

Hyunwoo Lee

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Education

2015-2020 M.S./Ph.D integrated Course in Dept. of Computer Science and Engineering, Seoul National University (*Advisor: Ted "Taekyoung" Kwon*)
2004-2011 B.S. in Dept. of Computer Science and Engineering, Seoul National University

Career

2022- Assistant Professor at Korea Institute of Energy Technology (KENTECH) (Energy AI)
2020-2022 Postdoc Research Associate Department of Computer Science, Purdue University (*Advisor: Elisa Bertino and Ninghui Li*)

Research Direction

- **Security by Design**
My research work aims to design, optimize, and implement security building blocks for computerized systems, including public key infrastructure (PKI) or security protocols (e.g., TLS)
Related Papers: MT-DPI (ESORICS '23), ZTLS (WWW '23), maTLS (NDSS '19)
- **Security Verification**
My research work aims to verify security and privacy properties of systems based on specifications or implementations, leveraging formal or informal methods
Related Papers: CTI-Lense (NDSS '24), VWAnalyzer (AsiaCCS '22), TELEPORT (AsiaCCS '21), TLS 1.3 in Practice (WWW '21)
- **AI-driven Security**
My research work aims to deploy machine-learning-based security building blocks such as intrusion detection systems to make computerized systems secure and trustworthy
Related Papers: AppSniffer (WWW '23), IoTEDef (ESORICS '22)

Publications

2024 **ARIoTEDef: Adversarially Robust IoT Early Defense System Based on Self-Evolution against Multi-step Attacks**
Mengdie Huang, **Hyunwoo Lee**, Ashish Kundu, Xiaofeng Chen, Anand Mudgerikar, Ninghui Li, and Elisa Bertino
ACM Transactions on Internet of Things (IF=2.7)

Sharing cyber threat intelligence: Does it really help?
Beomjin Jin, Eunsoo Kim, **Hyunwoo Lee**, Elisa Bertino, Doowon Kim, and Hyoungshick Kim
In Proceedings of the Network and Distributed System Security Symposium (NDSS '24), San Diego, USA, February 2024

- 2023** **Towards Efficient Privacy-Preserving Deep Packet Inspection**
Weicheng Wang, **Hyunwoo Lee**, Yan Huang, Elisa Bertino, and Ninghui Li
The 28th European Symposium on Research in Computer Security (ESORICS) 2023
The Hague, The Netherlands, September 2023
- How to decentralized the internet: A focus on data consolidation and user privacy**
Ted “Taekyoung” Kwon, Junghwan Song, Heeyoung Jung, Selin Chun, **Hyunwoo Lee**
Minhyeok Kang, Minkyung Park, Eunsang Cho
Computer Networks
Volume 234, October 2023, 109911
- AppSniffer: Towards Robust Mobile App Fingerprinting Against VPN**
Sanghak Oh, Minwook Lee, **Hyunwoo Lee**, Elisa Bertino, and Hyounghshick Kim
The Web Conference 2023 (TheWebConf 2023, formerly WWW)
Austin, USA, April 2023
- ZTLS: A DNS-based Approach to Zero Round Trip in TLS handshake**
Sangwon Lim, Hyeonmin Lee, Hyunsoo Kim, **Hyunwoo Lee**, and Ted “Taekyoung” Kwon
The Web Conference 2023 (TheWebConf 2023, formerly WWW)
Austin, USA, April 2023
- 2022** **An Infection-Identifying and Self-Evolving System for IoT Early Defense from Multi-Step Attacks**
Hyunwoo Lee, Anand Mudgerikar, Ashish Kundu, Ninghui Li, and Elisa Bertino
The 27th European Symposium on Research in Computer Security (ESORICS) 2022
Copenhagen, Denmark, September 2022
- VWAnalyzer: A Systematic Security Analysis Framework for the Voice over WiFi Protocol**
Hyunwoo Lee, Imtiaz Karim, Ninghui Li, and Elisa Bertino
The 17th ACM ASIA Conference on Computer and Communications Security (AsiaCCS 2022)
Nagasaki, Japan, June 2022
- Modelling Agent-Skipping Attacks in Message Forwarding Protocols**
Zach Smith, Hugo Jonker, Sjouke Mauw, and **Hyunwoo Lee**
arXiv (2201.08686)
- 2021** **Analyzing Spatial Differences in the TLS Security of Delegated Web Services**
Joonhee Lee, **Hyunwoo Lee**, Jongheon Jeong, Doowon Kim, and Taekyoung “Ted” Kwon
The 16th ACM ASIA Conference on Computer and Communications Security (AsiaCCS 2021)
Hong Kong, China, June 2021 (Virtual)
- TLS 1.3 in Practice: How TLS 1.3 Contributes to the Internet**
Hyunwoo Lee, Doowon Kim, and Yonghwi Kwon
The Web Conference 2021 (TheWebConf 2021, formerly WWW),
Ljubljana, Slovenia, April 2021 (Virtual)
- 2019** **mqTLS: Toward Secure MQTT Communication with an Untrusted Broker**
Hyunwoo Lee, Junghwan Lim, and Ted “Taekyoung” Kwon
The 10th International Conference on ICT Convergence (ICTC '19),
Jeju Island, Korea, October 2019
- Proactive SDN-based Load Balancing for Datacenter Network (Poster)**
Minhyeok Kang, **Hyunwoo Lee**, Junghwan Song, and Ted “Taekyoung” Kwon
The 14th International Conference on Future Internet Technologies (CFI '19),
Phuket, Thailand, August 2019
- D2TLS: Delegation-based DTLS for Cloud-based IoT Services**
Eunsang Cho, Minkyung Park, **Hyunwoo Lee**, Junhyeok Choi, and Ted “Taekyoung” Kwon
2019 ACM/IEEE Fourth International Conference on Internet-of-Things Design and
Implementation (IoTDI '19), Montreal, Canada, April 2019

maTLS: How to Make TLS middlebox-aware?

