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Personal

Date of Birth: 18/07/1994

Research Interests: Humanoid, Biomimetics, Machine Learning

Education

Project Assistant Professor in Dept. of Mechano-Informatics, The University of University, Japan, JSK Robotics Laboratory, 2022-

Ph.D. in Dept. of Mechano-Informatics, The University of University, Japan, with Prof. Masayuki Inaba (JSK Robotics Laboratory), 2019-2022

M.S. in Dept. of Mechano-Informatics, Graduate School of Information Science and Technology, The University of Tokyo, Japan, 2017-2019

B.S. in Dept. of Mechano-Informatics, Faculty of Engineering, The University of Tokyo, Japan, 2013-2017

Experience

Internship at Preferred Networks, Robotics Engineer, Japan, 2018-2020

Internship at Works Applications Co. Ltd., Software Engineer, Japan, 2016

Internship at Future Standard, Software Engineer, Japan, 2016

Internship at HIOKI, E.E. CORPORATION, Software Engineer, Japan, 2015

Skills

Software Skills

Advanced: C, C++, Python, Machine Learning, Algorithms

Intermediate: Ruby, Lisp, Statistics

Basic: Java, JavaScript, Android, Haskell

Hardware Skills

Intermediate: 3D CAD, 3D Printer

Basic: Electorinics, Machining

Publications

Journal Articles (Peer Reviewed)

1. **K. Kawaharazuka**, S. Yoshimura, T. Suzuki, K. Okada, M. Inaba: "Design Optimization of Wire Arrangement With Variable Relay Points in Numerical Simulation for Tendon-Driven Robots", *IEEE Robotics and Automation Letters (RAL)*, vol. 9, no. 2, pp. 1388-1395, 2024
2. **K. Kawaharazuka**, K. Okada, M. Inaba: "Deep Predictive Model Learning with Parametric Bias: Handling Modeling Difficulties and Temporal Model Changes (in press)", *IEEE Robotics and Automation Magazine (RAM)*, 2023, (**presented at ICRA2023**)
3. **K. Kawaharazuka**, N. Kanazawa, K. Okada, M. Inaba: "Self-Supervised Learning of Visual Servoing for Low-Rigidity Robots Considering Temporal Body Changes", *IEEE Robotics and Automation Letters (RAL)*, vol. 7, no. 3, pp. 7881-7887, 2022, **SICE International Young Authors Award (SIYA-IROS2022)**, (**presented at IROS2022**)
4. Y. Omura, **K. Kawaharazuka**, Y. Nagamatsu, Y. Koga, M. Nishiura, Y. Toshimitsu, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Human-mimetic binaural ear design and sound source direction estimation for task realization of musculoskeletal humanoids", *Robomech Journal*, vol. 9, no. 17, pp. 1-15, 2022
5. **K. Kawaharazuka**, A. Miki, M. Bando, K. Okada, M. Inaba: "Dynamic Cloth Manipulation Considering Variable Stiffness and Material Change Using Deep Predictive Model With Parametric Bias", *Frontiers in Neurorobotics*, vol. 16, pp. 1-16, 2022
6. **K. Kawaharazuka**, M. Nishiura, Y. Toshimitsu, Y. Omura, Y. Koga, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Robust Continuous Motion Strategy Against Muscle Rupture using Online Learning of Redundant Intersensory Networks for Musculoskeletal Humanoids", *Robotics and Autonomous Systems (RAS)*, vol. 152, pp. 1-14, 2022
7. **K. Kawaharazuka**, A. Miki, Y. Toshimitsu, K. Okada, M. Inaba: "Adaptive Body Schema Learning System Considering Additional Muscles for Musculoskeletal Humanoids", *IEEE Robotics and Automation Letters (RAL)*, vol. 7, no. 2, pp. 3459-3466, 2022, (**presented at ICRA2022**)
8. **K. Kawaharazuka**, K. Okada, M. Inaba: "Adaptive Robotic Tool-Tip Control Learning Considering Online Changes in Grasping State", *IEEE Robotics and Automation Letters (RAL)*, vol. 6, no. 3, pp. 5992-5999, 2021, (**presented at IROS2021**)
9. **K. Kawaharazuka**, Y. Kawamura, K. Okada, M. Inaba: "Imitation Learning with Additional Constraints on Motion Style using Parametric Bias", *IEEE Robotics and Automation Letters (RAL)*, vol. 6, no. 3, pp. 5897-5904, 2021, (**presented at IROS2021**)
10. Y. Koga, **K. Kawaharazuka**, Y. Toshimitsu, M. Nishiura, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Self-Body Image Acquisition and Posture Generation with Redundancy using Musculoskeletal Humanoid Shoulder Complex for Object Manipulation", *IEEE Robotics and Automation Letters (RAL)*, vol. 6, no. 4, pp. 6686-6692, 2021, (**presented at IROS2021**)
11. **K. Kawaharazuka**, M. Nishiura, Y. Koga, Y. Omura, Y. Toshimitsu, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Automatic Grouping of Redundant Sensors and Actuators Using Functional and Spatial Connections: Application to Muscle Grouping for Musculoskeletal Humanoids", *IEEE Robotics and Automation Letters (RAL)*, vol. 6, no. 2, pp. 1981-1988, 2021, (**presented at ICRA2021**)

