Seunghoon Woo

Assistant Professor (@KOREA UNIVERSITY), Chief Scientist (@LABRADOR LABS)

seunghoonwoo@korea.ac.kr | https://wooseunghoon.github.io

Software Security; Software Vulnerability Detection;
Software Composition Analysis; Code Clone Detection.

Earned Degrees

- **M.S. & Ph.D.** in Computer Science and Engineering, Korea University (GPA 4.45/4.5) — Sep 2016 - Aug 2022
- **B.S.** in Computer Science and Engineering, Korea University (GPA 4.22/4.5) — Mar 2010 - Feb 2016

Doctoral Dissertation

- Detecting Software Vulnerabilities for Mitigating Risks of Open-Source Reuse (Advisor: Prof. Heejo Lee) — Aug 2022

Working Experiences

- **Korea University, Assistant Professor** — Sep 2023 - Present
- **LABRADOR LABS Inc., Chief Scientist** — May 2022 - Present
- **Center for Software Security and Assurance (CSSA),** Research Professor — Sep 2022 - Aug 2023
- **National University of Singapore,** Research Intern — Dec 2016 - Feb 2017
- **Samsung Electronics,** Student Intern & Employee — Jun 2014 - Aug 2014, Dec 2015 - Jan 2016
- **DoDotDo (startup),** Core Developer — Jan 2015 - Sep 2015

Publications - International Conference

[1] **V1SCAN: Discovering 1-day Vulnerabilities in Reused C/C++ Open-source Software Components Using Code Classification Techniques**
Seunghoon Woo, Eunjin Choi, Heejo Lee, and Hakjoo Oh
Security 2023: 32nd USENIX Security Symposium (**Top-tier conference**)
Anaheim, USA, Aug 2023 (Acceptance rate: 29.0%)

[2] **MOVERY: A Precise Approach for Modified Vulnerable Code Clone Discovery from Modified Open-Source Software Components**
Seunghoon Woo, Hyunji Hong, Eunjin Choi, and Heejo Lee
Security 2022: 31st USENIX Security Symposium (**Top-tier conference**)
Boston, USA, Aug 2022 (Acceptance rate: 18.0%)

[3] **L2Fuzz: Discovering Bluetooth L2CAP Vulnerabilities Using Stateful Fuzz Testing**
Haram Park, Carlos Nkuba Kayembe, Seunghoon Woo, and Heejo Lee
DSN 2022: 52nd IEEE/IFIP International Conference on Dependable Systems and Networks
Baltimore, USA, Jun 2022 (Acceptance rate: 18.7%)

[4] **DICOS: Discovering Insecure Code Snippets from Stack Overflow Posts by Leveraging User Discussions**
Hyunji Hong, Seunghoon Woo, and Heejo Lee
ACSAC 2021: Annual Computer Security Applications Conference
Virtual, Dec 2021 (Acceptance rate: 24.5%)

[5] **V0Finder: Discovering the Correct Origin of Publicly Reported Software Vulnerabilities**
Seunghoon Woo, Dongwook Lee, Sunghan Park, Heejo Lee, and Sven Dietrich
Security 2021: 30th USENIX Security Symposium (**Top-tier conference**)
Virtual, Aug 2021 (Acceptance rate: 19.0%)

[6] **OctoPoCs: Automatic Verification of Propagated Vulnerable Code Using Reformed Proofs of Concept**
Seongkyeong Kwon, Seunghoon Woo, Gangmo Seong, and Heejo Lee
DSN 2021: 51st IEEE/IFIP International Conference on Dependable Systems and Networks
Virtual, Jun 2021 (Acceptance rate: 16.3%)

[7] **CENTRIS: A Precise and Scalable Approach for Identifying Modified Open-Source Software Reuse**
Seunghoon Woo, Sunghan Park, Seulbae Kim, Heejo Lee, and Hakjoo Oh
ICSE 2021: 43rd International Conference on Software Engineering (**Top-tier conference**)
Virtual, May 2021 (Acceptance rate: 22.4%)

[8] **VUDDY: A Scalable Approach for Vulnerable Code Clone Discovery**
Seulbae Kim, Seunghoon Woo, Heejo Lee, and Hakjoo Oh
S&P 2017: 38th IEEE Symposium on Security and Privacy (**Top-tier conference**)
San Jose, USA, May 2017 (Acceptance rate: 12.9%)

Publications - International Journal

[1] **ZMAD: Lightweight Model-based Anomaly Detection for the Structured Z-Wave Protocol**
Carlos Nkuba Kayembe, Seunghoon Woo, Heejo Lee, Sven Dietrich
IEEE ACCESS (SCIE/IF: 3.476), Jun 2023

