# Contents of Journal of Robotics and Mechatronics Volume 36, 2024

# Vol.36 No.1, February 2024

Congratulations! Journal of Robotics and	
Mechatronics Best Paper Award 2023	1

Special Issue on Robotic, Mechatronic and Information Systems for Decommissioning

- **Editorial:**
- Special Issue on Robotic, Mechatronic and Information Systems for Decommissioning 7 Kuniaki Kawabata, Fumiaki Abe, Satoshi Okada, and Takayuki Tanaka

#### **Review:**

- Development and Application of Robotics for Decommissioning of Fukushima Daiichi NPS by IRID.
   9
  - Naoaki Okuzumi, Kenji Matsuzaki, and Satoshi Okada

#### **Papers:**

- Enhancement of Control Stability Using Double Pulleys for Coupled Tendon-Driven Long-Reach Manipulator "Super Dragon" . 21 Yuki Shizume, Atsushi Takata, and Gen Endo

- Discrimination of Plant Structures in 3D Point Cloud Through Back-Projection of Labels Derived from 2D Semantic Segmentation. . 63 Takashi Imabuchi and Kuniaki Kawabata

- Development of Unmanned Remote System to Find Radiation Sources Based on 4π Gamma

- - Toshifumi Satake, and Naoki Igo

## **Development Reports:**

- and Soichiro Suzuki
- Organization for Nuclear Accidents . . . . 134 Sebastian Friedrich, Uwe Süss, and Michael Gustmann
- Determinants of Performance for Robotics Teleoperated Activities: From Emergency Response to Decommissioning . . . . . 139 Philippe Fauquet-Alekhine and Julien Bleuze

## **Regular Papers**

## **Papers:**

- Motion Evaluation of Variable-Stiffness Link Based on Shape-Memory Alloy and Jamming Transition Phenomenon. . . . 181 Kazuto Takashima, Hidetaka Suzuki, Toshiki Imazawa, and Hiroki Cho
- One-Way-Signal-Based Localization Method of Multiple Autonomous Underwater
   Vehicles for Distributed Ocean Surveys . 190 Takumi Matsuda, Yang Weng, Yuki Sekimori, Takashi Sakamaki, and Toshihiro Maki
- Demonstration of Autonomous Driving Control for a Retrofitted Wheel Loader . . 211 Tomohito Kawabe, Masahiro Inagawa, Toshinobu Takei, Hiroto Murayama, Keiichi Yoshizawa, Munehiro Ishibashi, and Keiji Nagatani

# Vol.36 No.2, April 2024

## **Review:**

## 

Taro Nakamura

# Special Issue on Advanced Robotic Technology and System for DX in Construction Industry

## Editorial:

## **Papers:**

 Development of a Highly Efficient Trajectory Planning Algorithm in Backfilling Task for Autonomous Excavators by Imitation of Experts and Numerical Optimization . . . 263 Ryuji Tsuzuki, Kosuke Hara, and Dotaro Usui

Bayesian Optimization for Digging Control of Wheel-Loader Using Robot Manipulator			
Motoki Koyama, Hiroaki Muranaka,	273		
Masato Ishikawa, and Yuki Takagi			

- Visual Presentation Interface to Reduce Effect of Machine Switching for Teleoperated Hydraulic Excavators . . . . 309 Masaki Nagai, Junya Masunaga, Masaru Ito, Chiaki Raima, Seiji Saiki, Yoichiro Yamazaki, and Yuichi Kurita
- Automatic Calibration of Environmentally Installed 3D-LiDAR Group Used for Localization of Construction Vehicles . . 320 Masahiro Inagawa, Keiichi Yoshizawa, Tomohito Kawabe, and Toshinobu Takei
- Lightweight Encoder with Attention
   Mechanism for Pipe Recognition Network 343
   Yang Tian, Xinyu Li, and Shugen Ma

## **Development Report:**

## **Regular Papers**

- Data Fusion for Sparse Semantic Localization Based on Object Detection . 375 Irem Uygur, Renato Miyagusuku, Sarthak Pathak, Hajime Asama, and Atsushi Yamashita