12. **K. Kawaharazuka**, K. Tsuzuki, Y. Koga, Y. Omura, T. Makabe, K. Shinjo, M. Onitsuka, Y. Nagamatsu, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Toward Autonomous Driving by Musculoskeletal Humanoids: Study of Developed Hardware and Learning-Based Software", *IEEE Robotics and Automation Magazine (RAM)*, vol. 27, no. 3, pp. 84-96, 2020, (**presented at ICRA2021**)
13. **K. Kawaharazuka**, K. Tsuzuki, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Object Recognition, Dynamic Contact Simulation, Detection, and Control of the Flexible Musculoskeletal Hand Using a Recurrent Neural Network With Parametric Bias", *IEEE Robotics and Automation Letters (RAL)*, vol. 5, no. 3, pp. 4580-4587, 2020, (**presented at IROS2020**)
14. **K. Kawaharazuka**, N. Hiraoka, K. Tsuzuki, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Estimation and Control of Motor Core Temperature with Online Learning of Thermal Model Parameters: Application to Musculoskeletal Humanoids", *IEEE Robotics and Automation Letters (RAL)*, vol. 5, no. 3, pp. 4273-4280, 2020, (**presented at IROS2020**)
15. **K. Kawaharazuka**, K. Tsuzuki, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Musculoskeletal AutoEncoder: A Unified Online Acquisition Method of Intersensory Networks for State Estimation, Control, and Simulation of Musculoskeletal Humanoids", *IEEE Robotics and Automation Letters (RAL)*, vol. 5, no. 2, pp. 2411-2418, 2020, (**presented at ICRA2020**)
16. **K. Kawaharazuka**, S. Makino, M. Kawamura, S. Nakashima, Y. Asano, K. Okada, M. Inaba: "Human Mimetic Forearm and Hand Design with a Radioulnar Joint and Flexible Machined Spring Finger for Human Skillful Motions", *Journal of Robotics and Mechatronics (JRM)*, vol. 32, no. 2, pp. 445-458, 2020, (**The first two authors contributed equally to this work**)
17. **K. Kawaharazuka**, K. Tsuzuki, S. Makino, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Long-time Self-body Image Acquisition and its Application to the Control of Musculoskeletal Structures", *IEEE Robotics and Automation Letters (RAL)*, vol. 4, no. 3, pp. 2965-2972, 2019, (**presented at IROS2019**)
18. **K. Kawaharazuka**, S. Makino, M. Kawamura, Y. Asano, K. Okada, M. Inaba: "Online Learning of Joint-Muscle Mapping using Vision in Tendon-driven Musculoskeletal Humanoids", *IEEE Robotics and Automation Letters (RAL)*, vol. 3, no. 2, pp. 772-779, 2018, (**presented at ICRA2018**)
19. **K. Kawaharazuka**, M. Kawamura, S. Makino, Y. Asano, K. Okada, M. Inaba: "Antagonist Inhibition Control in Redundant Tendon-driven Structures Based on Human Reciprocal Innervation for Wide Range Limb Motion of Musculoskeletal Humanoids", *IEEE Robotics and Automation Letters (RAL)*, vol. 2, no. 4, pp. 2119-2126, 2017, (**presented at IROS2017**)

