

SEUNGWAN HONG

Curriculum Vitae

CONTACT INFORMATION

Affiliation New York Genome Center
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POSITION

New York Genome Center, New York, NY, United States

Postdoctoral Research Assistant Mar 2022 - Present

Columbia University, New York, NY, United States

Postdoctoral Researcher Mar 2022 - Present

EDUCATION

Seoul National University, Seoul, Republic of Korea

Integrated M.S./Ph.D. in Mathematical Sciences Sep 2016 - Feb 2022
Advisor: Prof. Jung Hee Cheon

B.S. in Mathematical Sciences Mar 2010 - Aug 2016
Honors: *Cum Laude* (Major GPA: 3.92/4.3)

RESEARCH INTERESTS

- Homomorphic Encryption (HE)
 - Construction of new HE schemes and algorithms
 - Implementation of applications using CKKS scheme
 - non-arithmetic operation algorithm construction using HE
- Privacy-preserving Machine Learning (ML) based on HE
 - Transformation of ML algorithms into HE-friendly forms
- Functional Encryption
 - Construction of functional encryption scheme

PUBLICATIONS

Authors are listed in alphabetical order by last name, unless an asterisk (*) is indicated.[AMS Statement]

Conference

1. *Kyoohyung Han, **Seungwan Hong**, Jung Hee Cheon, and Daejun Park. “Logistic Regression on Homomorphic Encrypted Data at Scale.” In Innovative Applications of Artificial Intelligence (IAAI), 2019.

Journal

7. ***Seungwan Hong**, *Yoolim A. Choi, Daniel S. Joo, and Gamze Grsoy, “Privacy-preserving model evaluation for logistic and linear regression using homomorphically encrypted genotype data.” In Journal of Biomedical Informatics, 2024.
6. ***Seungwan Hong**, Jai Hyun Park, Wonhee Cho, Hyeongmin Choe, and Jung Hee Cheon, “Secure Tumor Classification by Shallow Neural Network Using Homomorphic Encryption.” In BMC Medical Genomics, 2022.
5. *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. “Ultra-Fast Homomorphic Encryption Models enable Secure Outsourcing of Genotype Imputation.” In Cell Systems, 2021.
4. ***Seungwan Hong**, Seunghong Kim, Jiheon Choi, Younho Lee, and Jung Hee Cheon, “Efficient Sorting of Homomorphic Encrypted Data with k -way Sorting Network.” In IEEE Transactions on Information Forensics and Security, 2021.
3. *Duhyeong Kim, Yongha Son, Dongwoo Kim, Andrey Kim, **Seungwan Hong**, and Jung Hee Cheon, “Privacy-preserving Approximate GWAS computation based on Homomorphic Encryption.” In BMC Medical Genomics, 2020.
2. Jung Hee Cheon, Minki Hhan, **Seungwan Hong**, and Yongha Son, “A Hybrid of Dual and Meet-in-the-Middle Attack on Sparse and Ternary Secret LWE.” In IEEE Access, 2019.
1. *Sungjoon Park, Minsu Kim, Seokjun Seo, **Seungwan Hong**, Kyoohyung Han, Keewoo Lee, Jung Hee Cheon, and Sun Kim, “A secure SNP panel scheme using homomorphically encrypted K-mers without SNP calling on the user side.” In BMC Genomics, 2019.

Preprint

2. *Jacob Blindenbach, *Jiayi Kang, ***Seungwan Hong**, Caline Karam, Thomas Lehner, and Gamze Grsoy, “Ultra-secure storage and analysis of genetic data for the advancement of precision medicine.” In Biorxiv.
1. Jung Hee Cheon, **Seungwan Hong**, and Duhyeong Kim, “Remark on the Security of CKKS Scheme in Practice.” In IACR Cryptol. ePrint Arch.

TALKS

International

Secure multi-label Tumor Classification using HEaaN Dec 2020
IDASH PRIVACY & SECURITY WORKSHOP 2020, Online ([see here](#))

Domestic

Introduction to HEaaN and its Applications July 2020
National Tax Service, Saejong, Republic of Korea

TEACHING EXPERIENCE

Introduction to Cryptography	Mar 2019 - Jun 2019
Introduction to Combinatorics	Mar 2019 - Jun 2019
Differential and Integral Calculus	Sep 2016 - Jun 2019

GRANT & AWARDS

International

iDASH 2020 Dec 2020
First Winner of Track 1 National institutes of Health (NIH)

iDASH 2019 Oct 2019
Second Winner of Track 2 National institutes of Health (NIH)

Domestic

Korea Cryptography Contest Nov 2019
Excellent Award (\$1,500) Korea Institute of Information Security and Cryptology

Awards for Excellence in Teaching Sep 2017
For teaching Differential and Integral Calculus Seoul National University

University Students Contest for Mathematics Nov 2015
Bronze Medal Korean Mathematical Society

Korean Mathematical Olympiad Nov 2009
Silver Medal Korean Mathematical Society

INTERNSHIP & WORK EXPERIENCES

NCSOFT, Republic of Korea Jun 2017 - Aug 2017
Game AI Development

Republic of Korea Army, Republic of Korea Jan 2013 - Oct 2014
Sergeant

GITHUB REPOSITORIES

<https://github.com/snucrypto/HEAAN> Code Maintenance (Mar 2021 - Jan 2022)

<https://github.com/idashSNU/Imputation> iDASH 2019 Solution (team SNU)

<https://github.com/swanhong/HybridLWEAttack> Bit-security estimation of hybrid MITM attack

<https://github.com/G2Lab/privateML> iDASH 2022 Solution

DOCKER REPOSITORIES

[swanhong/k_way_sort_enc](#) Secure Sorting Algorithm using CKKS scheme

[swanhong/idash2020](#) iDASH 2020 Solution (team SNU)

LANGUAGES AND SKILLS

Languages Korean (native), English (Fluent)

Skills C/C++, Python, L^AT_EX