Hyeonmin Lee

Network Security Researcher

min0921110@gmail.com

hyeonmin-lee.github.io

hyeonminlee1110

I'm a postdoctoral researcher at Seoul National University. I've performed large-scale network measurements to analyze network security *in practice*. Also, I've experienced diverse co-works with institutions such as Virginia Tech, University of Twente, KAIST, SIDN Labs, NLnet Labs, etc.
Currently, I'm interested in the security of DNS and Email—How can we solve the security problems that DNS and Email have? How can we solve other network problems by leveraging DNS or Email protocols?

Professional Experience

Postdoctoral Researcher **Apr 2022 — Present**
Seoul National University *Seoul, South Korea*
- [Web and DANE] Study how the Web ecosystem will be changed if the Web adopts DANE protocol.
- [STARTTLS] Investigate how to prevent STARTTLS downgrade attacks.
- [DNS and TLS] Analyze how DNS can be exploited to reduce TLS handshake time (Related Achievement - Publication[C3]).
- [DNS and PKIX] Study how we can guarantee the integrity of DNS records using PKIX certificates.

Research Assistant **Mar 2016 — Feb 2022**
Seoul National University *Seoul, South Korea*
- [Email and DANE] Measured how DANE is deployed in the SMTP ecosystem (Related achievement - Publication[C1]).
- [Email and DANE] Measured the underlying reasons for the DANE mismanagement (Related achievement - Publication[C2]).

Visiting Researcher **May 2019 — Aug 2019**
Rochester Institute of Technology *Rochester, USA*
- [Email and DANE] Analyzed DANE to measure its deployment in the real-world (Related achievement - Publication[C1]).

Research Publications (Selected)

[C3] ZTLS: A DNS-based Approach to Zero Round Trip in TLS handshake (To appear) **TheWebConf'23**
Sangwon Lim, **Hyeonmin Lee**, Hyunsoo Kim, Hyunwoo Lee, and Ted "Taekyoung" Kwon
In Proceedings of the ACM Web Conference 2023 , Austin, United States, Apr 2023

[C2] 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
31st USENIX Security Symposium, Boston, United States, Aug 2022

[C1] 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
29th USENIX Security Symposium, Boston, United States, Aug 2020

Research Project Experience (Selected)

System Designer/ Programmer **Aug 2022 — Present**
Research on Secure DNS and Privacy aware Packet Filtering Technology
(Funded by *Samsung Electronics*)
- [Project Goal] This project aims to design a secure DNS environment for mobile devices, which includes analyzing the performance of DoT/DoH in the mobile environment, designing a packet filtering mechanism based on DNS packets.
- [Keywords] Domain Name System, DNS over TLS, DNS over HTTPS, Packet filtering.
- [Role] I'm investigating a way to filter packets using the information in DNS messages and implementing it on BIND9.

Project Manager **Mar 2021 — Nov 2021**
Abnormal Detection and Forensic Techniques using IoT Network Traffic Analysis
(Funded by *Korea Institute of Information Security & Cryptology (KIISC)*)
- [Project Goal] Develop a system that detects anomalies (or attacks) in IoT networks and generates evidence for digital forensics by collecting IoT network traffic.
- [Keywords] IoT network, network security, machine learning, abnormal detection.
- [Role] I analyzed IoT network traffic to distinguish abnormal traffic from normal traffic based on an autoencoder model.

Education

Ph.D., Computer Science and Engineering, Seoul National University, (Seoul, South Korea) **Mar 2016 — Feb 2022**
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**

Skills

Tools and Languages	Python (proficient), C/C++, Java, Go, Git, LaTeX
Communication	English, Korean (native)