Hyeongkeun (Hugo) Kim

hk35@illinois.edu · +1 217-778-7409

EDUCATION

Ph. D. in Mechanical Engineering (Advisor: Prof. William P. King, Prof. Sameh H. Tawfick) May. 2026 (expected)
University of Illinois at Urbana-Champaign, IL, USA Cumulative GPA: 3.94/4.00

- Recipient of Mavis Future Faculty Fellowship (2025-2026), The Grainger College of Engineering

B. S. in Mechanical Engineering and B. S. in Bio and Brain Engineering (Double Major) Feb. 2013 – Feb. 2020
Korea Advanced Institute of Science and Technology (KAIST), Republic of Korea Cumulative GPA: 3.78/4.30

- Recipient of Korea Presidential Science Scholarship: One of 123 students chosen by the President of Korea
- Dean's List for Creative Excellence (Fall 2014): One of the top 1% students in creative achievements

RESEARCH FOCUS

To establish a reliable structure-property relationship in metamaterials and create robust, high-performance metamaterials by using an experimental data-driven approach and applying the approach for design and process optimizations in multidisciplinary settings.

RESEARCH EXPERIENCE

UIUC, Intelligent Manufacturing and Thermal Systems Laboratory – Research Assistant Aug. 2020 – Present
Advisor: Prof. William P. King, Prof. Sameh H. Tawfick (co-advisor) *Urbana, IL, USA*

- **Mechanics of Additively Manufactured Soft Lattice Structures and Architected Materials**
  - Developed an experimental data-driven approach for predicting and optimizing the compression response of the architected materials using a Gaussian Process regressor and a Graph Neural Network
  - Designed and implemented the telecentric imaging system for *in-situ* optical metrology of 2D architected materials, and successfully used metrology data to predict mechanical properties
  - Implemented digital image tracking software that tracks every node in a lattice under compression for reconstructing deformation and fracture events and extracting key features (e.g., Poisson's ratio)
  - Currently working on modeling the mechanical behaviors of ultra-soft elastomeric architected materials, and physics-informed models of lattice materials in deformation
- **ARPA-H MASCOT (Manufacturing Agile and SCalable Organoid Tumor models)**
  - Advanced, closed-loop manufacturing of tailored and reproducible tumor models for cancer research.
  - Drafted and coordinated the system integration and automation section of the ARPA-H Open BAA proposal with Prof. King, which resulted in a successful **$21 Million** funding
  - Managed the design and budget allocation for the $4 million automated biomanufacturing system
  - Liaised between five research groups from bioengineering, manufacturing, and computer vision, translating and negotiating different requirements into consistent, easy-to-understand specifications
  - Patent application pending: A patent application is being processed involving the project

KAIST, Biomicrofluidics Lab – Research Assistant Jun. 2016 – Aug. 2020
Advisor: Prof. Jessie S. Jeon *Daejeon, Republic of Korea*

- Designed an automated system that measures *in-situ* bacterial growth using vision markers.
- Fabricated lab-on-a-chips using soft lithography, developed codes with MATLAB and Arduino for developing image processing and lab automation system, conducted cell culture/banking, and photolithography.

PUBLICATIONS

1. A. E. Rzepka, **H. Kim**, C. H. Conway, S. Özerinç, S. H. Tawfick, W. P. King, K. H. Matlack, "Architected Granular Media: a new class of Composites for Energy Absorption Applications", *In Review*

