Hyeonmin Lee

Network Security Researcher

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hyeonminlee1110

I am a postdoctoral researcher at Seoul National University. My research interests lie in network security including DNS security, Email security, and TLS. I have participated in (or led) more than ten research projects with institutions such as Virginia Tech, Rochester Institute of Technology, University of Twente, SIDN Labs, NLnet Labs, etc.

Professional Experience

Postdoctoral Researcher, Network Convergence and Security Lab — **Apr 2022 — Present**
Seoul National University — *Seoul, South Korea*

Visiting Student, The Center for Cybersecurity — **May 2019 — Aug 2019**
Rochester Institute of Technology — *Rochester, NY, United States*

Education

Ph.D., Computer Science and Engineering, Seoul National University, (Seoul, South Korea) — **Mar 2016 — Feb 2022**
- [Ph.D. Thesis] "Understanding the DANE Ecosystem in Email: How Is It Deployed and Managed?"
- [Advisors] *Prof. Taekyoung "Ted" Kwon (Seoul National University)* and *Prof. Taejoong "Tijay" Chung (Virginia Tech)*

B.S., Computer Science and Engineering, Seoul National University, (Seoul, South Korea) — **Mar 2011 — Feb 2016**

Visiting Student, Information Technology, Uppsala University, (Uppsala, Sweden) — **Fall 2014**

Publications (Selected)

ZTLS: A DNS-based Approach to Zero Round Trip in TLS handshake — **TheWebConf'23**
- Sangwon Lim, **Hyeonmin Lee**, Hyunsoo Kim, Hyunwoo Lee, Ted "Taekyoung" Kwon
- In Proceedings of the ACM Web Conference 2023, Austin, United States, Apr 2023

Under the Hood of DANE mismanagement in SMTP — **USENIX Security'22**
- **Hyeonmin Lee**, Md. Ishtiaq Ashiq, Moritz Müller, Roland van Rijswijk-Deij, Taekyoung "Ted" Kwon, Taejoong Chung
- In Proceedings of the 31st USENIX Security Symposium, Boston, United States, Aug 2022

A Longitudinal and Comprehensive Study of the DANE Ecosystem in Email — **USENIX Security'20**
- **Hyeonmin Lee**, Aniketh Gireesh, Roland van Rijswijk-Deij, Taekyoung "Ted" Kwon, Taejoong Chung
- In Proceedings of the 29th USENIX Security Symposium, Boston, United States, Aug 2020

DNSSEC Extension by Using PKIX Certificates — **Internet-Draft**
- **Hyeonmin Lee**, Taekyoung Kwon
- Active Internet-Draft, Mar 2023

Method for Performing Mutual Authentication in Communication using Locator ID Separation Protocol, Apparatus, and System for Performing the Same — **Patent**
- Ted "Taekyoung" Kwon, **Hyeonmin Lee**, Hyunwoo Lee
- Registration No. 10-2476081, South Korea, Dec 2022

Research Project Experience (Selected)

A Study for the Future-oriented DANE-based Web Architecture to Solve Problems in the Current TLS-based Web Ecosystem
Primary Investigator — Sep 2022 – Present
(Funded by *Basic Science Research Program - National Research Foundation of Korea (NRF)*)
- [Role] I examined the potential impact of adopting the DANE protocol for peer authentication on the Web ecosystem.
- [Keywords] Web, Transport Layer Security (TLS), Authentication, DANE

Research on Secure DNS and Privacy aware Packet Filtering Technology
System Designer, Programmer — Aug 2022 — Jul 2023
(Funded by *Samsung Electronics*)
- [Role] My role was to investigate a way to filter packets using DNS packets and implement it on BIND9.
- [Keywords] Domain Name System, DNS over TLS (DoT), DNS over HTTPS (DoH), Packet filtering

Abnormal Detection and Forensic Techniques using IoT Network Traffic Analysis
Project Manager, System Designer, Programmer — Mar 2021 — Nov 2021
(Funded by *Korea Institute of Information Security & Cryptology (KIISC)*)
- [Role] I took on the role of project manager and designed the entire system aimed at detecting anomalies or attacks in IoT networks. In addition, I implemented an autoencoder model to distinguish between abnormal and normal IoT network traffic.
- [Keywords] Internet of Things (IoT), Machine learning, Abnormal detection, DDoS

Skills

Tools and Languages	Python (proficient), C/C++, Java, Go, Spark, Hadoop, Git, LaTeX, Linux OS
Knowledge Background	DNS, DNS Security (i.e., DNSSEC, DoT, DoH), SMTP, Email Security (i.e., STARTTLS), PKI, DANE, TLS, Network Protocols (i.e., TCP, IP, HTTP, HTTPS, QUIC), IoT, Edge computing
Communication	English, Korean (native)