International Conference Proceedings (Peer Reviewed)

1. **K. Kawaharazuka**, K. Okada, M. Inaba: "Robotic Constrained Imitation Learning for the Peg Transfer Task in Fundamentals of Laparoscopic Surgery (in press)", *Proceedings of the 2024 IEEE International Conference on Robotics and Automation (ICRA2024)*, 2024
2. **K. Kawaharazuka**, K. Okada, M. Inaba: "Adaptive Whole-body Robotic Tool-use Learning on Low-rigidity Plastic-made Humanoids Using Vision and Tactile Sensors (in press)", *Proceedings of the 2024 IEEE International Conference on Robotics and Automation (ICRA2024)*, 2024
3. A. Tang, T. Hiraoka, N. Hiraoka, F. Shi, **K. Kawaharazuka**, K. Kojima, K. Okada, M. Inaba: "HumanMimic: Learning Natural Locomotion and Transitions for Humanoid Robot via Wasserstein Adversarial Imitation (in press)", *Proceedings of the 2024 IEEE International Conference on Robotics and Automation (ICRA2024)*, 2024

4. K. Shirai, C. C. Beltran-Hernandez, M. Hamaya, A. Hashimoto, S. Tanaka, **K. Kawaharazuka**, K. Tanaka, Y. Ushiku, S. Mori: "Vision-Language Interpreter for Robot Task Planning (in press)", *Proceedings of the 2024 IEEE International Conference on Robotics and Automation (ICRA2024)*, 2024
5. Open X-Embodiment Collaboration: "Open X-Embodiment: Robotic Learning Datasets and RT-X Models (in press)", *Proceedings of the 2024 IEEE International Conference on Robotics and Automation (ICRA2024)*, 2024
6. S. Inoue, **K. Kawaharazuka**, K. Okada, M. Inaba: "Body Design and Gait Generation of Chair-Type Asymmetrical Tripedal Low-rigidity Robot", *Proceedings of the 2024 IEEE International Conference on Soft Robotics (ROBOSOFT2024)*, 2024
7. A. Miki, Y. Sahara, K. Miyama, Y. Ribayashi, **K. Kawaharazuka**, S. Hasegawa, K. Okada, M. Inaba: "Designing Fluid-Exuding Cartilage for Biomimetic Robots Mimicking Human Joint Lubrication Function (in press)", *Proceedings of the 2024 IEEE International Conference on Soft Robotics (ROBOSOFT2024)*, 2024
8. **K. Kawaharazuka**, Y. Obinata, N. Kanazawa, K. Okada, M. Inaba: "Robotic Applications of Pre-Trained Vision-Language Models to Various Recognition Behaviors", *Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2023)*, pp. 458-465, 2023
9. **K. Kawaharazuka**, N. Kanazawa, Y. Obinata, K. Okada, M. Inaba: "Daily Assistive View Control Learning of Low-Cost Low-Rigidity Robot via Large-Scale Vision-Language Model", *Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2023)*, pp. 452-457, 2023
10. S. Yoshimura, S. Yuzaki, **K. Kawaharazuka**, K. Okada, M. Inaba: "Optimization of Muscle Arrangement Extraction from Human Waist Structure for Biomimetic Humanoid Implementation", *Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2023)*, pp. 583-590, 2023
11. Y. Ribayashi, K. Miyama, A. Miki, **K. Kawaharazuka**, K. Okada, M. Inaba: "Development of a Wire-Wound Muscle-Tendon Complex Drive and Its Application to a Two-Dimensional Robot Configuration", *Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2023)*, pp. 758-764, 2023
12. S. Yuzaki, A. Miki, M. Bando, S. Yoshimura, T. Suzuki, **K. Kawaharazuka**, K. Okada, M. Inaba: "Fusion of Body and Environment with Movable Carabiners for Wire-Driven Robots Toward Expansion of Physical Capabilities", *Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2023)*, pp. 679-685, 2023
13. **K. Kawaharazuka**, T. Makabe, K. Okada, M. Inaba: "Daily Assistive Modular Robot Design Based on Multi-Objective Black-Box Optimization", *Proceedings of the 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)*, pp. 9970-9977, 2023
14. Y. Matsuura, **K. Kawaharazuka**, N. Hiraoka, K. Kojima, K. Okada, M. Inaba: "Development of a Whole-Body Work Imitation Learning System by a Biped and Bi-Armed Humanoid", *Proceedings of the 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)*, pp. 10374-10381, 2023
15. Y. Obinata, **K. Kawaharazuka**, N. Kanazawa, N. Yamaguchi, N. Tsukamoto, I. Yanokura, S. Kitagawa, K. Shinjo, K. Okada, M. Inaba: "Semantic Scene Difference Detection in Daily Life Patrolling by Mobile Robots Using Pre-Trained Large-Scale Vision-Language Model", *Proceedings of the 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)*, pp. 3228-3233, 2023, **IEEE RAS Japan Joint Chapter Young Award (2023), SICE International Young Authors Award (SIYA-IROS2023)**

