Chaewon Baek

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Research Interests

Geometry-controlled design of lightweight and reconfigurable structures

- Deployable Origami Structures, Soft Materials, Bio-inspired Actuation, Additive Manufacturing

Education

Seoul National University (SNU), Seoul, Korea — Mar 2019 – Present

B.S. in Mechanical Engineering

B.S. in Electrical and Computer Engineering

- GPA: 3.98/4.00 (Mech. Eng)
- 2021-2023: Mandatory Military Service (ROK Army)

Daegu Science High School(DSHS), Daegu, Korea — Mar. 2016 – Feb. 2019

- High School for gifted students in science, admission through competitive exam on science and mathematics.

Journal Publications

†: 1st author, *: corresponding author

[J1] **C. Baek**†, T. Tachi, H. Yasuda*, and J. Yang*, "Size Dependent Behaviors of Miura-ori Structure", Expected submission in 2025.

[J2] H. Yasuda†,*, **C. Baek**†, J. Yang*, T. Tachi, D. Ueda, M. Kenji, and K. Ishimura, "Homogenization of Periodic Origami Structures", Expected submission in 2025.

Conference Presentations

†: 1st author, *: corresponding author

[C1] H. Yasuda†,*, **C. Baek**†, J. Yang*, T. Tachi, D. Ueda, and M. Kenji, "Homogenization of Periodic Origami", JSME Materials and Mechanics Conference, Nov.10 – Nov. 13 2025, Kumamoto, Japan.

Research Experience

Japan Aerospace Exploration Agency(JAXA), Sagamihara Campus, Japan

Visiting Researcher, *Advisor: Prof. Hiromi Yasuda* — Aug. 2024, Feb.2025, Sep.2025

- Proposed a novel homogenization framework linking unit-cell geometry to directional stiffness in 1-DOF origami metamaterials (Journal manuscript in preparation). [J2] [C1]
- Performed finite element simulations to characterize strain propagation in origami-based deployable structures.
- Delivered a research seminar on size-dependent behavior of origami metamaterials to 10+ researchers at JAXA.

Transformative ARchitecture Lab, Seoul National University, Korea

Undergraduate Researcher, *Advisor: Prof. Jin-Kyu Yang* — Sep. 2023 – Present

- Developed and analyzed leaf-out origami-inspired bistable leg mechanism using loop-closure kinematics and energy landscape methods.
- Discovered size-dependent locking in Miura-ori structures along one of the orthotropic axes (Journal manuscript in preparation).[J1]
- Formulated general 3D directional locking condition for Miura-ori tube assemblies, demonstrating that axis-aligned locking is singular case within a broader directional locking framework.
- Selected for $5000 research grant from SNU's undergraduate-driven research program.

Biorobotics Laboratory, Seoul National University, Korea

Undergraduate Researcher, *Advisor: Prof. Kyu-Jin Cho* — Dec. 2020 – Sep. 2021

- Designed deployment mechanism for origami flasher by leveraging its 1-DOF behavior.
- Designed and built lightweight wall-climbing platform using soft polymer flexures and rotary microspine grippers; optimized molding and curing process to ensure mechanical consistency.

Selected Awards & Honors

Ministerial Award from the Ministry of Education, Korea Institute for Advancement of Technology 2024
- Awarded for optimization of GAA-FET geometry to reduce parasitic R/C and improve AC performance.
- Received government funded technical industry training in the U.S.

Outstanding B.S. Thesis Presentation Award, SNU 2024
- Thesis: Design of an Isotropic Miura-ori structure.

Sinyang Cultural Foundation Scholarship, Sinyang Cultural Foundation 2024, 2025
- Full-tuition scholarship, awarded to ∼80 undergraduates annually.

Grand Prize, Mechatronics Design Competition , SNU 2023
- Ranked 2nd out of 15 teams in semester-long mechatronics design challenge.
- Awarded $2,000 for developing a smart music-stand system with sound-pattern recognition.

Academic Merit Scholarship, SNU 2020, 2021, 2023

Creativity Award & 3rd Place, Creative Engineering Design, SNU 2019
- Ranked 3rd out of 32 teams in semester-long robot design challenge.
- Recognized for innovative mechanical design and strategy development.

Leadership & Activities

STEM (SNU Engineers Honor Society), College of Engineering, SNU Sep, 2024 – Present
- **Vice Chairman, Northeast Asia Student Round Table**
  - Organized rotational annual forum hosted 2025 by SNU, coordinating 8-day program uniting 50+ undergraduates from South Korea, Japan, Taiwan, Mongolia.

Run To You (SNU Society of Automobile Engineers Team), College of Engineering, SNU Mar. 2019 – Sep. 2021
- **Team Leader, Formula Powertrain Team**
  - Led design and construction of team's first Formula racecar powertrain system.
  - Delivered training seminars on FEA and topology optimization(Solidworks) to 30+ team members.
  - Developed a MATLAB-based optimization tool to configure powertrain hardpoints by minimizing load concentration and chain tension.
- **Engineer, Baja Team**
  - Developed and tested off-road endurance racecar, gained experience in precision fabrication and mechanical assembly (SMAW/TIG welding, finishing, tolerance control).

Teaching Experience

Freshmen Course Tutor, Physics, SNU Dec. 2023 – Feb. 2024

Undergraduate Course Assistant, M2794.001300 Fluid Mechanics, SNU Sep. 2023 – Dec. 2023

STEM Vision Exhibition, The Art of Folding, 50 SNU students Dec. 2024

Skills & Languages

Languages: Korean (Native), English (Fluent, TOEFL 109)

Programming: Python, C, C++, Matlab, LaTeX

CAD/Simulation: Solidworks, Fusion360, Autocad, Altair, KiCAD, TCAD, LTSpice, Paraview

Relevant Coursework: Analysis and Design of Lightweight Structures, Solid Mechanics, Mechanics and Design, Mechatronics, Analog Electronic Circuits, Electromechanical energy conversion