Wonyeol Lee

Assistant Professor at POSTECH | wonyeol.lee.cs@gmail.com | https://wonyeol.github.io

Education

- **Ph.D. in Computer Science**, Stanford University, USA. September 2014—September 2023
  Advisor: Alex Aiken. Thesis: Reasoning about Floating Point in Real-World Systems.
  On leave of absence for three years (for military service).
- **B.S. in Computer Science & Mathematics**, POSTECH, South Korea. March 2010—February 2014
  Graduated with the highest GPA ever at POSTECH (GPA: 4.26/4.30).

Employment

- **Assistant Professor**, POSTECH, South Korea. November 2024—Present
- **Postdoctoral Associate**, Carnegie Mellon University, USA. October 2023—September 2024
- **Research Scientist**, KAIST, South Korea (Military Service). September 2017—August 2020
- **Research Intern**, Microsoft Research, India. Summer 2017
- **Research Intern**, Microsoft Research Redmond, USA. Summer 2016

Honors

Scholarships

- **Samsung Scholarship** (for graduate study abroad). 2014—2017, 2020—2022
- **KFAS Overseas PhD Scholarship** (for graduate study abroad; declined). 2014
- **KFAS Undergraduate Scholarship** (for undergraduate study). 2011—2014
- **Korea Presidential Science Scholarship** (for undergraduate study). 2010—2014

Awards

- **Valedictorian of POSTECH**. 2014
- **Samsung HumanTech Paper Award**, Bronze Prize (University Division). 2013
- **Samsung HumanTech Paper Award**, One Gold & Two Bronze Prizes (High School Division). 2008, 2009

Research Interests

- **Continuous Computations**.
  Continuous Computing: Floating Point, Math Library, Neural Network.
  Differentiable Computing: Non-Differentiability, Automatic Differentiation, Gradient Estimation.
  Probabilistic Computing: Random Variate Generation, Probabilistic Inference.
- **Mathematical Properties**.
  Correctness, Efficiency: Program Analysis, Real Analysis.
  Fundamental Limits: Universal Approximation.

Publications

[1] Floating-Point Neural Networks Can Represent Almost All Floating-Point Functions.
Geonho Hwang, Yeachan Park, Wonyeol Lee, and Sejun Park.
ICML 2025.

[2] Universal Robustness of Certified Floating-Point Neural Networks.
Geonho Hwang*, Wonyeol Lee*, Yeachan Park, Sejun Park, and Feras Saad.
CAV 2025.

[3] Random Variate Generation with Formal Guarantees.
Feras Saad, and Wonyeol Lee.
PLDI 2025.

[4] Semantics of Integrating and Differentiating Singularities.
Jesse Michel, Wonyeol Lee†, and Hongseok Yang.
PLDI 2025.

[5] Expressive Power of ReLU and Step Networks under Floating-Point Operations.
Yeachan Park, Geonho Hwang, Wonyeol Lee, and Sejun Park.
Neural Networks, 2024.

[6] What Does Automatic Differentiation Compute for Neural Networks?
Sejun Park, Sanghyuk Chun, and Wonyeol Lee.
ICLR 2024. **Spotlight** (451/7262=6%).

[7] On the Correctness of Automatic Differentiation for Neural Networks with Machine-Representable Parameters.
Wonyeol Lee, Sejun Park, and Alex Aiken.
ICML 2023.

[8] Training with Mixed-Precision Floating-Point Assignments.
Wonyeol Lee, Rahul Sharma, and Alex Aiken.
TMLR, 2023.

[9] Smoothness Analysis for Probabilistic Programs with Application to Optimised Variational Inference.
Wonyeol Lee, Xavier Rival, and Hongseok Yang.
POPL 2023.

[10] On Correctness of Automatic Differentiation for Non-Differentiable Functions.
Wonyeol Lee, Hangyeol Yu, Xavier Rival, and Hongseok Yang.
NeurIPS 2020. **Spotlight** (385/9454=4%).

[11] Differentiable Algorithm for Marginalising Changepoints.
Hyoungjin Lim, Gwonsoo Che, Wonyeol Lee, and Hongseok Yang.
AAAI 2020.

[12] Towards Verified Stochastic Variational Inference for Probabilistic Programs.
Wonyeol Lee, Hangyeol Yu, Xavier Rival, and Hongseok Yang.
POPL 2020.

[13] Reparameterization Gradient for Non-Differentiable Models.
Wonyeol Lee, Hangyeol Yu, and Hongseok Yang.
NeurIPS 2018.

[14] On Automatically Proving the Correctness of math.h Implementations.
Wonyeol Lee, Rahul Sharma, and Alex Aiken.
POPL 2018.