16. K. Miyama, **K. Kawaharazuka**, K. Okada, M. Inaba: "Development of a Five-Fingerd Biomimetic Soft Robotic Hand by 3D Printing the Skin and Skeleton As One Unit", *Proceedings of the 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)*, pp. 6624-6630, 2023, **SICE International Young Authors Award (SIYA-IROS2023)**
17. S. Yoshimura, T. Suzuki, M. Bando, S. Yuzaki, **K. Kawaharazuka**, K. Okada, M. Inaba: "Design Method of a Kangaroo Robot with High Power Legs and an Articulated Soft Tail", *Proceedings of the 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2023)*, pp. 6631-6638, 2023
18. A. Ichikura, **K. Kawaharazuka**, Y. Obinata, K. Okada, M. Inaba: "A Method for Selecting Scenes and Emotion-Based Descriptions for a Robot's Diary (in press)", *Proceedings of the 32nd IEEE International Conference on Robot and Human Interactive Communication (ROMAN2023)*, 2023
19. A. Miki, **K. Kawaharazuka**, M. Bando, K. Okada, K. Kawasaki, M. Inaba: "System Architecture and Real-World Task Realization of Musculoskeletal Wheeled Robot Musashi-W with Various Hardware Components (in press)", *Proceedings of the 18th International Conference on Intelligent Autonomous Systems (IAS2023)*, 2023
20. L. Wu, **K. Kawaharazuka**, S. Hasegawa, K. Okada, M. Inaba: "Workspace-Based Precision Grasp Pose Generator for Multi-Fingered Robotic Hands (in press)", *Proceedings of the 18th International Conference on Intelligent Autonomous Systems (IAS2023)*, 2023
21. N. Kanazawa, **K. Kawaharazuka**, Y. Obinata, K. Okada, M. Inaba: "Recognition of Heat-Induced Food State Changes by Time-Series Use of Vision-Language Model for Cooking Robot (in press)", *Proceedings of the 18th International Conference on Intelligent Autonomous Systems (IAS2023)*, 2023
22. A. Ichikura, **K. Kawaharazuka**, Y. Obinata,, K. Shinjo, K. Okada, M. Inaba: "Automatic Diary Generation System Including Information on Joint Experiences between Humans and Robots (in press)", *Proceedings of the 18th International Conference on Intelligent Autonomous Systems (IAS2023)*, 2023
23. **K. Kawaharazuka**, Y. Obinata, N. Kanazawa, K. Okada, M. Inaba: "VQA-based Robotic State Recognition Optimized with Genetic Algorithm", *Proceedings of the 2023 IEEE International Conference on Robotics and Automation (ICRA2023)*, pp. 8306-8311, 2023
24. H. Sato, **K. Kawaharazuka**, T. Makabe, K. Okada, M. Inaba: "Online Estimation of Self-Body Deflection with Various Sensor Data Based on Directional Statistics", *Proceedings of the 2023 IEEE/SICE International Symposium on System Integration (SII2023)*, pp. 1-8, 2023
25. **K. Kawaharazuka**, A. Miki, M. Bando, T. Suzuki, Y. Ribayashi, Y. Toshimitsu, Y. Nagamatsu, K. Okada, M. Inaba: "Hardware Design and Learning-Based Software Architecture of Musculoskeletal Wheeled Robot Musashi-W for Real-World Applications", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, pp. 413-419, 2022, **Best Interactive Paper Award Finalist**
26. **K. Kawaharazuka**, T. Suzuki, K. Okada, M. Inaba: "Continuous Jumping of a Parallel Wire-Driven Monopedal Robot RAMIEL Using Reinforcement Learning", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, pp. 759-764, 2022
27. **K. Kawaharazuka**, N. Kanazawa, K. Okada, M. Inaba: "Learning-Based Wiping Behavior of Low-Rigidity Robots Considering Various Surface Materials and Task Definitions", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, pp. 919-924, 2022
28. Y. Ribayashi, **K. Kawaharazuka**, Y. Toshimitsu, D. Kusuyama, A. Miki, K. Shinjo, M. Bando, T. Suzuki, Y. Kojio, K. Okada, M. Inaba: "Design of Robot Foot with Outer Edge Measurement Structure and Chair Rotation Motion by Friction Control", *Proceedings of the 2022 IEEE-RAS International*