- - Aulia Khilmi Rizgi, Ryohei Kurata, Naoyuki Takesue, Yoshiyuki Toso, Shinichi Kawabata, Akira Tsunoda, and Daichi Suzuki
- Cam-Like Mechanism in Intertarsal Joints of Ratites and its Design Framework . . . 406 Kazuki Ito, Sayaka Hida, Tetsuya Kinugasa, Kentaro Chiba, Yu Okuda, Miwa Ichikawa, Tsukasa Okoshi, Ryuji Takasaki, Ryota Hayashi, Koji Yoshida, and Koichi Osuka
- GREEMA: Proposal and Experimental Verification of Growing Robot by Eating Environmental Material for Landslide Disaster
   Yusuke Tsunoda, Yuya Sato, and Koichi Osuka

- Design of a Quasi-Passive Dynamic Walking Robot Based on Anatomy Trains Theory . 458 Hiroki Nishii, Shoei Hattori, Akira Fukuhara, Hisashi Ishihara, Takeshi Kano, Akio Ishiguro, and Koichi Osuka
- An Admittance Controller with a Jerk Limiter for Position-Controlled Robots . . . . . . 483 Ryusei Mae and Ryo Kikuuwe

## Special Issue on Control and Applications of Multi-Agent Systems

## Editorial:

#### **Review:**

#### **Papers:**

- Collective Transport Behavior in a Robotic
   Swarm with Hierarchical Imitation Learning
  - Ziyao Han, Fan Yi, and Kazuhiro Ohkura
- Designing Decentralized Systems with High Survivability Inspired by Altruistic Social Interactions of Vampire Bats. . . . . . . . 546 Takeshi Kano, Shokichi Kawamura, Taishi Mikami, Daiki Wakita, and Akio Ishiguro
- Exploration of Space Under Debris Using Primitive Mobility Algorithms . . . . . . . 568 Nelson Andrés Sánchez Otálora and Naoki Wakamiya
- A Study for Comparative Analysis of Dueling DQN and Centralized Critic Approaches in Multi-Agent Reinforcement Learning . . . 589 Masashi Sugimoto, Kaito Hasegawa, Yuuki Ishida, Rikuto Ohnishi, Kouki Nakagami, Shinji Tsuzuki, Shiro Urushihara, and Hitoshi Sori

- Unveiling Multi-Agent Strategies:
   A Data-Driven Approach for Extracting and Evaluating Team Tactics from Football
   Event and Freeze-Frame Data . . . . . . 603 Calvin Yeung, Rory Bunker, and Keisuke Fujii
- Noncooperative Population-Based Search Relying on Spatial and/or Temporal Scale-Free Behaviors of Individuals. . . . 618 Kei Ohnishi
- Automatic Route Design by Stepwise
   Subdivision of Virtual Walls—Reduces Route
   Length and Speeds Up Execution Time— 628
   Yuki Itoh, Junya Hoshino, Tenta Suzuki,
   Kenji Matsuda, Kaito Kumagae, Mao Tobisawa,
   Tomohiro Harada, Jyouhei Matsuoka,
   Toshinori Kagawa, and Kiyohiko Hattori
- Acquisition of Cooperative Control of Multiple Vehicles Through Reinforcement Learning Utilizing Vehicle-to-Vehicle Communication

- Innovation Sharing Distributed Kalman
   Filter with Packet Loss . . . . . . . . . . . . 680
   Shuo Huang and Kaoru Yamamoto

## Special Issue on Activity of Research Center – Osaka Electro-Communication University: The Fundamental Mechatronics Research Institute

#### **Institute Overview:**

 Osaka Electro-Communication University: The Fundamental Mechatronics Research Institute . . . . . . . . . . . . . . . . . . 690 Masatsugu Iribe

#### Papers:

- Change in Muscular Activity According to Trunk Posture When Landing on Feet. . . 704 Masanobu Manno, Takuya Koide, Hiroshi Takahama, and Tomohiko Fujikawa

