Byungchul Kim(김병철) – Curriculum Vitae

Bio-inspired Embodied AI and Robotics (BEAR) Lab
Global Biomedical Engineering Department /
Intelligent Precision Healthcare Convergence
Sungkyunkwan University
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Academic Appointments

Assistant Professor — 2026 -Present
Global Biomedical Engineering Department/Intelligent Precision Healthcare Convergence,
Bioinspired Embodied AI and Robotics Lab, Sungkyunkwan University

Postdoctoral Research Associate — 2023 - 2026
Distributed Robotics Lab, Computer Science and Artificial Intelligence Lab (CSAIL),
Massachusetts Institute of Technology (MIT)
Advisors: Prof. Daniela Rus

Postdoctoral Research Associate — 2020 - 2022
Soft Robotics Research Center, Seoul National University (SNU)
Advisors: Prof. Kyu-Jin Cho

Education

Ph.D. in Mechanical Engineering — 2014 - 2020
SNU, Seoul, Korea
Advisor: Prof. Kyu-Jin Cho

M.S. in Mechanical and Aerospace Engineering — 2012 - 2014
SNU, Seoul, Korea
Advisor: Prof. Kyu-Jin Cho

B.S. in Mechanical and Aerospace Engineering — 2008 - 2012
SNU, Seoul, Korea
Advisor: Prof. Minsu Kim

Grants (as a PI)

Jan. 2027 - Dec. 2027 — **Industry–Academia Collaborative Research Project (Vacatio)**
TWIN-STAY: Adaptive Digital Twin and Robot–Space Co-design for Autonomous Hotel Operation (Role: PI)

Jul. 2026 - Jun. 2030 — **SKKU–SMC Joint Research Program (Sungkyunkwan University & Samsung Medical Center)**
MAESTRO: Multimodal Action Data Factory for Embodied Surgical and Therapeutic Robotic Operation (Role: PI)

Mar. 2026 - Mar. 2028 — **Early-Career Research Program (funded by the National Research Foundation of Korea)**
AI-based Design Optimization of Task-Specific Robot Hands for Humanoids and Robot Arms (Role: PI)

Sep. 2024 - Sep. 2025 — **Sejong Science Fellowship (funded by the National Research Foundation of Korea)**
Generative Artificial Intelligence driven robot design and control (Role: PI)

Selected Publication

International Journals

1. **Byungchul Kim**, Useok Jeong, and Kyu-Jin Cho, "Exo-Glove Pinch: Soft Hand-wearable Robot Designed through the Analysis of the Constrained Tendon Routing", in **IEEE Robotics & Automation Letters**, 2025.
2. **Byungchul Kim**, Useok Jeong, and Kyu-Jin Cho, "Dual-Tendon Routing: Tendon Routing for Under-actuated Tendon-Driven Soft Hand Wearable Robot", in **IEEE Robotics & Automation Letters,** 2025.
3. Kyu Bum Kim, Hyungmin Choi, **Byungchul Kim**, Brian Byunghyun Kang, Sangheui Cheon, and Kyu-Jin Cho, "Exo-Glove Poly III: Grasp Assistance by Modulating Thumb and Finger Motion Sequence with a Single Actuator", ***Soft Robotics*****,** 2025.
4. **Byungchul Kim**, Hyungmin Choi, Kyubum Kim, Sejin Jeong, and Kyu-Jin Cho, "Exo-Glove Shell: A Hybrid Exo-Glove for the Thumb Opposition with an Under-Actuated Tendon-Driven System," ***Soft Robotics***, 2024.
5. Jaehyun Yi, **Byungchul Kim**, Kyu-Jin Cho, and Yong-Lae Park, "Underactuated Robotic Gripper with Fiber-Optic Force Sensing Tendons," in **IEEE Robotics & Automation Letters,** 14.1 (2023)
6. **Byungchul Kim**, Useok Jeong, Brian Byunghyun Kang, and Kyu-Jin Cho, "Slider-Tendon Linear Actuator with Under-actuation and Fast-connection for Soft Wearable Robots," in ***IEEE/ASME Transactions on Mechatronics***, vol. 26, no. 6, pp. 2932-2943, Dec. 2021.
7. **Byungchul Kim**, Jiwon Ryu, and Kyu-Jin Cho, "Joint Angle Estimation of a Tendon-Driven Soft Wearable Robot through a Tension and Stroke Measurement," in ***Sensors***, 20.10 (2020): 2852.
8. **Byungchul Kim**, Hyunki In, Daeyoung Lee, and Kyu-Jin Cho, "Development and assessment of a hand assist device: GRIPIT", in ***Journal of NeuroEngineering and Rehabilitation***, 14.1 (2017): 15.

