Hyungsub Kim

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Research Interests

My research interests are all aspects of cyber-physical systems security such as drones and autonomous vehicles. In particular, I am working on automatically finding logic bugs, patching them, and verifying the patches. My anticipated graduation date is 05/2024.

Education

2018–Present **PhD student in Computer Science**, ***Purdue University***, IN, the USA, *GPA* – .

2013–2015 **M.S. in Computer Science and Engineering**, ***POSTECH***, Pohang, South Korea, *GPA – 3.8/4.3*.
- Thesis: "Privacy Threats in HTML5 Geolocation API: Case Studies and Countermeasures"

2011–2013 **B.S. in School of Computer Science**, ***University of Seoul***, Seoul, South Korea, *GPA – 4.15/4.5*.

2005–2011 **Major in Mathematics**, ***Chonnam National University***, Gwangju, South Korea, *GPA – 3.27/4.5*.

2002–2005 **Major in Information Processing**, ***Pyeongchon Information Industry High School***, Anyang, South Korea.

Employment History

2015–2018 **Researcher**, *3rd R&D Institute (Intelligence, Surveillance and Reconnaissance)*, **Agency for Defense Development** (**ADD**), DaeJeon, South Korea.

2007–2009 **Auxiliary Policeman**, *Gwangju Seobu Police Station*, **Gwangju Metropolitan Police Agency**, Gwangju, South Korea.
Mandatory military service

Publications

Conference Papers

[1] **PatchVerif: Discovering Faulty Patches in Robotic Vehicles** [PDF]
Hyungsub Kim, Muslum Ozgur Ozmen, Z. Berkay Celik, Antonio Bianchi, Dongyan Xu
In the Proceedings of the 32nd USENIX Security Symposium (**USENIX**), Anaheim, California, USA, August 9-11, 2023.

[2] **PGPATCH: Policy-Guided Logic Bug Patching for Robotic Vehicles** [PDF]
Hyungsub Kim, Muslum Ozgur Ozmen, Z. Berkay Celik, Antonio Bianchi, Dongyan Xu
In the Proceedings of the 43rd IEEE Symposium on Security and Privacy (**S&P**), San Francisco, California, USA, May 23-26, 2022.

[3] **M2MON: Building an MMIO-based Security Reference Monitor for Unmanned Vehicles** [PDF]
Arslan Khan, **Hyungsub Kim**, Byoungyoung Lee, Dongyan Xu, Antonio Bianchi, Dave (Jing) Tian
In the Proceedings of the 30th USENIX Security Symposium (**USENIX**), Vancouver, British Columbia, Canada, August 11-13, 2021.

[4] **PGFUZZ: Policy-Guided Fuzzing for Robotic Vehicles** [PDF]
Hyungsub Kim, Muslum Ozgur Ozmen, Antonio Bianchi, Z. Berkay Celik, Dongyan Xu
In the Proceedings of the 28th Network and Distributed System Security Symposium (**NDSS**), San Diego, California, USA, February 21-24, 2021.

[5] **Inferring Browser Activity and Status Through Remote Monitoring of Storage Usage** [PDF]
Hyungsub Kim, Sangho Lee, and Jong Kim
In the Proceedings of the 32nd Annual Computer Security Applications Conference (**ACSAC**), Los Angeles, California, USA, December 5-9, 2016.

[6] **Identifying Cross-origin Resource Status Using Application Cache** [PDF]
Sangho Lee, **Hyungsub Kim**, and Jong Kim
In the Proceedings of the 22nd Network and Distributed System Security Symposium (**NDSS**), San Diego, California, USA, February 8-11, 2015.

[7] **Exploring and mitigating privacy threats of HTML5 geolocation API** [PDF]
Hyungsub Kim, Sangho Lee, and Jong Kim
In the Proceedings of the 30th Annual Computer Security Applications Conference (**ACSAC**), New Orleans, Louisiana, USA, December 8-12, 2014.

Workshop Papers

[1] **Demo: Policy-based Discovery and Patching of Logic Bugs in Robotic Vehicles** [PDF]
Hyungsub Kim, Muslum Ozgur Ozmen, Antonio Bianchi, Z. Berkay Celik, Dongyan Xu
In the Proceedings of the 4th International Workshop on Automotive and Autonomous Vehicle Security (**AutoSec**), San Diego, California, USA, April 24, 2022.

Thesis

[1] **Privacy Threats in HTML5 Geolocation API: Case Studies and Countermeasures** [PDF]
Master's Thesis, Department of Computer Science and Engineering, POSTECH, 2015.

Interdisciplinary Work

[1] **Community-based death preparation and education: A scoping review** [PDF]
Sungwon Park, Hyungkyung Kim, Min Kyeong Jang, Hyungsub Kim, Rebecca Raszewski & Ardith Z. Doorenbos
Death Studies, March 11, 2022.