Hyunwoo Lee, Zach Smith, Junghwan Lim, Gyeongjae Choi, Selin Chun, Taejoong Chung, and Ted “Taekyoung” Kwon
In Proceedings of the Network and Distributed System Security Symposium (NDSS ’19), San Diego, USA, February 2019

A Multi-Interface Mobility Support Socket Library for Edge Computing (Korean)

Junghwan Lim, **Hyunwoo Lee**, and Ted “Taekyoung” Kwon
Korea Information and Communication Society (KICS) Conference Winter 2019, Pyeongchang, Gangwon-do, January 2019

2018 A Trustworthy Middlebox-aware Networking Architecture (Poster)

Hyunwoo Lee, Zach Smith, Selin Chun, and Ted “Taekyoung” Kwon
15th USENIX Symposium on Networked Systems Design and Implementation (NSDI ’18), Renton, USA, April 2018

An Application and Analysis on TLS extension with Compressed Certificate (Korean)

Hyunwoo Lee, Younghyun Kim, Eunsang Cho, and Ted “Taekyoung” Kwon
Korea Information and Communication Society (KICS) Conference Winter 2018, Jeongsun-gun, Gangwon-do, January 2018

2017 A Preliminary Study on Disaster Waste Detection and Volume Estimation based on 3D Spatial Information

Hyungtaeck Yoo, **Hyunwoo Lee**, Seokho Chi, Bon-Gang Hwang
2017 International Workshop on Computing in Civil Engineering (IWCCE 2017)

2016 Position Estimation of Robotic Mobile Nodes in Wireless Testbed using GENI

Ahmed Abdelhadi, Felipe Rechia, Arvind Narayanan, Thiago Teixeira, Ricardo Lent, Driss Benhaddou, **Hyunwoo Lee**, T. Charles Clancy
Systems Conference (SysCon 2016)

2015 Enabling SDN Experimentation with Wired and Wireless Resources: The SmartFIRE facility

Kostas Choumas, Thanasis Korakis, **Hyunwoo Lee**, Donghyun Kim, Junho Suh
Ted “Taekyoung” Kwon, Pedro Martinez-Julia, Antonio Skarmeta, Taewan You, Loic Baron
Serge Fdida, and JongWon Kim
6th EAI International Conference on Cloud Computing (Cloudcomp 2015)

ICN-OMF: A Control, Management Framework for Information-Centric Network Testbed

Hyunwoo Lee, Donghyun Kim, Junho Suh, Ted “Taekyoung” Kwon
International Conference on Information Networking (ICOIN 2015)

Awards

2019 Ph D. Fellowship Award

December 20 from Naver Corporation

Best Research Award

August 20 in Open Tech Talk at Samsung Security Tech Forum (SSTF) 2019

Patents

2020 Method for Performing Mutual Authentication in Communication using Locator ID

Separation Protocol, Apparatus and System for Performing the Same (Registered / Korea)

Ted “Taekyoung” Kwon, Hyeonmin Lee, **Hyunwoo Lee**
(Application No. 10-2020-0184529)

- 2019** **Network System and Method for Performing Message Security Thereof (Registered / Korea)**
 Ted “Taekyoung” Kwon, **Hyunwoo Lee**, Myungchul Kwak, Hyeonmin Lee, Junghwan Lim,
 Yoojung Shin
 (Application No. 10-2019-0156578)
- Communication Method and Apparatus for Supporting Diverse Interface, Mobility,
 and Multicasting using Integrated Flat ID (Pending / PCT)**
 Ted “Taekyoung” Kwon, **Hyunwoo Lee**, Myungchul Kwak, Hyeonmin Lee, Junghwan Lim,
 Yoojung Shin, Gyeongjae Choi
 (Application No. PCT/KR2019/016640)
- 2017** **Integrated ID based Communication Method and System (Registered / Korea)**
 Ted “Taekyoung” Kwon, **Hyunwoo Lee**, Hyeonmin Lee, Dongjun Lee, Hyunchul Oh
 (Application No. 10-2017-0159700)
- Waste Volume Calculation Method and Waste Volume Calculation System (Pending / Korea)**
 Seokho Chi, Hyungtaeck Yoo, **Hyunwoo Lee**
 (Application No. 10-2017-0020084)
- 2016** **Method and System for Estimating the Generation of Disaster Waste using Unmanned Aerial
 Vehicle (UAV) (Pending / Korea)**
 Seokho Chi, Hyungtaeck Yoo, **Hyunwoo Lee**
 (Application No. 10-2016-0181527)
- Systems and Methods that Support an Integrated Identity (Pending / Korea)**
 Ted “Taekyoung” Kwon, Myungchul Kwak, **Hyunwoo Lee**, Hyeonmin Lee
 (Application No. 10-2016-0158686)

Certification

- **Engineer Information Security**
 Certified by Korea Internet & Security Agency on December 27, 2013
 (Qualification Number: 13202000151A)
- **Oracle Certified Professional, Java SE 6 Programmer**
 Certified by Oracle on December 27, 2013
- **Engineer Information Processing**
 Certified by Human Resources Development Service of Korea on June 1, 2009
 (Qualification Number: 09201021824B)
- **Craftsman Computer Graphics Operation**
 Certified by Human Resources Development Service of Korea on October 8, 2001
 (Qualification Number: 01403071984N)