. Quader

Solar-Powered Autonomous Surface Robot with Dynamic Strategy Switching Based on Energy Budget Management: A Simulation Study 498
Yasuyuki Fujii, Joo-Ho Lee

Evaluation of Vision–Language Models for Trustworthy Object Detection and Explanations in Domestic Healthcare Robotics 504
Lim Jia Zheng, Muhammad Hisyam Bin Rosle, Zool Hilmi Ismail, Muhammad Nazrin Shah Shahrol Aman

ParCo-SDF: Learning Prior-Free Partial-to-Complete Signed Distance Fields of Deformable Objects 510
Deokmin Hwang, Minseok Song, Daehyung Park

View-Aware Person Re-Identification for Improving Long-Term Identity Consistency in Multi-Object Tracking 516
Haruki Tsuka, Kakeru Minesaki, Yuya Hosoda, Joo-Ho Lee

Robotic Mosaic Art System Using Semantic Segmentation and Depth Information 522
Junwoo Park, Yuya Hosoda, Joo-Ho Lee

Robust 3D-Aware Video Object Tracking for Mobile Robots Based on 2D Vision Foundation Models 528
Hayeoung You, Sangbeom Lee, Huisu Kim, Kyoobin Lee

Multi-Class Semantic Segmentation of Oil Palm Plantation Environments using YOLOv8 534
Nurafiqah Farhani Ramzyzan, Wan Nurshazwani Binti Wan Zakaria, Norhaflyza Marbukhari

A Lightweight Non-Neural Segmentation Pipeline for Underwater Robot Vision 540
Mingyu Jeon, Jane Shin, Sejin Lee

Only-Event Camera MVS via Phosphorescent Material in Darkness 548
Nam-Jun Park, Shunsei Takarabe, Yeon-Woo Shin, Pil-Eun Kim, Yonghoon Ji

Learning Vision-Based Control for Autonomous Roadside Mowing 555
Qi Li, Moritz Renner, Karsten Berns

Computational Design Framework for a Compact Multi-axis Contact Force Sensing Mechanism 561
Alvin Zhu, Yusuke Tanaka, Conrad Ku, Dennis Hong

Feasibility Embedded Photoplethysmogram Sensing in Short-Duration Tactile Interactions With Ubiquitous Robotics Through IMU and Confidence-Based Filtering 569
Turjja Datta, Morten Roed Frederiksen

Ranking-Based Learning for Robust Tactile Roughness Perception under Domain Shift 577
Seojung Min, Juhee Park, Gunhee Park, Jung Kim

Dense Optical Flow Estimation Using Event Cameras for High-speed Visuotactile Sensing 585
Sosa Hashimoto, Yasuyuki Fujii, Yoshiki Mori, Nobutaka Shimada

Robotic Skin with Sparsely Embedded Transducers for Contact Localization on Non-planar Surfaces 591
Minju Kim, Junhwi Cho, Sangha Jeon, Hyunki Park, Woojong Kim, Jung Kim

MiNI-Q: A Miniature, Wire-Free Quadruped with Unbounded, Independently Actuated Leg Joints 597
Daniel Koh, Suraj Shah, Yufeng Wu, Dennis Hong

Design and Evaluation of Gait Motions for Quadruped Robots to Evoke Different Age Impressions 604
Ai Mitsushima, Nguyen Tri Tung Nguyen, Yuya Hosoda, Joo-Ho Lee

HIP: Hybrid Impedance and PD Control for Adaptive and Compliant Locomotion in Quadruped Robots 610
Hyeonwoo Lee, Mincheol Kim, Hyun Myung

XNav-Pipe: Cross-Platform Robot Navigation Data Generation Pipeline 616
Sungwoong Kim, Minseo Kim, Siyeol Kim, Junhee Park, Youngjae Yu

A Co-Designed Legged Robotics Workshop for High School Students Using the Q8bot Miniature Quadruped 624
Elizabeth Ashforth, Joanie Banks-Hunt, Yufeng Wu, Stefan Grunspan, Ethan Hong, Dennis Hong

Robotic Multi-Angle Point Reflection Spectroscopy: Towards Quantitative Spectroscopic Modeling 630
Leo Fiedler, Jim Magiera, Ian Howard, Jürgen Beyerer

Person Detection and Tracking from an Overhead Crane LiDAR 638
Nilusha Jayawickrama, Henrik Toikka, Risto Ojala

Objective Singing-Voice Evaluation System for A Cappella Performances 646
Hibiki Takai, Yuya Hosoda, Joo-Ho Lee

Proposal of a Trajectory Planning Method for Tag-mounted Mobile Robot used in Position Estimation of Ranging Tag 652
Taisuke Sato, Taku Shimizu, Sousuke Nakamura

DV-SSL: Direct Vector Estimation Network for Real-Time 3D DoA Estimation on Humanoid Robots* 657
JungHo Cheon, JongSuk Choi

Multi-Session Ground Texture SLAM in Low-Dynamic Environments 663
Kyle M. Hart, Brendan Englot

EdgeJamMa: Edge-Enhanced Joint Mamba for Feature Matching 671
Itsuki Kawahara, Yuya Hosoda, Joo-Ho Lee

Unified Where–Who–What Estimation in Indoor Drone Surveillance Using a Pre-built 3D Map 677
Asahi Fumimoto, Yuya Hosoda, Joo-Ho Lee

Development of a Handheld Scanner and Semi-Automatic Primitive Fitting Using a Point-Cloud Map 683
Izuru Ippitsu, Yuya Hosoda, Joo-Ho Lee

Consistency-Enhanced Tightly Coupled Visual-Inertial Odometry via Bounded Double Window Optimization 689
Euntae Hong, Beomjin Cho, DongKi Noh