

CONTACT INFORMATION	<p>Homepage: hyeonbumlee.github.io LinkedIn: www.linkedin.com/in/hyeonbum-lee E-mail: hyeonbumlee@snu.ac.kr, leehb3706@gmail.com</p>	
RESEARCH BACKGROUND	<ul style="list-style-type: none"> • Cryptography: Zero-Knowledge Proof Systems, Secure Multi-Party Computation, Homomorphic Encryption, Advanced Encryption • Security: Zero-Trust Security, Privacy Preserving Distributed System. 	
CURRENT POSITION	<p>Postdoctoral Researcher</p> <ul style="list-style-type: none"> • Supervisor : Prof. Yongsoo Song • Institute : Seoul National University, Seoul 	Sep 2025 - Present
EDUCATION	<p>Hanyang University, Seoul</p> <ul style="list-style-type: none"> • Ph.D. Department of Mathematics • Major: Applied Mathematics (Cryptology) • Advisor: Prof. Jae Hong Seo. <p>Hanyang University, Seoul.</p> <ul style="list-style-type: none"> • B.S. Department of Mathematics 	<p>Mar 2020 - Aug 2025</p> <p>Mar 2014 - Feb 2018</p>
RESEARCH PROJECTS	<p>Projects</p> <ul style="list-style-type: none"> • A Study on Incrementally Verifiable Computation through Zero-Knowledge Proof Supported by National Security Research Institute (NSR), PI, Sep 2024 - Aug 2025. • International Joint Research to Develop Next-generation Copyright Infringement Prevention Technology and Safe Content Distribution Technology Supported by Korea Creative Content Agency, Researcher, Apr 2024 - Aug 2025 • Logging and Zero-knowledge Proof based on Hierarchical Blockchain, Institute for Information and Communications Technology Promotion Supported by Institute of Information & Communications Technology Planning & Evaluation (IITP), Researcher, May 2022 - Apr 2023. • Research on the design technology of a cryptographic proof system suitable for Proof-Carrying Data Supported by National Security Research Institute (NSR), Researcher, Apr 2022 - Oct 2022. • Secure Multi-party Approximate Computation Supported by Samsung Science & Technology Foundation, Researcher, Sep 2021 - Aug 2024. • A Study on Cryptographic Primitives for SNARK Supported by Institute of Information & Communications Technology Planning & Evaluation (IITP), Research Associate, Apr 2021 - Dec 2026. • Research on Incrementally Verifiable Computation Design Technique and Application Method Supported by National Security Research Institute (NSR), Researcher, Apr 2021 - Oct 2021. • Research on Post-Quantum Non-Interactive Zero-Knowledge Proofs Supported by National Research Foundation of Korea (NRF), Researcher, Mar 2020 - Feb 2025. • Research on Post-Quantum Zero-Knowledge Proofs Design Technique and Application Method Supported by National Security Research Institute (NSR), Researcher, Apr 2020 - Oct 2020. • A Study of Functional Encryption and Its Core Techniques Supported by Institute of Information & Communications Technology Planning & Evaluation (IITP) & National Research Foundation of Korea (NRF), Researcher, Mar 2020 - Jul 2021. 	

PUBLICATIONS **Journal**

1. Chanyang Ju, **Hyeonbum Lee**, Heewon Chung, Jae Hong Seo, and Sungwook Kim, *Analysis of Zero-Knowledge Protocols for Verifiable Computation and Its Applications* Journal of The Korea Institute of Information Security & Cryptology VOL.31, NO.4, Aug. 2020
2. Chanyang Ju, **Hyeonbum Lee**, Heewon Chung, and Jae Hong Seo, *Efficient Sum-Check Protocol for Convolution* IEEE Access, VOL.9, pp.164047-164059, 2021, doi
3. Sungwook Kim, Gwangwoon Lee, **Hyeonbum Lee**, and Jae Hong Seo [alphabetical order] *Sublinear Verifier Inner Product Argument under Discrete Logarithm Assumption* IEEE Transactions on Information Forensics and Security, VOL.18, pp.5332-5344, 2023, doi
4. Changhao Chenli, Wenyi Tang, **Hyeonbum Lee**, and Taeho Jung, *Fair2Trade: Digital Trading Platform Ensuring Exchange and Distribution Fairness* IEEE Transactions on Dependable and Secure Computing, VOL.21, pp.4827-4842, 2024, doi
5. **Hyeonbum Lee**, Seunghun Paik, Hyunjung Son, and Jae Hong Seo, *Cougar: Cubic Root Verifier Inner Product Argument under Discrete Logarithm Assumption* IEEE Access, VOL.14, pp.10217-10244, 2026, doi

