

Seungwan Hong

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Research Experience

Yale University

New Haven, CT, United States

Postdoctoral Associate

Jan. 2026 - Present

- Conducting research on secure genomic analysis, especially focusing on Homomorphic Encryption applications, in the [Hoon Cho lab](#).

New York Genome Center & Columbia University

New York, NY, United States

Postdoctoral Research Associate

Mar. 2022 - Dec. 2025

- In the [G²Lab](#), I led research on designing privacy-preserving methodologies for genomic data analysis using homomorphic encryption. Joint appointment at Columbia University.

Education

Seoul National University

Seoul, South Korea

Integrated M.S./Ph.D. in Mathematical Sciences

Sep. 2016 - Feb. 2022

- Thesis: Approximation of Multivariate Functions and Homomorphic Data Ordering (Awarded Best PhD Dissertation Award from the College of Natural Sciences)
- Advisor: [Jung Hee Cheon](#)

Seoul National University

Seoul, South Korea

B.S. in Mathematical Sciences

Mar. 2010 - Aug. 2016

- Honors: *Cum Laude*

Publications

- An asterisk (*) indicates co-first authors and a hash (#) indicates co-corresponding authors.
- A dagger (†) indicates authors listed in alphabetical order, with all authors contributing equally. For more information, see [AMS Statement](#).

Journal

Secure and scalable gene expression quantification with pQuant

Seungwan Hong, Conor R. Walker, Annie Y. Choi, and Gamze Gürsoy

[Nature Communications](#) (2025)

SQID: Ultra-Secure Storage and Analysis of Genetic Data for the Advancement of Precision Medicine

Jacob Blindenbach*, Jiayi Kang*, Seungwan Hong*[#], Caline Karam, Thomas Lehner, and Gamze Gürsoy[#]

[Genome Biology](#) (2024)

Privacy-preserving model evaluation for logistic and linear regression using homomorphically encrypted genotype data

Seungwan Hong*, Yoolim A. Choi*, Daniel S. Joo, and Gamze Gürsoy

[Journal of Biomedical Informatics](#) (2024)

Secure Tumor Classification by Shallow Neural Network Using Homomorphic Encryption

Seungwan Hong, Jai Hyun Park, Wonhee Cho, Hyeongmin Choe, and Jung Hee Cheon

[BMC Medical Genomics](#) (2022)

Ultra-Fast Homomorphic Encryption Models Enable Secure Outsourcing of Genotype Imputation

Miran Kim*, Arif Harmanci*, Jean-Philippe Bossuat, Sergiu Carpov, Jung Hee Cheon, Ilaria Chillotti, Wonhee Cho, David Froelicher, Nicolas Gama, Mariya Georgieva, Seungwan Hong, Jean-Pierre Hubaux, Duhyeong Kim, Kristin Lauter, Yiping Ma, Lucila Ohno-Machado, Heidi Sofia, Yongha Son, Yongsoo Song, Juan Troncoso-Pastoriza, and Xiaoqian Jiang

[Cell Systems](#) (2021)

Efficient Sorting of Homomorphic Encrypted Data with k-way Sorting Network

Seungwan Hong, Seunghong Kim, Jiheon Choi, Younho Lee, and Jung Hee Cheon

[IEEE Transactions on Information Forensics and Security](#) (2021)

Privacy-preserving Approximate GWAS Computation Based on Homomorphic Encryption

Duhyeong Kim, Yongha Son, Dongwoo Kim, Andrey Kim, Seungwan Hong, and Jung Hee Cheon

[BMC Medical Genomics](#) (2020)

A Hybrid of Dual and Meet-in-the-Middle Attack on Sparse and Ternary Secret LWE

† Jung Hee Cheon, Minki Hhan, Seungwan Hong, and Yongha Son

[IEEE Access](#) (2019)

A Secure SNP Panel Scheme Using Homomorphically Encrypted K-mers Without SNP Calling on the User Side

Sungjoon Park, Minsu Kim, Seokjun Seo, **Seungwan Hong**, Kyoohyung Han, Keewoo Lee, Jung Hee Cheon, and Sun Kim
BMC Genomics (2019)

Conference

Logistic Regression on Homomorphic Encrypted Data at Scale

Kyoohyung Han, **Seungwan Hong**, Jung Hee Cheon, and Daejun Park
Innovative Applications of Artificial Intelligence (IAAI) (HI, United States, 2019)

Preprint

MRFHE: Mixed-Radix Fully Homomorphic Encryption with Better Batch Bootstrapping

† Jung Hee Cheon, **Seungwan Hong**, Minsik Kang, Jonghyun Kim, Taeseong Kim, Changmin Lee, Junho Lee
IACR Cryptology ePrint Archive (2026)