## **Regular Papers**

## **Papers:**

- Dataset Generation and Automation to
   Detect Colony of Morning Glory at Growing
   Season Using Alignment of Two Season's
   Orthomosaic Images Taken by Drone... 721
   Yuki Hirata, Satoki Tsuichihara,
   Yasutake Takahashi, and Aki Mizuguchi
- - Ayaka Watanabe, Tomonori Mitsuhashi, Masayuki Okugawa, Katsuji Ogane, Tetsuya Kimura, Tetsuya Kinugasa, and Yoshikazu Ohtsubo

- Vehicle Self-Position Estimation Using Lighting Recognition in Expressway Tunnel for Visual Inspection Flow . . . . . . . . . 746 Yushi Moko, Yuka Hiruma, Tomohiko Hayakawa, Yushan Ke, Yoshimasa Onishi, and Masatoshi Ishikawa

## Vol.36 No.4, August 2024

## Special Issue on Robotics and Mechatronics Technology for Sports, Exercise, and Health Care (Part 1)

## Editorial:

Shunji Moromugi, Yuichi Kurita, and Akihiko Murai

- Development of a System for Determining Technique Level of Vascular Anastomosis
  - Using Hand Motion . . . . . . . . . . . . . . . . . 801 Xiaoshuai Chen, Taro Shoji, Ryosuke Kowatari, Koki Ebina, Yoshifumi Kobayashi, Moeki Kato, Hinaha Kabasawa, Taisei Suzuki, Kazuya Sase, Teppei Tsujita, Shunsuke Komizunai, Kazuhiko Oka, and Atsushi Konno

- Pneumatic Plantar Stimulation Device Replicating Manual Therapy Improves Lateral Stability in Standing Posture . . . 813 Qi An, Hiroyuki Hamada, Shigeki Maruta, Yuki Abe, Kenichi Takada, Ken Kikuchi, Hiroshi Yamakawa, Hajime Asama, and Atsushi Yamashita
- Comparison of Parameters of Regression Equations for Estimating the Perceptual Quantity of Pseudo-Haptics . . . . . . . 823 Kazuhiro Matsui, Iori Kikuchi, Kotaro Okada, Keita Atsuumi, Kazuhiro Taniguchi, Hiroaki Hirai, and Atsushi Nishikawa

 Development of a Curling Stone Delivery Robot with High Delivery Reproducibility 864 Tadaaki Sone and Takashi Kawamura

## **Regular Papers**

#### **Papers:**

- Design of a Hierarchical-Type Control System Based on Smart MBD Approach and its Application to Hydraulic Excavator . . . 909 Shin Wakitani, Mikiya Sako, Toru Yamamoto, Yohei Ohno, Hiromu Kishi, Natsuki Yumoto, and Kazushige Koiwai

## Special Issue on Robotics and Mechatronics Technology for Aerial Robots

#### **Editorial:**

 Special Issue on Robotics and Mechatronics Technology for Aerial Robots . . . . . . 999 Hiroshi Ohtake, Satoshi Suzuki, Naoyuki Takesue, Masafumi Miwa, and Taro Fujikawa

## **Papers:**

 Proposal of UAV-SLAM-Based 3D Point Cloud Map Generation Method for Orchards Measurements . . . . . . . . . . . . . . . . 1001 Soki Nishiwaki, Haruki Kondo, Shuhei Yoshida, and Takanori Emaru