Computer Science Conference

9. Dongwook Choi, Taeyoon Kwon, Bogyung Jeong, Minju Kim, Yeonjun Hwang, Hyojun Kim, **Byungchul Kim**, Young Kyun Jang, and Jinyoung Yeo, "EMBGuard: Constructing Hazard-Aware Guardrails for Safe Planning in Embodied Agents", Forty-third International Conference on Machine Learning (ICML), 2026.
10. Tsun-Hsuan Wang, Juntian Zheng, Pingchuan Ma, Yilun Du, **Byungchul Kim**, Andrew Everett Spielberg, Joshua B. Tenenbaum, Chuang Gan, Daniela Rus, "DiffuseBot: Breeding Soft Robots with Physics-Augmented Generative Diffusion Models," in **Neural Information Processing Systems (NeurIPS)**, 2023. **Oral presentation**

Peer-reviewed International Conference Paper

11. **Byungchul Kim*,** Tsun-Hsuan Wang*, and Daniela Rus, "Generative-AI-Driven Jumping Robot Design Using Diffusion Models", **2025 IEEE International Conference on Robotics and Automation (ICRA)**.
12. Gregory Xie, Lilly Chin, **Byungchul Kim**, Rachel Holladay and Daniela Rus, "Strong Compliant Grasps Using a Cable-Driven Soft Gripper," in **2024 IEEE International Conference on Intelligent Robots and Systems (IROS)**.

Patents

13. Kyu-Jin Cho, **Byungchul Kim**, and Daeyoung Lee, "PEN HOLDER", US 9522562, US.
14. Kyu-Jin Cho, Hyunki In, Kyuhan Cho, and **Byungchul Kim**, "PASSIVE VARIABLE TRANSMISSION FOR WIRE DRIVEN JOINT MECHANISM", 10-11600270-0000, KR. **Technology transfer**
15. Kyu-Jin Cho, **Byungchul Kim**, and Hyungmin Choi, "SLIDER TYPE TENDON DRIVEN ACTUATOR FOR UNDER-ACTUATION AND GLOVE TYPE WEARABLE ROBOT HAVING THE SAME ACTUATOR", 2020/005275, Patent pending (PCT/KR).

Selected Talks

Toward safe robot design for domestic environments MIT Media Lab, Ask-a-Robot session	Dec. 2024
How will the "future" researchers design/fabricate the robots? Seoul National University	Jan. 2024
Under-actuated Tendon-driven Soft Robots for the Human Assistance UC Berkeley	Jun. 2023
Under-actuated Tendon-driven Mechanism for the Simple and Competent Robots MIT	Jun. 2022

Workshop Organization

Organizing committee, "Advancing wearable devices and applications through novel design, sensing, actuation, and AI", IEEE International Conference on Robotics and Automation (ICRA) [site]	May. 2024

Organizing committee, "Advancing Hand Wearable Robotics through novel design, actuation, sensing, and control algorithm", workshop, IEEE RAS/EMBS International Conference on Biomedical Robotics & Biomechanics[site] — Aug. 2022

Selected Research

Computational co-design framework [site], [video]
Presented in 2024 CES, 2024 TED TALK
- Generative AI for robot design — 2023 - Present
- PI for Sejong Fellowship
- PI for Early-Career Research Program

Project CETI [site]
- Understanding what whales are saying. — 2023 - 2024

Contributed wearable tag design.

Tendon-driven Actuators for the Soft Wearable Robots [site]
Funded by National Research Foundation of Korea, Ministry of Trade, Industry and Energy of Korea
- Slider-Tendon Linear Actuator (Dissertation Topic for Ph. D)

Exhibited in 2020 CES / 2019 RoboSoft / 2022 IROS
Contributed the original idea, design, prototyping, experiments, and analyzing the data. — 2017 -2023
- Slack Enabling Actuator

Stabilized the actuator performance and reduced the actuator size.
- Series/Parallel Elastic Actuator

Designed series/parallel elastic actuator for the tendon-driven soft wearable robot.

Under-actuated bionic arm system Technology transfer
Funded by National Research Foundation of Korea, Ministry of Science, ICT and Future Planning — 2014 -2015
- Under-actuated Prosthetic hand for the amputee

Contributed the under-actuated tendon routing design.

GRIPIT Minister`s Prize, 16th Industrial Technology Award of the Month
Funded by National Research Foundation of Korea, Ministry of Industry and Energy
(Co-work with SMT Inc.)
- Active Hand Assist Device for the People with Spinal Cord Injury — 2013 - 2017

Contributed the original idea, design, prototyping, experiments, and analyzing the data.
Received $2,000 investment through social funding (KaKao Story Funding)

Selected Honors

Early-Career Researcher Award, Institute of Control, Robotics and Systems (ICROS) — July. 2026
Excellence award, Government 3.0 National Participation and Collaboration Contest, Ministry of Health and Welfare — Dec. 2016
Grand prize, Creative design competition, Seoul National University — Oct. 2012

Teaching

IPH5040: Introduction to AI for Robotics, SKKU — Spring 2025
IPH5039: Robotic Systems and Applications, SKKU — Fall 2026
GBE3087: Introduction to Robotics, SKKU — Fall 2026
Kaufman Teaching Certificate, MIT — Fall 2023
Instructor, Introduction for soft robotics, SNU — Spring 2017
Instructor, Mechanical System Modeling and Control, SNU — Spring 2012