

Akihiro Miki

Project Assistant Professor



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Summary

- a Project Assistant Professor at the University of Tokyo, working on the intersection of biological understanding and intelligent machine design, with a focus on biomimetic robotics to investigate biological systems and their underlying principles.

Research Interests

Biomimetic Robotics, Soft Robotics, Musculoskeletal Humanoid, Biological System, Neuroscience, Physiology, Embodied Intelligence, Constructive Understanding, Complex Emergent Systems

Experience

The University of Tokyo, Project Assistant Professor
Working at JSK Robotics Laboratory (Creative Informatics, Information Science and Technology).Tokyo, Japan
Apr 2026 – present

JSPS (Japan Society for the Promotion of Science), JSPS Research Fellowships for young students (DC2)Tokyo, Japan
Apr 2024 – Mar 2026

Japan Science and Technology Agency (JST), The University of Tokyo "Advanced Human Resource Development Leading Green Transformation (GX) (SPRING GX)" Project student
• Description 1. JST Support for Pioneering Research Initiated by the Next Generation (SPRING) ProgramTokyo, Japan
Apr 2023 – Mar 2024

The University of Tokyo, Research AssistantTokyo, Japan
May 2022 – Mar 2026

Education

PhD The University of Tokyo, Mechano-Informatics
• PhD in Graduate School of Information Science and Technology
• Dissertation: A Cross-Hierarchical Constructive Framework for Biological Understanding Based on Reproducing Emergent Functional Processes via Biomimetic Tissue RoboticsTokyo, Japan
Apr 2023 – Mar 2026

Master The University of Tokyo, Interdisciplinary Information Studies
• Completed Master's program at Graduate School of Interdisciplinary Information StudiesTokyo, Japan
Apr 2021 – Mar 2023

Bachelor The University of Tokyo, Mechano-InformaticsTokyo, Japan
Apr 2017 – Mar 2021

- Graduated from Department of Mechano-Informatics, Faculty of Engineering

M.D. Ehime University, Medicine
Pro-gram
(with-drawn)

Ehime, Japan
 Mar 2017

Awards

- 2026-03-24 - Valedictorian (Graduation Ceremony Representative), The University of Tokyo ([link](#))
- 2025-03-18 - 2024 SICE Young Authors Award for Basic Research, The Society of Instrument and Control Engineers ([link](#))
- 2024-01-23 - The 24th SICE Systems Integration Conference Excellent Presentation Award, The Society of Instrument and Control Engineers ([link](#))
- 2023-09-13 - The 3th Robotics Symposia Excellent Research and Technology Award, The Robotics Society of Japan ([link](#))

Grants-in-Aid and Scholarship

- 2024-04 to 2026-03 - JSPS Research Fellowship for Young Scientists (DC2), JSPS (Japan Society for the Promotion of Science)
- 2023-04 to 2024-03 - The University of Tokyo "Advanced Human Resource Development Leading Green Transformation (GX) (SPRING GX)" Project student., Japan Science and Technology Agency (JST)
- 2023-04 to 2024-03 - Iwai Hisao Memorial Tokyo Scholarship Foundation
- 2022-04 to 2023-03 - HAYASHI Rheology Scholarship Foundation
- 2021-04 to 2022-03 - Iwadare Scholarship Foundation Scholarship
- 2019-04 to 2021-03 - HAYASHI Rheology Scholarship Foundation
- 2019-04 to 2023-03 - SINNIHON SCHOLARSHIP FOUNDATION Scholarship

Media

- 2026-03-24 - AY 2025 Diploma Presentation Ceremony held (Valedictorian), The University of Tokyo ([link](#))
- 2024-08-06 - The 2nd BAIRAL Research Meeting for Fiscal Year 2024 ([link](#))

International Journal Papers (5)