Talks

[1] **Defeating Logic Bugs in Robotic Vehicles**, *New York University Abu Dhabi, UAE, November 10, 2022.*

[2] **Logic Bug-Finding and Patching Tools**, *2nd Technology Innovation Institute (TII) Annual SSRC Research Partners Summit, Abu Dhabi, UAE, November 8, 2022.*

[3] **PGPATCH: Policy-Guided Logic Bug Patching for Robotic Vehicles**, *43rd IEEE Symposium on Security and Privacy (S&P), San Francisco, California, USA, May 25, 2022.*

[4] **PGFUZZ: Policy-Guided Fuzzing for Robotic Vehicles**, *28th Network and Distributed System Security Symposium (NDSS), San Diego, California, USA, Feb 24, 2021.*

[5] **Inferring Browser Activity and Status Through Remote Monitoring of Storage Usage**, *32nd Annual Computer Security Applications Conference (ACSAC), Los Angeles, California, USA, Dec 8, 2016.*

[6] **Exploring and Mitigating Privacy Threats of HTML5 Geolocation API**, *30th Annual Computer Security Applications Conference (ACSAC), New Orleans, Louisiana, USA, Dec 11, 2014.*

Fellowships, Awards, and Honors

IEEE S&P Student Travel Grant (US$1,300), San Francisco, California, USA, May, 2022.

CCS Student Conference Grant, Virtual Conference, November, 2021.

Ross Fellowship, Purdue University Graduate School, 2018.

ACSAC Student Conferenceship Award (US$1,200), New Orleans, Louisiana, USA, December, 2014.

Best Student Presentation Award, POSTECH CSE Student Workshop, 2014.

Semester High Honors, 2011 and 2012 2nd semester, University of Seoul.

Semester High Honors, 2007 2nd semester, Chonnam National University.

Ministry of Commerce, Industry and Energy grand prize (US$2,600), high school competitions in the field of computer science, 2004.

Professional Services

Organizing Committee

2023 ISOC Symposium on Vehicle Security and Privacy (VehicleSec) Travel Grant Chair

Program Committee (PC)

2023 European Symposium on Research in Computer Security (ESORICS)
2023 International Symposium on Research in Attacks, Intrusions and Defenses (RAID)
2023 ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)
2023 ISOC Symposium on Vehicle Security and Privacy (VehicleSec)
2023 Workshop of Designing Security for the Web (SecWeb)

Artifact Evaluation Committee (AEC)

2022-2023 USENIX Security Symposium
2023 European Conference on Computer Systems (EuroSys)
2022 Annual Computer Security Applications Conference (ACSAC)

Journal Reviewer

2023 IEEE Transactions on Dependable and Secure Computing (TDSC)

Sub-reviewer

2021, 2022 IEEE Symposium on Security and Privacy (Oakland)
2021-2023 Network and Distributed System Security Symposium (NDSS)
2022 USENIX Security Symposium
2021 Annual Computer Security Applications Conference (ACSAC)
2021 European Symposium on Research in Computer Security (ESORICS)
2021, 2022 ACM ASIA Conference on Computer and Communications Security (ASIACCS)
2020 Dependable Systems and Networks (DSN)
2020 Security and Privacy in Communication Networks (SecureComm)
2022 Workshop on Automotive and Autonomous Vehicle Security (AutoSec)
2014 World Conference on Information Security Applications (WISA)

Session Chair

2022 Robotic Vehicles Security in Workshop on Automotive and Autonomous Vehicle Security (AutoSec)

Volunteering

2014 Participating in the international World Wide Web Conference (WWW) as a volunteer, April, 7-11, Seoul, South Korea.
- Helped organization and progress of the conference

Teaching Experience

Guest Lecturer

2022 Fall Topic: Static Analysis, Software Security (CS 490) Purdue University, West Lafayette, IN, USA
2022 Spring Topic: Program Analysis for IoT/CPS (Dynamic, Static Analysis, and Symbolic Execution), IoT/CPS Security (CS 590) Purdue University, West Lafayette, IN, USA

Teaching Assistant (TA)

2019 Fall **Teaching assistant** Problem Solving And Object-Oriented Programming (CS180) and Data Structures And Algorithms (CS251), Purdue University, West Lafayette, IN, the USA.
- Assignment and project development.

2014 Fall **Teaching assistant** Software Design Methods (CSED332), POSTECH, Pohang, South Korea.
- Planned, teached, and graded course term project assignments about implementing a database-management system (DBMS).

Reported Vulnerabilities

August, 2023 **115 bugs in ArduPilot and PX4**, *discovered by PatchVerif*.

February, 2021 **207 bugs in ArduPilot, PX4, and Paparazzi**, *discovered by PGFuzz*.

March, 2020 **ArduPilot Bug #13815**, *Checking min/max angular position of mount*, Link.

March, 2020 **ArduPilot Bug #13811**, *Drone crash when repeating flip mode*, Link.

July, 2018 **ArduPilot Bug #8783**, *NULL pointer dereference*, Link.

June, 2018 **ArduPilot Bug #8644**, *Memory leak*, Link.

June, 2018 **ArduPilot Bug #8642**, *Memory leak*, Link.

June, 2018 **ArduPilot Bug #8641**, *NULL pointer dereference*, Link.

June, 2018 **ArduPilot Bug #8640**, *Resource leak*, Link.

References

Available on Request