2. **H. Kim**, C. H. Conway, S. Özerinç, S. H. Tawfick, W. P. King, "Predicting Mechanical Properties of Elastomer Honeycombs Using Fast Image-Based Measurements." *Materials & Design* 254 (2025): 114119 [Link]
3. S. Kim, **H. Kim**, W. P. King, N. Miljkovic, "Optimal phase change material integration strategies for maximizing electronic device reliability." *Applied Thermal Engineering* 267 (2025): 125736. [Link]
4. S. Kim, **H. Kim**, W. P. King, N. Miljkovic, "Gaussian Process Optimization of Phase Change Material Heat Sink Design " *Numerical Heat Transfer, Part B: Fundamentals* (2023): 1-19 [Link]
5. **H. Kim**, S. H. Tawfick, W. P. King, "Buckling elastomeric springs and lattices for tailored energy absorption." *Materials Today Communications* 35 (2023): 106417. [Link]
6. **H. Kim**, S. H. Tawfick, W. P. King. "Modeling and Design of Zero-Stiffness Elastomer Springs Using Machine Learning." *Advanced Intelligent Systems* 4.12 (2022): 2200225. [Link]
7. K. Kim*, J. Hyun*, **H. Kim**, H. Lim, H. Myung, "A Deep Learning-based Automatic Mosquito Sensing and Control System for Urban Mosquito Habitats" *Sensors* 19.12 (2019): 2785 [Link]
8. K. Kim*, **H. Kim***, S. Kim, J. S. Jeon, "MineLoC: A Rapid Production of Lab-on-a-Chip Biosensors Using 3D Printer and the Sandbox Game, Minecraft" *Sensors* 18.6 (2018): 1896 (***Co-first Author**) [Link]
9. K. Kim, **H. Kim**, and H. Myung, "Bio-inspired robot swarm control algorithm for dynamic environment monitoring." *Advances in Robotics Research* 2.1 (2018):1-11 [Link]
10. K. Kim, D. Choi, H. Lim, **H. Kim**, J. S. Jeon, "Vision Marker-Based *In-Situ* Examination of Bacterial Growth in Liquid Culture Media." *Sensors* 16.12 (2016): 2179 [Link]
11. K. Kim, **H. Kim**, H. Lim, H. Myung, "A Low Cost/Low Power Open Source Sensor System for Automated Tuberculosis Drug Susceptibility Testing." *Sensors* 16.6 (2016): 942 [Link]

SELECTED PRESENTATIONS

1. **H. Kim**, C. H. Conway, S. Özerinç, S. H. Tawfick, W. P. King, "Graph Neural Network-based Mechanical Properties Predictions of Elastomer Lattices Using Fast Image-Based Measurements" in *2025 Society of Engineering Science Annual Technical Meeting (SES2025)*, Atlanta, GA, 2025 (**Oral Presenter)**
2. **H. Kim**, K. Lee, S. Özerinç, S. H. Tawfick, W. P. King, "Force Estimation of Additively Manufactured Auxetic Lattices Under Large Compression Using Digital Image Tracking" in *2025 Society of Engineering Science Annual Technical Meeting (SES2025)*, Atlanta, GA, 2025 (**Poster Presenter**)
3. S. Özerinç, **H. Kim**, C. H. Conway, S. H. Tawfick, W. P. King, "Mechanical Behavior of Ultra-Soft Elastomeric Architected Materials" in *2025 Society of Engineering Science Annual Technical Meeting (SES2025)*, Atlanta, GA, 2025 (**Oral**)
4. M. H. Mohammadi, R. Manoharaan, Y. Liu, T. Dillon, M. Bimrose, **H. Kim**, M. Duncan, K. V. Prasanth, W. P. King, R. Bhargava "Developing Defined Serum-Free Media for Reproducible Breast Cancer Models" in *Biomedical Engineering Society 2025 Annual Meeting (BMES 2025)*, San Diego, CA, 2025 (**Oral**)
5. **H. Kim**, S. H. Tawfick, W. P. King, "Machine Learning-Enabled Modeling and Design of Additively Manufactured Zero-Stiffness Elastomer Springs" in *2022 Society of Engineering Science Annual Technical Meeting (SES2022)*, College Station, TX, 2022 (**Poster Presenter**)
6. D. Choi, M. Kim**, H. Kim**, J. Choe, M. C. Nah, "Motion Planning of Autonomous Personal Transporter Using Model Predictive Control for Minimizing Non-Minimum Phase Behavior" in *15th International Conference on Ubiquitous Robots (UR 2018)*, Honolulu, HI, 2018, pp. 362-368. (**Best Application Paper Award**) [Link]
7. J. Choe*, U. Kwon*, M. C. Nah* and **H. Kim***, "'Design Analysis of TuskBot: Universal Stair Climbing 4-Wheel Indoor Robot" in *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, 2017, pp. 6908-6914. (**Corresponding Author**) [Link]
8. J. Choe*, M. C. Nah*, **H. Kim*** and U. Kwon*, "'TuskBot': Design of the Mobile Stair Climbing 2 By 2 Wheels Robot Platform with Novel Passive Structure 'Tusk'" in *2017 3rd International Conference on Control, Automation and Robotics (ICCAR)*, Nagoya, Japan, 2017, pp. 217-220. (**Co-first Author**) [Link]