[2] **CIRCUIT: A JavaScript Memory Heap-Based Approach for Precisely Detecting Cryptojacking Websites**
Seunghoon Woo*, Hyunji Hong*, Sunghan Park*, Jeongwook Lee, and Heejo Lee (* contributed equally)
IEEE ACCESS (SCIE/IF: 3.476), Sep 2022

[3] **xVDB: A High-Coverage Approach for Constructing a Vulnerability Database**
Hyunji Hong, Seunghoon Woo, Eunjin Choi, Jihyun Choi, and Heejo Lee
IEEE ACCESS (SCIE/IF: 3.476), Aug 2022

Publications - Domestic

[1] **Blockchain Security Threats and Analysis in the Web 3.0 Era**
Seunghoon Woo, Geonwoo Lee, Taejun Lee, Yunseong Choi, Heejo Lee, Kyeongsik Min, and Jinsang Park
KISA INSIGHT, 2023

[2] **Trends in Open-source Software Vulnerability Analysis and Detection Technology**
Seunghoon Woo, Hyunji Hong, and Heejo Lee
OSIA Standards & Technology Review, 2022

[3] **Open-source Software Vulnerability Detection Techniques for Enhancing Supply Chain Security**
Hyunji Hong, Seunghoon Woo, and Heejo Lee
Review of KIISC, 2022

Patent

[1] **METHOD FOR IDENTIFYING OPEN-SOURCE SOFTWARE COMPONENTS AT THE SOURCE-CODE LEVEL**
Heejo Lee and Seunghoon Woo
REGISTRATION, Korea (10-2476358), Dec 2022

[2] **METHOD FOR IDENTIFYING OPEN-SOURCE SOFTWARE COMPONENTS AT THE SOURCE-CODE LEVEL**
Heejo Lee and Seunghoon Woo
APPLICATION, US (17525126), Nov 2021

[3] **METHOD FOR IDENTIFYING OPEN-SOURCE SOFTWARE COMPONENTS AT THE SOURCE-CODE LEVEL**
Heejo Lee and Seunghoon Woo
APPLICATION, Europe (EP21202849.2), Oct 2021

Standard

- **Structured Software Vulnerability Database Information Expression for Vulnerability Detection and Resolution**
  Heejo Lee, Seunghoon Woo, Hyunji Hong, Choonsik Park, and Yunseong Choi
  Korea (TTAK.KO-12.0384), Jun 2022

Technology Transfer

- **METHOD FOR IDENTIFYING OPEN-SOURCE SOFTWARE COMPONENTS AT THE SOURCE-CODE LEVEL**
  Technology Transfer to LABRADOR LABS, Dec 2022

Projects (Selected)

- **Development of SBOM Technologies for Securing Software Supply Chains (IITP/MSIT)**
  Researcher
  Apr 2022 - Present
- **Development of Automated Vulnerability Discovery Technologies for Blockchain Security (IITP/MSIT)**
  Project Manager & Researcher & Developer
  International Joint Research (ETH Zurich)
  Jun 2019 - Dec 2022
  ***2022 IITP outstanding performance project**
- **The Intelligent IoT Integrator (I3): LA Smart City Project**
  Researcher & Developer
  International Joint Research (City of LA, University of Southern California, Amazon, etc.)
  Nov 2017 - Present
- **Verifying Open-Source Software Reliability for Reinforcing Operating System Security (NSR)**
  Researcher & Developer
  Apr 2020 - Oct 2020
- **Examining Software Vulnerabilities on Platform for IoT-based Home Appliance Consulting Service (KETI)**
  Researcher & Analyst
  Feb 2020 - Apr 2020
- **Development of DNS-based Lightweight Framework for Addressing Abnormal Network Behaviors (KISTI)**
  Researcher & Developer
  May 2018 - Oct 2018
- **A Study of a DDoS-resilient Network Architecture through Traffic Classification and Isolation (US ONR)**
  Project Manager
  International Joint Research (ETH Zurich, Office of Naval Research)
  Sep 2017 - Sep 2019

- **Development of Vulnerability Discovery Technologies for IoT Software Security (IITP/MSIT)**
  Researcher & Developer
  International Joint Research (ETH Zurich, Carnegie Mellon University, University of Oxford)
  Feb 2016 - May 2018

Real-world Software Contributions (Selected)