<ul> <li>Pedestrian's Avoidance Behavior Characteristics Against Autonomous Personal Mobility Vehicles for Smooth Avoidance</li></ul>
<ul> <li>Buoyancy and Propulsion Mechanisms for Stable Movement in Snow Field 928 Haruka Fujiuchi, Shinichirou Sumita, and Sadayoshi Mikami</li> </ul>
<ul> <li>Overturn Recovery of Working Six-Legged Robots on a Flat Slope with Preparatory Body Rotation</li></ul>
<ul> <li>Motion Planning for Dynamic Three-Dimensional Manipulation for Unknown Flexible Linear Object 950 Kenta Tabata, Renato Miyagusuku, and Hiroaki Seki</li> </ul>
<ul> <li>Automatic Excavation System with Multiple Excavators in the Pneumatic Caisson Method.</li> <li>Method.</li> <li>Method.</li> <li>Shirgo Tsugawa, Hiroki Harada, Hayato Osaki, Shingo Tsugawa, Shinichi Tachibana, Hideyuki Fujisawa, Taichi Terui, Kiyoshi Nakamura, and Yusen Inagawa</li> </ul>
<ul> <li>Adaptation of Motor Control Through Transferring Mirror-Image Kinematics</li> <li>Between Dual Arms</li></ul>
Letter: <ul> <li>Tunable Social Hierarchies in</li> <li>Self-Organizing Model with Chemotactic</li> <li>Agents</li></ul>

# Vol.36 No.5, October 2024

 Effect of Bio-Inspired Cutout Shapes at the Leading Edge of Propellers on Noise and Flight Efficiency . . . . . . . . . . . 1010 Ryusuke Noda, Masaki Hirose, Teruaki Ikeda, Toshiyuki Nakata, and Hao Liu

Chikoo Oosawa

- - Rikiya Dohi and Yoshiyuki Higashi

- Development of Wall Hammering Inspection
   Systems Using Two-Wheeled Multi-Copters

- Covariance Control for Uncrewed Aircraft
   Systems Under Correlated Uncertainty . 1082
   Yoshinori Matsuno
- Uncrewed Aerial Vehicle Routing Problem for Integrated Crewed and Uncrewed Aircraft Operations . . . . . . . . . . . . . . . 1090 Yoshinori Matsuno and Adriana Andreeva-Mori

- Senswing: A Force Sensing Wing for Intelligent Flapping-Wing Aerial Vehicles

   Wing Design and Comprehensive
   Evaluation of Force Sensing Capabilities 1156
   Hidaka Sato, Muhammad Labiyb Afakh, and Naoyuki Takesue

## **Development Report:**

# Special Issue on Robotics and Mechatronics Technology for Sports, Exercise, and Health Care (Part 2)

Editorial:

- Proposal for Cane Tip Position to Achieve Both High Stability and Low Joint Torque Using Inverse Dynamics Analysis in

- Development of Self-Powered Prosthetic Finger with Pneumatic Passive Joints for
   Distal Interphalangeal Joint Amputees . 1221
   Kotaro Nishikawa, Kentaro Hirata, and Masahiro Takaiwa
- Basic Analysis for Evaluation of Tennis Volley Skill Using Body Propagated Vibration Sensing.
   Atsutoshi Ikeda and Katsuya Mori
- 3D Motion Analysis of Alpine Skiing on Steep Slope Gate in Men's Giant Slalom 1243 Yohei Yoshida and Masahiro Yuki

## **Regular Papers**

- **Papers:** 
  - Design of an Optimal Allocator for Power Consumption Minimization in Hexarotor Drone Control Systems ..... 1255 Natsuki Kawaguchi and Haruka Maruyama

- Development of 3-USR Type Spatial 6-DOF Parallel Mechanism with Large Workspace
   —Proposal of 3-USR Mechanism and Design of Spherical 5-Link Mechanism to Replace
   Active Universal Pairs (U)— . . . . . . 1273 Hayato Ishihara, Takumu Kikuchi, Masaru Higuchi, Yuichi Nakazato, and Kensuke Takita

#### Letter:

# Vol.36 No.6, December 2024

## Special Issue on Robotics and Mechatronics Technology for Snake-Like and Hyper-Redundant Robots

#### **Editorial:**

 Special Issue on Robotics and Mechatronics Technology for Snake-Like and Hyper-Redundant Robots . . . . . . . 1301 Motoyasu Tanaka, Tetsushi Kamegawa, and Ryo Ariizumi

- Evaluation of the Travel Efficiency of a Transformable Snake-Like Robot Utilizing Infinite Rotation Joint . . . . 1328 Akio Yamano and Tsuyoshi Kimoto
- Semi-Autonomous Stair Climbing Control for an Articulated Mobile Robot by
   Propagating a Single Backward Wave . 1339 Mizuki Nakajima, Kosuke Fukui, and Motoyasu Tanaka