PATENTS

1. W. P. King, R. Bhargava, M. Bimrose, **H. Kim**, S. Mukherjee, R. Manoharaan, "Scalable closed-loop bio-manufacturing of tumor models or other volumetric biological samples", U.S. Provisional Patent Application 63/674,595, Jul. 23, 2024
2. U. Kwon*, **H. Kim***, M. C. Nah*, J. Choe*, S. Seok, "ROBOT APPARATUS FOR CLIMBING STAIRS", Republic of Korea Patent No. 10-2068239, Jan. 14, 2020. [Link]

TEACHING EXPERIENCE

UIUC MechSE, Engineering Materials (ME330) – Teaching Assistant (Lab) Fall 2021

- Advised and mentored 15 students in lab sessions
- Conducted pre-lab lecture sessions, managed laboratory sessions, hosted office hours, and graded lab reports and presentations

KAIST School of Computing, Introduction to Programming (CS101) – Teaching Assistant Fall 2015, Spring 2016

- Advised and mentored freshmen in lab sessions. Provided technical support, graded exams, and assignments

PROFESSIONAL EXPERIENCE

NAVER Corp., NAVER LABS Robotics Group – Research Intern Aug. 2016 – Feb. 2017
Advisor: Dr. Sangok Seok, current CEO of NAVER LABS Corp.; Dr. Dongil Choi *Seongnam, Republic of Korea*

- **TuskBot:** An indoor service robot compatible with most stairs in existence, featured in *IROS 2017*
- Improved structural components and data collection system of the autonomous personal transporter
- Involved STM32F4 programming, SolidWorks/SolidEdge modeling, LabView (including FPGA), RTOS, Webots, Kinect-based point cloud processing, Qt toolkit, OpenCV and MATLAB

MENTORSHIP & LEADERSHIP

UIUC, Intelligent Manufacturing and Thermal Systems Laboratory – Research Mentor Aug. 2023 – Current

- Mentored two graduate students in the research group and provided guidance on the research program
- Liaised with collaboration on Biomineralization on additively manufactured scaffolds for one of the mentees (U.S. Army Construction Engineering Research Laboratory)

UIUC, Data Science & Artificial Intelligence Society (DAIS) – Team Leader Aug. 2020 – May 2023

- Mentored undergraduate student team of three for derivative-free optimization and evolutionary algorithms
- Jointly drafted a successful proposal for a Korean governmental grant for on-campus AI/ML outreach society for graduate students focusing on sharing recent research and educating Korean-heritage undergraduates

KAIST, Microrobot Research (Robotics Club) – Team Co-founder and Team Leader Mar. 2013 – Feb. 2020

- Co-founded Team W5, a team for interdisciplinary projects between robotics and bioengineering
- Won 13 prizes across robotics and bioengineering competitions, was featured in the keynote for the 2014 Intel Korea Year-End Press Conference, presented in 6 robotics conferences, and published 5 journal papers