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|---|------|
| <p>Exploring the proprioceptive potential of joint receptors using a bio-mimetic robotic joint</p> <p>Akihiro Miki, Shun Hasegawa, Sota Yuzaki, Yuta Sahara, Yoshimoto Ribayashi, Kento Kawaharazuka, Kei Okada</p> <p>https://doi.org/10.1038/s41598-025-27311-3 (Scientific Reports, vol. 16, no. 1, pp. 4724)</p> | 2026 |
| <p>Robotic Physical Comparison of Biologically Motivated and Counterfactual Sensory Arrangements using Biomimetic Skin</p> <p>Akihiro Miki, Shun Hasegawa, Yoshimoto Ribayashi, Yuta Sahara, Kento Kawaharazuka, Kei Okada</p> <p>https://doi.org/10.1088/1748-3190/ae7786 (Bioinspiration & Biomimetics, vol. 21, no. 4, pp. 046009)</p> | 2026 |
| <p>Liquid Metal Sloshing for High-Load Active Self-Healing System: An Application to Tendon-Driven Legged Robot</p> | 2025 |

Shinsuke Nakashima, Kento Kawaharazuka, Yuya Nagamatsu, Koki Shinjo, Akihiro Miki, Yuki Asano, Yohei Kakiuchi, Kei Okada, Masayuki Inaba
<https://doi.org/10.1002/aisy.202500040> (Advanced Intelligent Systems, vol. 7, no. 7, pp. 2500040)

Adaptive Body Schema Learning System Considering Additional Muscles for Musculoskeletal Humanoids

2022

Kento Kawaharazuka, Akihiro Miki, Yasunori Toshimitsu, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/LRA.2022.3147457> (IEEE Robotics and Automation Letters, vol. 7, no. 2, pp. 3459-3466)

Dynamic Cloth Manipulation Considering Variable Stiffness and Material Change Using Deep Predictive Model With Parametric Bias

2022

Kento Kawaharazuka, Akihiro Miki, Masahiro Bando, Kei Okada, Masayuki Inaba

<https://doi.org/10.3389/fnbot.2022.890695> (Frontiers in Neurorobotics, vol. 16, pp. 1-16)

International Conference Proceedings (Peer Reviewed) (16)

Fundamental Three-Dimensional Configuration of Wire-Wound Muscle-Tendon Complex Drive

Nov 2024

Yoshimoto Ribayashi, Yuta Sahara, Shogo Sawaguchi, Kazuhiro Miyama, Akihiro Miki, Kento Kawaharazuka, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/Humanoids58906.2024.10769901> (Proceedings of the 2024 IEEE-RAS International Conference on Humanoid Robots, pp. 980-987)

Vlimb: A Wire-Driven Wearable Robot for Bodily Extension, Balancing Powerfulness and Reachability

Nov 2024

Shogo Sawaguchi, Temma Suzuki, Akihiro Miki, Kento Kawaharazuka, Sota Yuzaki, Shunnosuke Yoshimura, Yoshimoto Ribayashi, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/Humanoids58906.2024.10769893> (Proceedings of the 2024 IEEE-RAS International Conference on Humanoid Robots, pp. 851-857)

Construction of Musculoskeletal Simulation for Shoulder Complex with Ligaments and Its Validation via Model Predictive Control

Oct 2024

Yuta Sahara, Akihiro Miki, Yoshimoto Ribayashi, Shunnosuke Yoshimura, Kento Kawaharazuka, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/IROS58592.2024.10802465> (Proceedings of The 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 327-333)

Patterned Structure Muscle : Arbitrary Shaped Wire-driven Artificial Muscle Utilizing Anisotropic Flexible Structurefor Musculoskeletal Robots

Oct 2024

Shunnosuke Yoshimura, Akihiro Miki, Kazuhiro Miyama, Yuta Sahara, Kento Kawaharazuka, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/IROS58592.2024.10801899> (Proceedings of The 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 13930-13937)

Designing Fluid-Exuding Cartilage for Biomimetic Robots Mimicking Human Joint Lubrication Function

Apr 2024

Akihiro Miki, Yuta Sahara, Kazuhiro Miyama, Shunnosuke Yoshimura, Yoshimoto Ribayashi, Kento Kawaharazuka, Shun Hasegawa, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/RoboSoft60065.2024.10521920> (Proceedings of 2024 IEEE-RAS International Conference on Soft Robotics, pp. 452-459)

Development of a Wire-Wound Muscle-Tendon Complex Drive and Its Application to a Two-Dimensional Robot Configuration

Dec 2023

Yoshimoto Ribayashi, Kazuhiro Miyama, Akihiro Miki, Kento Kawaharazuka, Kei Okada, Koji Kawasaki, Masayuki Inaba

<https://doi.org/10.1109/Humanoids57100.2023.10375220> (Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots, pp. 758-764)