Detection tool	**VUDDY** (S&P 2017)	**CENTRIS** (ICSE 2021)	**V0Finder** (Security 2021)	**OctoPoCs** (DSN 2021)	**DICOS** (ACSAC 2021)	**L2Fuzz** (DSN 2022)	**MOVERY** (Security 2022)	**Total**
#Reported vulnerabilities	15	5	20	3	4	7	11	**65**

- **LibGDX,** Resolved security vulnerabilities — Mar 2022
  Detected a possible remote code execution vulnerability in LibGDX (https://github.com/libgdx/libgdx)
- **Android,** Resolved security vulnerabilities in Android Bluetooth stack — Dec 2021
  Discovered DoS vulnerabilities in Android Bluetooth stack
- **Apple,** Resolved security vulnerabilities — Dec 2021
  Discovered DoS vulnerabilities in Apple tvOS, watchOS, iOS, iPadOS, and macOS Monterey Bluetooth stack
- **XPDF,** Resolved security vulnerabilities (CVE-2020-35376 assigned) — Dec 2020
  Detected a stack consumption vulnerability in XPDF (https://www.xpdfreader.com)
- **Gif2png,** Corrected CVE information — Feb 2020
  Corrected wrong CVE information (CVE-2019-17371)
- **Redis,** Resolved security vulnerabilities (CVE-2020-14147 assigned) — Feb 2020
  Detected a possible stack-based buffer overflow vulnerability in Redis (https://github.com/redis/redis)
- **Stepmania,** Resolved security vulnerabilities (CVE-2020-20412 assigned) — Sep 2019
  Detected a improper validation vulnerability in Stepmania (https://github.com/stepmania/stepmania)
- **Godot,** Resolved security vulnerabilities — Jul 2019
  Detected a possible remote code execution vulnerability in Godot (https://github.com/godotengine/godot)

Open-source Software Artifacts

[1] **V1SCAN**, A tool for discovering 1-day security vulnerabilities (Security 2023)
https://github.com/WOOSEUNGHOON/V1SCAN-public

[2] **MOVERY**, A tool for discovering propagated vulnerable codes (Security 2022)
https://github.com/WOOSEUNGHOON/MOVERY-public

[3] **V0Finder**, A tool for discovering the correct origin of software vulnerabilities (Security 2021)
https://github.com/WOOSEUNGHOON/V0Finder-public

[4] **CENTRIS**, A tool for identifying open-source software components (ICSE 2021)
https://github.com/WOOSEUNGHOON/CENTRIS-public

Talks and Presentations (Selected)

- **USENIX Security 2023,** Paper Presentation — Aug 2023
  V1SCAN: Discovering 1-day Vulnerabilities in Reused C/C++ Open-source Software Components Using Code Classification Techniques — *Anaheim*, USA
- **NetSec-KR 2023** — Apr 2023
  Discovering Open-source Software Vulnerabilities for Supply Chain Security — *Seoul*, Korea

- **Blockchain Grand Week** — Dec 2022
  Vulnerabilities and Security in Blockchain Software — *Busan*, Korea
- **UNIST Seminar** — Dec 2022
  Vulnerabilities and Security in Open-Source Software — *Virtual*
- **USENIX Security 2022,** Paper Presentation — Aug 2022
  MOVERY: A Precise Approach for Modified Vulnerable Code Clone Discovery from Modified Open-Source Software Components — *Boston*, USA
- **Supply Chain Security Workshop** — Jul 2022
  Open Source Vulnerability Detection for Supply Chain Security — *Seoul*, Korea
- **IoTcube Conference 2021** — Aug 2021
  Analysis of Reused Open-Source Software Components for Software Bill of Materials — *Seoul*, Korea
- **USENIX Security 2021,** Paper Presentation — Aug 2021
  V0Finder: Discovering the Correct Origin of Publicly Reported Software Vulnerabilities — *Virtual*
- **ICSE 2021,** Paper Presentation — May 2021
  CENTRIS: A Precise and Scalable Approach for Identifying Modified Open-Source Software Reuse — *Virtual*
- **KIISC Online Short Course** — Nov 2020
  Verification Technology for Open-Source Software Security — *Virtual*
- **Workshop among Asian Information Security Labs (WAIS) 2018** — Jan 2018
  Identifying Constituent OSS in Software through Code Similarity Detection — *Wuhan*, China
- **IEEE S&P Poster 2017**, Poster Presentation — May 2017
  IoTcube: an automated analysis platform for finding security vulnerabilities — *San Jose*, USA

External Reviewer

- **ACM Transactions on Software Engineering and Methodology** 2023
- **Software: Practice and Experience** 2023
- **IEEE Transactions on Vehicular Technology** 2022
- **Journal of Communications and Networks** 2021