Conference on Humanoid Robots (HUMANOIDs2022), pp. 314-321, 2022, (**Top 7 Best Oral Paper Presentation**)

29. K. Miyama, S. Hasegawa, **K. Kawaharazuka**, N. Yamaguchi, K. Okada, M. Inaba: "Design of a Five-Fingered Hand with Full-Fingered Tactile Sensors Using Conductive Filaments and Its Application to Bending after Insertion Motion", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDs2022)*, pp. 780-785, 2022
30. **K. Kawaharazuka**, K. Okada, M. Inaba: "Realization of Seated Walk by a Musculoskeletal Humanoid with Buttock-Contact Sensors From Human Constrained Teaching", *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2022)*, pp. 5774-5780, 2022
31. **K. Kawaharazuka**, K. Okada, M. Inaba: "Online Learning Feedback Control Considering Hysteresis for Musculoskeletal Structures", *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2022)*, pp. 5767-5773, 2022
32. **K. Kawaharazuka**, Y. Ribayashi, A. Miki, Y. Toshimitsu, T. Suzuki, K. Okada, M. Inaba: "Learning of Balance Controller Considering Changes in Body State for Musculoskeletal Humanoids", *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2022)*, pp. 5809-5816, 2022
33. Y. Toshimitsu, **K. Kawaharazuka**, A. Miki, K. Okada, M. Inaba: "DIJE: Dense Image Jacobian Estimation for Robust Robotic Self-Recognition and Visual Servoing", *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2022)*, pp. 2219-2226, 2022
34. Y. Ribayashi, **K. Kawaharazuka**, Y. Toshimitsu, D. Kusuyama, A. Miki, K. Shinjo, M. Bando, T. Suzuki, Y. Kojio, K. Okada, M. Inaba: "Imitation Behavior of the Outer Edge of the Foot by Humanoids Using a Simplified Contact State Representation", *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2022)*, pp. 4243-4249, 2022
35. T. Suzuki, Y. Toshimitsu, Y. Nagamatsu, **K. Kawaharazuka**, A. Miki, Y. Ribayashi, M. Bando, K. Kojima, Y. Kakiuchi, K. Okada, M. Inaba: "RAMIEL: A Parallel-Wire Driven Monopedal Robot for High and Continuous Jumping", *Proceedings of the 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2022)*, pp. 5017-5024, 2022, **SICE International Young Authors Award (SIYA-IROS2022)**
36. **K. Kawaharazuka**, K. Shinjo, Y. Kawamura, K. Okada, M. Inaba: "Environmentally Adaptive Control Including Variance Minimization Using Stochastic Predictive Network with Parametric Bias: Application to Mobile Robots", *Proceedings of the 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2021)*, pp. 8381-8387, 2021
37. **K. Kawaharazuka**, Y. Toshimitsu, M. Nishiura, Y. Koga, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Design Optimization of Musculoskeletal Humanoids with Maximization of Redundancy to Compensate for Muscle Rupture", *Proceedings of the 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2021)*, pp. 3204-3210, 2021
38. **K. Kawaharazuka**, N. Hiraoka, Y. Koga, M. Nishiura, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Online Learning of Danger Avoidance for Complex Structures of Musculoskeletal Humanoids and Its Applications", *Proceedings of the 2020 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDs2020)*, pp. 349-355, 2021
39. **K. Kawaharazuka**, Y. Koga, M. Nishiura, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Motion Modification Method of Musculoskeletal Humanoids by Human Teaching Using Muscle-Based Compensation Control", *Proceedings of the 2020 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDs2020)*, pp. 83-89, 2021