[15] Verifying Bit-Manipulations of Floating-Point.
Wonyeol Lee, Rahul Sharma, and Alex Aiken.
PLDI 2016.

[16] A Proof System for Separation Logic with Magic Wand.
Wonyeol Lee and Sungwoo Park.
POPL 2014.

[17] CT-IC: Continuously Activated and Time-Restricted Independent Cascade Model for Viral Marketing.
Wonyeol Lee, Jinha Kim, and Hwanjo Yu.
ICDM 2012.

[18] Edge Detection Using Morphological Amoebas in Noisy Images.
Wonyeol Lee, Seyun Kim, Youngwoo Kim, Jaeyoung Lim, and Dong Hoon Lim.
ICIP 2009.

Academic Talks

- **On Correctness of Numerical Libraries**.
  POSTECH, Pohang, South Korea. March 2025
  STAAR Workshop, Yeosu, South Korea. February 2025
- **What Does Automatic Differentiation Compute for Non-Differentiable Functions?**.
  KAIST, Daejeon, South Korea. December 2024
  KAIST-INRIA Joint Workshop, Daejeon, South Korea. November 2024
- **Bridging the Theory and Practice of Continuous Computations**.
  Carnegie Mellon University, Pittsburgh, PA, USA. February 2024
- **Smoothness Analysis for Probabilistic Programs and Optimised Variational Inference**.
  PROBPROG 2024. (Virtual) March 2024
  Stanford University, Stanford, CA, USA. February 2023
  POPL 2023, Boston, MA, USA. January 2023
- **On Numerical Programs in Machine Learning**.
  Bay Area K-Group, San Jose, CA, USA. (Virtual) March 2022
  KAIST, Daejeon, South Korea. December 2021
  Seoul National University, Seoul, South Korea. December 2021
  POSTECH, Pohang, South Korea. (Virtual) August 2021
- **On Correctness of Automatic Differentiation for Non-Differentiable Functions**.
  Stanford University, Stanford, CA, USA. December 2022
  Workshop on Differentiable Programming, Paris, France. June 2022
  NeurIPS 2020 (Spotlight). (Virtual) December 2020
- **Towards Verified Stochastic Variational Inference for Probabilistic Programs**.
  Stanford University, Stanford, CA, USA. (Virtual) October 2020
  POPL 2020, New Orleans, LA, USA. January 2020
- **Implementing Non-Linear Functions with Floating Point**.
  FuriosaAI, Seoul, South Korea. December 2019
- **Reparameterization Gradient for Non-Differentiable Models**.
  NAVER Corp., Seongnam, South Korea. January 2019
- **On Automatically Proving the Correctness of math.h Implementations**.
  FPTalks 2020. (Virtual) June 2020
  Korea Science Academy, Busan, South Korea. June 2018
  FuriosaAI, Seoul, South Korea. May 2018
  POPL 2018, Los Angeles, CA, USA. January 2018
  KAIST, Daejeon, South Korea. September 2017
- **Verifying Bit-Manipulations of Floating-Point**.
  SRI International, Menlo Park, CA, USA. October 2016
  Microsoft Research, Redmond, WA, USA. July 2016
  PLDI 2016, Santa Barbara, CA, USA. June 2016
- **CT-IC: Continuously Activated and Time-Restricted Independent Cascade Model**.
  ICDM 2012, Brussels, Belgium. December 2012

Academic Services

- **Conferences**. [PC=Program Committee, AEC=Artifact Evaluation Committee, External=External Reviewer]
  2026: POPL (PC).
  2025: POPL (External), NeurIPS (Reviewer).
  2024: OOPSLA (AEC), ICML (Reviewer).
  2023: PLDI (External), ICML (Reviewer).
  2022: POPL (External), ICML (Reviewer), NeurIPS (Reviewer).

2021: NeurIPS (Reviewer).
2020: POPL (AEC), ESOP (External).
2019: CAV (External).

- **Journals**.
  2024: ACM Transactions on Probabilistic Machine Learning (Reviewer).

Teaching Experience

- **Continuous Computations (CSED490V)**, Instructor, POSTECH. Spring 2025
- **Compilers (CS143)**, Course Assistant, Stanford University. Spring 2022
- **Programming Languages (CS242)**, Course Assistant, Stanford University. Winter 2021

References

- **Alex Aiken**, Professor, Stanford University, USA. aaiken@stanford.edu
- **Hongseok Yang**, Professor, KAIST, South Korea. hongseok.yang@kaist.ac.kr
- **Xavier Rival**, Research Director, INRIA/ENS/CNRS Paris, France. rival@di.ens.fr
- **Rahul Sharma**, Principal Researcher, Microsoft Research, India. rahsha@microsoft.com