Hyungseok (Hyu) Kim

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EDUCATION

Massachusetts Institute Of Technology 2023
Ph.D. Candidate in Mechanical Engineering and Statistics (GPA: 4.8/5.0)

Massachusetts Institute Of Technology 2020
S.M. in Mechanical Engineering (GPA: 4.9/5.0)

Seoul National University 2017
B.S. in Mechanical and Aerospace Engineering, *summa cum laude*

EXPERIENCE

Massachusetts Institute of Technology, 2021 - present
Institute of Data, Systems, and Society, Cambridge, MA
Graduate student

- Statistics and Data Science Center
- Study on dimensional reduction for hypothesis testing in multivariate analysis

Massachusetts Institute of Technology, 2017 - present
Department of Mechanical Engineering, Cambridge, MA
Graduate student

- Laboratory for Energy and Microsystems Innovation (PI: Dr. Cullen R. Buie)
- Development of bioinstrumentation for studying microbial interactions
- Contributed in securing U.S. Department of Energy grant (∼$0.4M, 5 yrs)

PrognomiQ, Inc., San Mateo, CA Summer 2022
Summer intern

- Data Science Team (Supervisor: Dr. Chinmay Belthangady)
- Contributed in 1 patent application

Lawrence Livermore National Laboratory, Livermore, CA January 2019
Visiting student

- uBiospheres Scientific Focus Area (Sponsor: Dr. Xavier Mayali)
- Participated in a wet lab study profiling 16S rRNA gene in microbial community

Seoul National University, Seoul, South Korea 2015 - 2017
Undergraduate research assistant

- Microfluid and Soft Matter Laboratory (PI: Dr. Ho-Young Kim)
- Developed numerical method and instrumentation for studying ice tribology

PUBLICATIONS

Q Wang*, **H Kim***, TM Halvorsen, S Chen, CS Hayes and CR Buie, "Leveraging microfluidic dielectrophoresis to distinguish compositional variations of lipopolysaccharide in *Escherichia coli*," *Frontiers in Bioengineering and Biotechnology* **11**:991784 (2023).

CA Vaiana, **H Kim**, J Cottet, K Oai, Z Ge, K Conforti, AM King, AJ Meyer, H Chen, CA Voigt† and CR Buie†, "Characterizing chemical signaling between engineered "microbial sentinels" in porous microplates," *Molecular Systems Biology* **18**:e10785 (2022).

H Kim, JA Kimbrel, CA Vaiana, JR Wollard, X Mayali† and CR Buie†, "Bacterial response to spatial gradients of algal-derived nutrients in a porous microplate," *The ISME Journal* **16**, 1036–1045 (2022). **Editor's choice.** Appeared in: Nature Microbiology Community, Phys.org, F1000, AZO Life Sciences, LLNL News.

C Yun*, JW Choi*, **H Kim***, D Kim and H-Y Kim, "Sliding on ice: real contact area, melted film thickness, and friction force," *International Journal of Heat and Mass Transfer* **160**, 120166 (2020). Appeared in: Advances in Engineering.

H Kim et al., "Multidimensinoal scaling for *F*-informed hypothesis testing," *in preparation.*

H Kim et al., "Microfluidic electrokinetics for algal-bacterial attachment," *in preparation.*

PATENTS

M Liu, C Belthangady, B Wilcox, P Ma, J-Y Lee, **H Kim**, Direct classification of raw biomolecule measurement data, PrognomiQ, Inc., (PCT application filed September 2022).

CONFERENCE AND WORKSHOP

H Kim, "Methods for characterizing bacterial surfaces and interactions with algae," presented at the LLNL BioSFA All-Hands Meeting, Livermore, CA, September 15-16, 2022.

H Kim, M Morris, T Samo, R Stuart, CR Buie and X Mayali, "Microscale characterization tools for algal-bacterial interaction and cell sinking," presented at the 2022 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Virtual, February 28-March 2, 2022.