40. M. Onitsuka, M. Nishiura, **K. Kawaharazuka**, K. Tsuzuki, Y. Toshimitsu, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Development of Musculoskeletal Legs with Planar Interskeletal Structures to Realize Human Comparable Moving Function", *Proceedings of the 2020 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2020)*, pp. 17-24, 2021, **Best Oral Paper Award, Finalists of Mike Stilman Paper Award**
41. Y. Toshimitsu, **K. Kawaharazuka**, M. Nishiura, Y. Koga, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Biomimetic Operational Space Control for Musculoskeletal Humanoid Optimizing across Muscle Activation and Joint Nullspace", *Proceedings of the 2021 IEEE International Conference on Robotics and Automation (ICRA2021)*, pp. 1184-1190, 2021
42. S. Nakashima, **K. Kawaharazuka**, M. Nishiura, Y. Asano, Y. Kakiuchi, K. Okada, K. Kawasaki, M. Inaba: "Restoring Force Design of Active Self-Healing Tension Transmission System and Application to Tendon-Driven Legged Robot", *Proceedings of the 2021 IEEE International Conference on Robotics and Automation (ICRA2021)*, pp. 7033-7038, 2021
43. **K. Kawaharazuka**, M. Nishiura, S. Nakashima, Y. Toshimitsu, Y. Omura, Y. Koga, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Stability Recognition with Active Vibration for Bracing Behaviors and Motion Extensions Using Environment in Musculoskeletal Humanoids", *Proceedings of the 2021 IEEE International Conference on Soft Robotics (ROBOSOFT2021)*, pp. 126-133, 2021
44. **K. Kawaharazuka**, Y. Koga, K. Tsuzuki, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Exceeding the Maximum Speed Limit of the Joint Angle for the Redundant Tendon-driven Structures of Musculoskeletal Humanoids", *Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2020)*, pp. 3585-3590, 2020
45. **K. Kawaharazuka**, Y. Koga, K. Tsuzuki, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Applications of Stretch Reflex for the Upper Limb of Musculoskeletal Humanoids: Protective Behavior, Postural Stability, and Active Induction", *Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2020)*, pp. 3598-3603, 2020
46. **K. Kawaharazuka**, T. Ogawa, C. Nabeshima: "Tool Shape Optimization through Backpropagation of Neural Network", *Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2020)*, pp. 8387-8393, 2020
47. Y. Toshimitsu, **K. Kawaharazuka**, K. Tsuzuki, M. Onitsuka, M. Nishiura, Y. Koga, Y. Omura, M. Tomita, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Biomimetic Control Scheme for Musculoskeletal Humanoids Based on Motor Directional Tuning in the Brain", *Proceedings of the 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2020)*, pp. 7784-7791, 2020
48. **K. Kawaharazuka**, K. Tsuzuki, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Stable Tool-Use with Flexible Musculoskeletal Hands by Learning the Predictive Model of Sensor State Transition", *Proceedings of the 2020 IEEE International Conference on Robotics and Automation (ICRA2020)*, pp. 4572-4578, 2020
49. T. Nishio, M. Zhao, F. Shi, T. Anzai, **K. Kawaharazuka**, K. Okada, M. Inaba: "Stable Control in Climbing and Descending Flight under Upper Walls using Ceiling Effect Model based on Aerodynamics", *Proceedings of the 2020 IEEE International Conference on Robotics and Automation (ICRA2020)*, pp. 172-178, 2020
50. **K. Kawaharazuka**, S. Makino, K. Tsuzuki, M. Onitsuka, Y. Nagamatsu, K. Shinjo, T. Makabe, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Component Modularized Design of Musculoskeletal Humanoid Platform Musashi to Investigate Learning Control Systems", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, pp. 7294-7301, 2019

