

# Kento Kawaharazuka

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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**, 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)
2. 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
3. **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
4. **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
5. **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)
6. **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)
7. **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)
8. 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)
9. **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)
10. **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)
11. **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)

12. **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)**
13. **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)**
14. **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)**
15. **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)**
16. **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)**
17. **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**, 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 (in press)", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, 2022
2. **K. Kawaharazuka**, T. Suzuki, K. Okada, M. Inaba: "Continuous Jumping of a Parallel Wire-Driven Monopedal Robot RAMIEL Using Reinforcement Learning (in press)", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, 2022
3. **K. Kawaharazuka**, N. Kanazawa, K. Okada, M. Inaba: "Learning-Based Wiping Behavior of Low-Rigidity Robots Considering Various Surface Materials and Task Definitions (in press)", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, 2022
4. 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 (in press)", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, 2022
5. 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 (in press)", *Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2022)*, 2022

6. **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
7. **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
8. **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
9. 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
10. 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
11. 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
12. **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
13. **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
14. **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
15. **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
16. 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**
17. 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
18. 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
  19. **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
  20. **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
  21. **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
  22. **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
  23. 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
  24. **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
  25. 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
  26. **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
  27. **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
  28. **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

29. 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
30. 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)**
31. 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
32. **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
33. 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
34. 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
35. **K. Kawaharazuka**, K. Tsuzuki, S. Makino, Y. Asano, K. Okada, M. Inaba: "Modeling and On-line Learning of Musculoskeletal Intersensory Networks for Static Controls of Tendon-driven Humanoids", *Proceedings of 9th International Symposium on Adaptive Motion of Animals and Machines (AMAM2019)*, 2019, **Company of Biologists Early Career Researcher Grant (500 GBP)**
36. **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
37. **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)**
38. **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
39. 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
40. **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
  41. 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**
  42. 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 Biomechanics (BIOROB2018)*, pp. 853-858, 2018
  43. **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)**
  44. 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
  45. 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**

Last updated: October 30, 2022

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