H Kim, JA Kimbrel, CA Vaiana, JR Wollard, X Mayali and CR Buie, "Porous co-culture microplate for studying bacterial responses to host-derived resource gradients," presented at the 2021 Engineering Biology Research Consortium (EBRC) Annual Meeting, Virtual, April 26-27, 2021.

H Kim, JA Kimbrel, JR Wollard, X Mayali and CR Buie, "Bioinstrumentations for studying algal-bacterial interactions," presented at the LLNL BioSFA All-Hands Meeting, Virtual, February 4-5, 2021.

H Kim, JA Kimbrel, T Samo, J Wollard, C Ramon, R Stuart, PK Weber, CR Buie and X Mayali, "Impacts of physical proximity and metabolite diffusion on algal-bacteria interactions," presented at the 2021 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Virtual, February 22-24, 2021.

H Kim, JA Kimbrel, JR Wollard, X Mayali and CR Buie, "A hydrogel co-culture platform reveals community responses to bacteria to algal host and nutrients under diffusion-controlled environment," presented at the 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS), Virtual, October 4-9, 2020.

H Kim, JA Kimbrel, T Samo, R Stuart, J Wollard, D Veličković, C Anderton, CR Buie and X Mayali, "Examining the role of physical proximity and diffusion of metabolites in algal-bacterial interactions,"

presented at the 2020 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Washington, DC, February 24-26, 2020.

H Kim and CR Buie, "Hydrogel platform for algae-bacteria interaction," presented at the LLNL BioSFA All-Hands Meeting, Livermore, CA, January 9-10, 2020.

Q Wang, **H Kim** and CR Buie, "Microfluidic dielectrophoresis enables rapid characterization of lipopolysaccharide glycoforms in gram-negative bacteria," presented at the 2019 Gordon Research Seminar on Physics and Chemistry of Microfluidics, Hong Kong, China, June 15-16, 2019.

H Kim, C Yun, D Kim and H-Y Kim, "Interfacial melting of ice under a high-speed slider: real-time visualization and friction modeling," presented at 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.

SELECTED COURSEWORK

Statistics

MIT 18.6501	Fundamentals of Statistics,	MIT 6.436	Fundamentals of Probability,
MIT 18.656	Mathematical Statistics,	MIT 6.265	Discrete Prob & Stoch Process,
Harvard	Advanced Regr & Stat Learning.		

Computer Science

MIT 6.437	Inference and Information,	MIT 6.036	Intro to Machine Learning,
MIT 2.168	Learning Machines,	Coursera	Deep Learning Specialization.

Physics

MIT 2.122	Stochastic Systems,	MIT 2.25	Fluid Mechanics,
SNU	Numerical Analysis,	SNU	Turbulent Flows.

PROGRAM LANGUAGES AND SKILLS

Languages. Python, R, Unix shell; some use of MATLAB, Fortran.
Machine learning frameworks. PyTorch, TensorFlow, Numpy, Scikit-learn, Pandas.
Others. Git, AWS, TeX, Adobe Illustrator, SolidWorks.
Hands-on. Cell culture, Flow cytometry, Microscopy, Microfluidics, Machine tools.

FELLOWSHIPS AND AWARDS

Kwanjeong Educational Foundation Fellowship, $25,000/yr	2017 - present
Thesis Presentation Award, Seoul National University	2016
Achievement Award, Republic of Korea Marine Corps	2015
National Scholarship for Science and Engineering, South Korea, $6,000/yr	2011 - 2016

SERVICE AND PROFESSIONAL ACTIVITIES

Reviewer, Marine Pollution Bulletin	2023
Reviewer, The 5th International Workshop on Environment and Geoscience	2022
President,, MIT Korean Graduate Student Association in Mechanical Engineering	2020
Board Member, External Affairs Coordination, MIT Korean Graduate Student Association	2018
Co-chair, Kwanjeong Educational Foundation Student Association	2017
Sergeant (veteran), 2nd Marine Corps Division, Republic of Korea Marine Corps	2015
Violinist, 39th Concert by Seoul National University Philharmonic Orchestra	2011