51. **K. Kawaharazuka**, K. Tsuzuki, S. Makino, M. Onitsuka, K. Shinjo, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Task-specific Self-body Controller Acquisition by Musculoskeletal Humanoids: Application to Pedal Control in Autonomous Driving", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, pp. 813-818, 2019
52. **K. Kawaharazuka**, T. Ogawa, C. Nabeshima: "Dynamic Task Control Method of a Flexible Manipulator Using a Deep Recurrent Neural Network", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, pp. 7689-7695, 2019
53. K. Shinjo, **K. Kawaharazuka**, Y. Asano, S. Nakashima, S. Makino, M. Onitsuka, K. Tsuzuki, K. Okada, K. Kawasaki, M. Inaba: "Foot with a Core-shell Structural Six-axis Force Sensor for Pedal Depressing and Recovering from Foot Slipping during Pedal Pushing Toward Autonomous Driving by Humanoids", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, pp. 3049-3054, 2019
54. S. Nakashima, T. Shirai, **K. Kawaharazuka**, Y. Asano, Y. Kakiuchi, K. Okada, M. Inaba: "An Approach of Facilitated Investigation of Active Self-healing Tension Transmission System Oriented for Legged Robots", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, pp. 2567-2572, 2019, **SICE International Young Authors Award (SIYA-IROS2019)**
55. T. Makabe, T. Shirai, Y. Nagamatsu, **K. Kawaharazuka**, S. Fumihito, K. Okada, M. Inaba: "Development of Joint Module with Two-Speed Gear Transmission and Joint Lock Mechanism during Driving for Task Adaptable Robot", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, pp. 5123-5130, 2019
56. **K. Kawaharazuka**, K. Tsuzuki, M. Onitsuka, Y. Koga, Y. Omura, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Reflex-based Motion Strategy of Musculoskeletal Humanoids under Environmental Contact Using Muscle Relaxation Control", *Proceedings of the 2019 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2019)*, pp. 114-119, 2019
57. Y. Koga, **K. Kawaharazuka**, M. Onitsuka, T. Makabe, K. Tsuzuki, Y. Omura, Y. Asano, K. Okada, M. Inaba: "Modification of Muscle Antagonistic Relations and Hand Trajectory on the Dynamic Motion of Musculoskeletal Humanoid", *Proceedings of the 2019 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2019)*, pp. 632-637, 2019
58. Y. Asano, S. Nakashima, I. Yanokura, M. Onitsuka, **K. Kawaharazuka**, K. Tsuzuki, Y. Koga, Y. Omura, K. Okada, M. Inaba: "Ankle-Hip-Stepping Stabilizer on Tendon-Driven Humanoid Kengoro by Integration of Muscle-Joint-Work Space Controllers for Knee-Stretched Humanoid Balance", *Proceedings of the 2019 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2019)*, pp. 397-402, 2019
59. **K. Kawaharazuka**, T. Ogawa, J. Tamura, C. Nabeshima: "Dynamic Manipulation of Flexible Objects with Torque Sequence Using a Deep Neural Network", *Proceedings of the 2019 IEEE International Conference on Robotics and Automation (ICRA2019)*, pp. 2139-2145, 2019
60. **K. Kawaharazuka**, T. Makabe, S. Makino, K. Tsuzuki, Y. Nagamatsu, Y. Asano, T. Shirai, F. Sugai, K. Okada, K. Kawasaki, M. Inaba: "TWIMP: Two-Wheel Inverted Musculoskeletal Pendulum as a Learning Control Platform in the Real World with Environmental Physical Contact", *Proceedings of the 2018 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2018)*, pp. 784-790, 2018, **(The first two authors contributed equally to this work)**
61. **K. Kawaharazuka**, S. Makino, M. Kawamura, Y. Asano, K. Okada, M. Inaba: "A Method of Joint Angle Estimation Using Only Relative Changes in Muscle Lengths for Tendon-driven Humanoids with Complex Musculoskeletal Structures", *Proceedings of the 2018 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2018)*, pp. 1128-1135, 2018