Fusion of Body and Environment with Movable Carabiners for Wire-Driven Robots Toward Expansion of Physical Capabilities

Dec 2023

Sota Yuzaki, Akihiro Miki, Masahiro Bando, Shunnosuke Yoshimura, Temma Suzuki, Kento Kawaharazuka, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/Humanoids57100.2023.10375200> (Proceedings of the 2023 IEEE-RAS International Conference on Humanoid Robots, pp. 679-685)

Fault Mitigation and Fault Tolerant Humanoid System against Contact Impact

July 2023

Takuma Hiraoka, Shimpei Sato, Naoki Hiraoka, Akihiro Miki, Kunio Kojima, Kei Okada, Masayuki Inaba, Koji Kawasaki

https://doi.org/10.1007/978-3-031-44851-5_27 (Intelligent Autonomous Systems 18, pp. 353-366)

System Architecture and Real-World Task Realization of Musculoskeletal Wheeled Robot Musashi-W with Various Hardware Components

July 2023

Akihiro Miki, Kento Kawaharazuka, Masahiro Bando, Kei Okada, Koji Kawasaki, Masayuki Inaba

https://doi.org/10.1007/978-3-031-44851-5_9 (Intelligent Autonomous Systems 18, pp. 109-122)

Muscle-Tendon Complex-Inspired Deformable Exteriors as a Wire-Drive Extension

June 2023

Yoshimoto Ribayashi, Kazuhiro Miyama, Akihiro Miki, Kento Kawaharazuka, Kei Okada, Koji Kawasaki, Masayuki Inaba

<https://doi.org/10.18910/92308> (Proceedings of 11th International Symposium on Adaptive Motion of Animals and Machines, pp. P53)

Design of Robot Foot with Outer Edge Measurement Structure and Chair Rotation Motion by Friction Control

Nov 2022

Yoshimoto Ribayashi, Kento Kawaharazuka, Yasunori Toshimitsu, Daiki Kusuyama, Akihiro Miki, Koki Shinjo, Masahiro Bando, Temma Suzuki, Yuta Kojio, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/Humanoids53995.2022.10000127> (Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots, pp. 314-321)

Hardware Design and Learning-Based Software Architecture of Musculoskeletal Wheeled Robot Musashi-W for Real-World Applications

Nov 2022

Kento Kawaharazuka, Akihiro Miki, Masahiro Bando, Temma Suzuki, Yoshimoto Ribayashi, Yasunori Toshimitsu, Yuya Nagamatsu, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/Humanoids53995.2022.10000123> (Proceedings of the 2022 IEEE-RAS International Conference on Humanoid Robots, pp. 413-419)

DIJE: Dense Image Jacobian Estimation for Robust Robotic Self-Recognition and Visual Servoing

Oct 2022

Yasunori Toshimitsu, Kento Kawaharazuka, Akihiro Miki, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/IROS47612.2022.9981868> (Proceedings of The 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 2219-2226)

Imitation Behavior of the Outer Edge of the Foot by Humanoids Using a Simplified Contact State Representation

Oct 2022

Yoshimoto Ribayashi, Kento Kawaharazuka, Yasunori Toshimitsu, Daiki Kusuyama, Akihiro Miki, Koki Shinjo, Masahiro Bando, Temma Suzuki, Yuta Kojio, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/IROS47612.2022.9981673> (Proceedings of The 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 4243-4249)

Learning of Balance Controller Considering Changes in Body State for Musculoskeletal Humanoids

Oct 2022

Kento Kawaharazuka, Yoshimoto Ribayashi, Akihiro Miki, Yasunori Toshimitsu, Temma Suzuki, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/IROS47612.2022.9981051> (Proceedings of The 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 5809-5816)

RAMIEL: A Parallel-Wire Driven Monopedal Robot for High and Continuous Jumping

Oct 2022

Temma Suzuki, Yasunori Toshimitsu, Yuya Nagamatsu, Kento Kawaharazuka, Akihiro Miki, Yoshimoto Ribayashi, Masahiro Bando, Kunio Kojima, Yohei Kak-iuchi, Kei Okada, Masayuki Inaba

<https://doi.org/10.1109/IROS47612.2022.9981963> (Proceedings of The 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 5017-5024)