Non-interactive Fully Encrypted Machine Learning Protocol for Inference

† **Seungwan Hong**, Jiseung Kim, Changmin Lee, and Minhye Seo
IACR Cryptology ePrint Archive (2025)

Remark on the Security of CKKS Scheme in Practice

† Jung Hee Cheon, **Seungwan Hong**, and Duhyeong Kim
IACR Cryptology ePrint Archive (2020)

Honors & Awards

International

Dec. 2020 First Winner , HE track - iDASH Competition 2020	<i>NIH, United States</i>
Oct. 2019 Second Winner , HE track - iDASH Competition 2019	<i>NIH, United States</i>

Domestic

Nov. 2019 Excellent Award (\$1,500) , Korea Cryptography Contest	<i>KIISC, South Korea</i>
Sep. 2017 Awards for Excellence in Teaching , Teaching Awards: Differential and Integral Calculus Practice	<i>SNU, South Korea</i>
Nov. 2015 Bronze Medal , University Students Contest for Mathematics	<i>KMS, South Korea</i>

Presentations

International

RECOMB 2024	<i>MA, United States</i>
Poster: Ultra-Secure Storage and Analysis of Genetic Data for the Advancement of Precision Medicine	<i>Apr. 2024</i>
RECOMB 2023	<i>Istanbul, Turkey</i>
Poster: Privacy-preserving prediction of phenotypes from genotypes using homomorphic encryption	<i>Apr. 2023</i>
IDASH Privacy & Security Workshop	<i>Online</i>
Talk: Winning Teams' presentation (link)	<i>Dec. 2020</i>

Domestic

Yale University	<i>CT, United States</i>
Talk: Advances in FHE	<i>Apr. 2026</i>
Rochester Institute of Technology	<i>NY, United States</i>
Talk: Homomorphic Encryption for Secure Data Analysis	<i>Nov. 2025</i>
City College of New York	<i>NY, United States</i>
Talk: Homomorphic Encryption for Secure Data Analysis	<i>Sep. 2025</i>
Korea Institute for Advanced Study (KIAS)	<i>Seoul, South Korea</i>
Talk: Introduction to Neural Networks: Theory and Implementation	<i>Oct. 2023</i>
Hanyang University	<i>Seoul, South Korea</i>
Talk: Homomorphic Encryption and Applications	<i>Apr. 2023</i>
Samsung SDS	<i>Online</i>
Talk: Private AI and Homomorphic Encryption	<i>Aug. 2021</i>
National Tax Service	<i>Sejong, South Korea</i>
Talk: Basics of Homomorphic Encryption	<i>Jul. 2020</i>

Teaching

Invited Lecture

Advances in FHE · Yale University, CT, United States	2026
Introduction to Cryptography · Jeonbuk National University, South Korea	2025
Homomorphic Encryption and Applications · Hanyang University, South Korea	2023
Linear Algebra · Columbia University, NY, United States	2023

Lecture

Honor Calculus Practice · Seoul National University, South Korea	2019
Differential and Integral Calculus Practice · Seoul National University, South Korea	2016, 2017, 2018

Teaching assistant

Computational Number Theory · Seoul National University, South Korea	2018, 2020
Introduction to Cryptography · Seoul National University, South Korea	2019
Linear Algebra · Seoul National University, South Korea	2018

Students supervised

Daniel Joo · Undergraduate student from Columbia University	2022
• Project: privacy-preserving neural network evaluation using homomorphic encryption	

Other Scientific Activities

Committees

Nov. 2024 Program Committee , Genopri	CA, United States
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Reviewer / External Reviewer for

- ACM Transactions on Privacy and Security, IEEE Transactions on Information Forensics and Security, IEEE Transactions on Emerging Topics in Computing, Journal of Supercomputing, IEEE Access
- EUROCRYPT, ASIACRYPT, Public Key Cryptography
- BMC Medical Genomics

Extracurricular Activities

NCSOFT

Sungnam, South Korea

Game AI Development Internship

Jun. 2017 - Aug. 2017

- Developed and tested AI algorithms to improve PVE matches

Republic of Korea Army

South Korea

Military service

Jan. 2013 - Oct. 2014

- Discharged as a Sergeant

Skills

Programming	Python, Bash, C++, rust, go, $\LaTeX$
Python Libraries	Numpy, Keras, Tensorflow, PyTorch, pandas, matplotlib, seaborn
C++ Libraries	NTL, GMP, Eigen
FHE Libraries	HEAAN, SEAL, OpenFHE, Lattigo
Coding practices	Git, Snakemake, Docker, Vim, Slurm
Operating Systems	Linux, MacOS
Languages	Korean, English