- 62. T. Makabe, **K. Kawaharazuka**, K. Tsuzuki, K. Wada, S. Makino, M. Kawamura, A. Fujii, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Development of Movable Binocular High-Resolution Eye-Camera Unit for Humanoid and the Evaluation of Looking Around Fixation Control and Object Recognition", *Proceedings of the 2018 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2018)*, pp. 840-845, 2018
- 63. **K. Kawaharazuka**, S. Makino, M. Kawamura, A. Fujii, Y. Asano, K. Okada, M. Inaba: "Online Self-body Image Acquisition Considering Changes in Muscle Routes Caused by Softness of Body Tissue for Tendon-driven Musculoskeletal Humanoids", *Proceedings of the 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2018)*, pp. 1711-1717, 2018
- 64. S. Makino, **K. Kawaharazuka**, M. Kawamura, A. Fujii, T. Makabe, M. Onitsuka, Y. Asano, K. Okada, K. Kawasaki, M. Inaba: "Five-Fingered Hand with Wide Range of Thumb Using Combination of Machined Springs and Variable Stiffness Joints", *Proceedings of the 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2018)*, pp. 4562-4567, 2018, **IEEE RAS Japan Joint Chapter Young Award (2018), IROS ICROS Best Application Paper Award 2018 Finalists**
- 65. A. Fujii, S. Nakashima, M. Kawamura, **K. Kawaharazuka**, S. Makino, Y. Asano, K. Okada, M. Inaba: "Development and Functional Evaluation of a Deformable Membrane Capsule for an Open Ball Glenohumeral Joint", *Proceedings of the 2018 IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics (BIOROB2018)*, pp. 853-858, 2018
- 66. **K. Kawaharazuka**, S. Makino, M. Kawamura, Y. Asano, Y. Kakiuchi, K. Okada, M. Inaba: "Human Mimetic Forearm Design with Radioulnar Joint using Miniature Bone-muscle Modules and its Applications", *Proceedings of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2017)*, pp. 4956-4962, 2017, **IEEE RAS Japan Joint Chapter Young Award (2017)**
- 67. S. Makino, **K. Kawaharazuka**, M. Kawamura, Y. Asano, K. Okada, M. Inaba: "High-power, flexible, robust hand: Development of musculoskeletal hand using machined springs and realization of self-weight supporting motion with humanoid", *Proceedings of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2017)*, pp. 1187-1192, 2017
- 68. Y. Asano, T. Kozuki, S. Ookubo, M. Kawamura, S. Nakashima, T. Katayama, Y. Iori, H. Toshinori, **K. Kawaharazuka**, S. Makino, Y. Kakiuchi, K. Okada, M. Inaba: "Human Mimetic Musculoskeletal Humanoid Kengoro toward Real World Physically Interactive Actions", *Proceedings of the 2016 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2016)*, pp. 876-883, 2016, **Best Interactive Paper Award Finalist**

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