- Motion Design of a Snake Robot to Move Between Two Adjacent Walls . . . . . . 1357 Ryo Ariizumi, Hiroto Mizuno, Hiroki Sasaki, Toru Asai, Shun-ichi Azuma, and Motoyasu Tanaka
- Shape Estimation of Snake Robot Using Extended Kalman Filter and Automatic Propulsion in Piping by Helicoidal Rolling Motion Considering Helix Pitch . . . . 1378 Yuki Tada and Tetsushi Kamegawa
- Soft Pipe Inspection Robot with Vibrating Cilia Capable of Underwater Transport . 1387 Moses Gladson Selvamuthu, Ryuto Okada, and Riichiro Tadakuma
- - Yuki Ishikawa, Mizuki Nakajima, and Motoyasu Tanaka

<ul> <li>Development of Snake-Like Robot for Cable-Laying—Motion Design for Locomotion over Cable Racks and Ceiling Spaces</li></ul>
<ul> <li>Propulsion Method of Modular Robot Using Different Types of Locomotion Modules</li></ul>
<ul> <li>Bio-Inspired Undulatory Locomotion Control Strategy for Novel Soft Robot Based on Auxetic Structures</li></ul>
<ul> <li>Active Inclination Modification for Snake Robots in Environments Including a Plane with Varying Inclination Angle 1438 Shunta Suyama, Mizuki Nakajima, and Motoyasu Tanaka</li> </ul>
<ul> <li>Hybrid RobOstrich Manipulator with Intrinsic and Extrinsic Actuations 1448 Takeru Manome and Ryuma Niiyama</li> </ul>
<ul> <li>Grasping of Cylindrical Structures Using an Underwater Snake Robot Without Force/Torque Sensors and Actuator Waterproofing</li></ul>
<ul> <li>WORMESH-I: Introducing a Robot Concept Bio-Inspired by Flatworms, Developing a Mechanical Model, and Creating Locomotion via Pedal Waves 1468</li> <li>Ryuichi Hodoshima, Kunihiko Sato, Ganegoda Vidanage Charaka Rasanga, and Shinya Kotosaka</li> </ul>
Regular Papers

## itegulai i ap

## 

 Face Mask Surveillance Using Mobile Robot Equipped with an Omnidirectional Camera ..... 1495 Sumiya Ejaz, Ayanori Yorozu, and Akihisa Ohya

Photogrammetry-Based Photic Seafloor Surveying and Analysis with Low-Cost Autonomous Underwater and Surface Vehicles	1507
LiDAR Based Road Detection and Contro for Agricultural Vehicles	
Development of Automated Display Shelf System for New Purchasing Experience by Dynamic Product Layout Changes Masashi Seki, Kazuyoshi Wada, and Tetsuo Tomizawa	1527
Image Selection Method from Image Sequence to Improve Computational Efficiency of 3D Reconstruction: Application of Fixed Threshold to Remov Redundant Images	e 1537
Operational Verification of a Parallel Open/Closeable Forceps Tip Mechanism for Forceps-Type Mini-PET Hiroto Hayashi, Kazuya Kawamura, Shigeki Ito, Miwako Takahashi, and Taiga Yamaya	1550
Toilet Floor Trash Detection System for Unidentified Solid Waste Rama Okta Wiyagi and Kazuyoshi Wada	1558
Manipulability Analysis of Anterior and Mediolateral Dynamic Gait Stability of	

- Mediolateral Dynamic Gait Stability of Young and Elderly Individuals..... 1568 Hiroki Watanabe, Shogo Okamoto, Tomohito Kuroda, and Yasuhiro Akiyama
- The Effect of Adding Japanese Honorifics When Naming a Driving-Review Robot . 1577 Kota Tanaka, Maho Shigematsu, Masayoshi Kanoh, Felix Jimenez, Mitsuhiro Hayase, Naoto Mukai, Tomohiro Yoshikawa, and Takahiro Tanaka