Chaewon Baek

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Education

Seoul National University (SNU), Seoul, Korea — Mar. 2019 – Aug. 2026

B.S. in Mechanical Engineering, 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 exam on science and mathematics.

Research Interests

Geometric approaches to engineering and physical systems

Journal Publications

†: 1st author, *: corresponding author

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

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

Conference Proceedings

[C1] H. Yasuda†,*, **C. Baek**†, J. Yang*, D. Ueda, M. Kenji, and K. Ishimura, "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 using Poisson's ratio, linking unit-cell geometry to directional stiffness in 1-DOF origami metamaterials. [J2] [C1]
- Performed finite element simulations to characterize strain propagation in origami-based structures.

SNU Transformative ARchitecture (STAR) Laboratory, SNU, Korea

Research Intern, *Advisor: Prof. Jinkyu Yang* — Sep. 2023 – Present

- Developed and analyzed leaf-out origami-inspired bistable leg mechanism using loop-closure kinematics and energy landscape methods.
- Discovered kinematic locking along the orthotropic axis in small-tessellation Miura-ori.[J1]
- Formulated general 3D directional locking condition for Miura-ori tube architectures, demonstrating that axis-aligned locking is singular case within a broader directional locking framework.
- Selected for $5,000 research grant from SNU's undergraduate-driven research program.

Biorobotics Laboratory, SNU, Korea

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

- Engineered lightweight wall-climbing platform using soft polymer flexures and rotary microspine.
- Optimized molding and curing process to ensure the mechanical consistency of compliant flexures.

Selected Awards & Honors

Minister's Award, Ministry of Education, Korea Institute for Advancement of Technology 2024
- Awarded for optimizing GAA-FET geometry to reduce parasitic R/C and improve AC performance.
- Government-funded technical industry training in the U.S. at Purdue University and Lam Research

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 nationwide annually.

Grand Prize, Mechatronics Design Competition , SNU 2023
- Ranked 2nd out of 15 teams in semester-long mechatronics course.
- 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
- Achieved 3rd out of 32 teams in semester-long robot design and competition course.
- Recognized for innovative mechanical design and strategy development.

Leadership & Activities

STEM (SNU Engineers Honor Society), 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), 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.

Teaching

Invited Talks

Origami: Bridging Art, Mathematics, and Engineering, 30+ SNU students Nov. 2025

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

Size Dependence of Origami Metamaterials, 10+ JAXA researchers Aug. 2024, Sep. 2025

Mentoring

Introduction to Research and Experimentation, 4 science high school students Feb. 2025

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

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

Skills

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