

# Kento Kawaharazuka

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## Personal

Date of Birth: 18/07/1994

Research Interests: Humanoid, Biomimetics, Machine Learning

## Education

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

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-current

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*

Basic: Java, JavaScript, Android, Haskell

Intermediate: Ruby, Lisp, Statistics

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

### *Hardware Skills*

Basic: Electorinics, Machining

Intermediate: 3D CAD, 3D Printer

## Publications

### *Journal Articles (Peer Reviewed)*

1. **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**)
2. **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**)
3. **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. 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 (in press)", *Proceedings of the 2019 IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS2019)*, 2019
2. **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 (in press)", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, 2019
3. **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 (in press)", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, 2019
4. **K. Kawaharazuka**, T. Ogawa, C. Nabeshima: "Dynamic Task Control Method of a Flexible Manipulator Using a Deep Recurrent Neural Network (in press)", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, 2019
5. 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 (in press)", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, 2019
6. 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 (in press)", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, 2019
7. 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 (in press)", *Proceedings of the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2019)*, 2019

8. **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)**
9. **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
10. **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)**
11. **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
12. 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
13. **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
14. 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**
15. 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
16. **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)**
17. 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
18. 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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