Conference

1. Sungwook Kim, **Hyeonbum Lee**, Jae Hong Seo [alphabetical order] *Efficient Zero-Knowledge Arguments in Discrete Logarithm Setting: Sublogarithmic Proof or Sublinear Verifier* ASIACRYPT 2022, Taipei, Taiwan, December 5–9, 2022, Proceedings, doi
2. **Hyeonbum Lee**, and Jae Hong Seo, *TENET : Sublogarithmic Proof and Sublinear Verifier Inner Product Argument without a Trusted Setup* IWSEC 2023, Yokohama, Japan, Aug 29-31, 2023, Proceedings, doi
3. **Hyeonbum Lee**, Kyuhwan Lee, Wenyi Tang, Shankha Shubhra Mukherjee, Jae Hong Seo, and Taeho Jung *PrivHChain: Monitoring the Supply Chain of Controlled Substances with Privacy-Preserving Hierarchical Blockchain* IEEE ICBC 2024, Dublin, Ireland, May 27-31, 2024, Proceedings, doi
4. Jaehwan Park, **Hyeonbum Lee**, Junbeom Hur, Jae Hong Seo and Doowon Kim [co-first author] *UTRA: Universal Token Reusability Attack and Token Unforgeable Delegatable Order-Revealing Encryption* ESORICS 2025, Toulouse, France, Sep 22-24, 2025, doi
5. Intak Hwang , **Hyeonbum Lee**, Jinyeong Seo, and Yongsoo Song [alphabetical order] *Practical Zero-Knowledge PIOP for Maliciously Secure Multiparty Homomorphic Encryption* ACM CCS 2025, Taipei, Taiwan, Oct 13-17, 2025, doi

Preprint

1. **Hyeonbum Lee**, and Jae Hong Seo *On the Security of Nova Recursive Proof System: Limitations of and Alternatives to Bounded-Depth Analysis* Cryptology ePrint Archive 2024/232, ePrint
2. Intak Hwang, **Hyeonbum Lee**, Jinyeong Seo, and Yongsoo Song. *Jindo: Practical Lattice-Based Polynomial Commitments for Client-Side Proving* Cryptology ePrint Archive 2026/044, ePrint

EXPERIENCE

Work Experience

- **Visiting Scholar**
 - Supervisor: Prof. Taeho Jung
Institute : University of Notre Dame, IN
Period : Sep 1, 2022 - Mar 1, 2023

- **Teaching Experience**

- Spring 2025: Mathematical Algorithm, Teaching Fellow (Part-time Lecturer)
- Spring 2023: PBL: Cryptography, Teaching Fellow (Part-time Lecturer)
- Spring 2022: Calculus I, Teaching Assistant
- Spring 2021: Calculus I, Teaching Assistant
- Fall 2020: Modern Algebra II, Teaching Assistant
- Spring 2020: Modern Algebra I, Teaching Assistant

TALKS & PRE-SENTATIONS **Presentations**

- *UTRA: Universal Token Reusability Attack and Token Unforgeable Delegatable Order-Revealing Encryption*, Toulouse, Sep 21, 2025
- *How to Design a Zero-Knowledge Proof System in the Discrete Logarithm Setting*
2024-2 Hanyang Mathematics Colloquium, Seoul, Nov 05, 2024
- *Cougar: Cubic Root Verifier Inner Product Argument under Discrete Logarithm Assumption*
2024 KMS Annual Meeting, Suwon, Oct 26, 2024
- *On the Security of Nova Recursive Proof System*
6th ZKProof Workshop, Berlin, May 24, 2024
- *On the Security of Nova IVC*
2024 KMS Spring Meeting, Daejeon, Apr 19, 2024
- *TENET : Sublogarithmic Proof and Sublinear Verifier Inner Product Argument without a Trusted Setup*
IWSEC 2023, Yokohama, Aug 30, 2023
- *Efficient Zero-Knowledge Arguments in Discrete Logarithm Setting : Sublogarithmic Proof or Sublinear Verifier*
Asiacrypt 2022, Taipei, Dec 07, 2022
- *Efficient zero-knowledge arguments in discrete logarithm setting without pairing: Sublinear verifier*
2022 KMS Spring Meeting, Virtual, Apr 28, 2022
- *Transparent and efficient zero-knowledge arguments from discrete log with better complexity*
2021 KMS Spring Meeting, Virtual, Apr 30, 2021

HONORS & AWARDS **Awards**

- **Excellence Prize**, National Cryptographic Technology Contest. Oct 2024
Korea Cryptography Forum
- **Excellence Prize**, Best Research Paper Award for graduate students Feb 2024
The Research Institute for Natural Sciences, Hanyang University
- **Grand Prize**, National Cryptographic Technology Contest. Oct 2022
Korea Cryptography Forum
- **Special Prize**, National Cryptographic Technology Contest. Oct 2021, Oct 2023, Oct 2025
Korea Cryptography Forum
- **SUMMA CUM LAUDE**, Graduate Honors. Feb 2018
Hanyang University
- **Dean's list** 2016 (Fall)
College of Natural Science, Hanyang University

Scholarships & Stipends

- **AI Seoul Tech Research Support Project 2026** Jun 2026 - May 2027
Seoul Future Foundation (Seoul Metropolitan Government)
≈ \$44000/year
- **Teaching Assistant Scholarship** Sep 2020 - Aug 2022
Hanyang University
≈ \$6000/year

- **Master and Ph.D Program Scholarship**
Hanyang University
Full tuition for 3 years (\approx \$12000/year) Mar 2020 - Feb 2023
- **Hanyang Excellent Scientist Scholarship**
Hanyang University
Full tuition for 4 years (\approx \$8000/year) Mar 2014 - Feb 2018