

# Hyungsub Kim

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## Research Interests

My research interests are all aspects of cyber-physical systems security. In particular, I am working on automatically finding logic bugs, patching them, and verifying the patches in robotic vehicle software. My anticipated graduation date is May 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.*  
o 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.  
(acceptance rate: TBA)
- [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.  
(acceptance rate: 147/1012=14.5%)
- [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.  
(acceptance rate: 246/1316=18.7%)
- [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.  
(acceptance rate: 87/573=15.2%)

- [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.  
 (acceptance rate:  $48/210=22.8\%$ )
- [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.  
 (acceptance rate:  $50/302=16.6\%$ )
- [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.  
 (acceptance rate:  $47/236=19.9\%$ )

### Short Paper

- [1] **Short: Rethinking Secure Pairing in Drone Swarms** [PDF]  
 Muslum Ozgur Ozmen, Habiba Farrukh, **Hyungsub Kim**, Antonio Bianchi, Z. Berkay Celik  
 In the Proceedings of the Inaugural ISOC Symposium on Vehicle Security and Privacy (**VehicleSec**), San Diego, California, USA, February 27, 2023.

### Workshop/Demo Papers

- [1] **Demo: Discovering Faulty Patches in Robotic Vehicle Control Software** [PDF]  
**Hyungsub Kim**, Muslum Ozgur Ozmen, Z. Berkay Celik, Antonio Bianchi, Dongyan Xu  
 In the Proceedings of the Inaugural ISOC Symposium on Vehicle Security and Privacy (**VehicleSec**), San Diego, California, USA, February 27, 2023.
- [2] **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.

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### Talks

- [1] **Defeating Logic Bugs in Robotic Vehicles**, *Ohio State University, Columbus, Ohio, USA, February 17, 2023.*
- [2] **Defeating Logic Bugs in Robotic Vehicles**, *Purdue University, West Lafayette, Indiana, USA, November 18, 2022, preliminary examination.*
- [3] **Defeating Logic Bugs in Robotic Vehicles**, *New York University Abu Dhabi, UAE, November 10, 2022.*
- [4] **Logic Bug-Finding and Patching Tools**, *2nd Technology Innovation Institute (TII) Annual SSRC Research Partners Summit, Abu Dhabi, UAE, November 8, 2022.*

- [5] **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.
- [6] **PGFUZZ: Policy-Guided Fuzzing for Robotic Vehicles**, *28th Network and Distributed System Security Symposium (NDSS)*, San Diego, California, USA, February 24, 2021.
- [7] **Inferring Browser Activity and Status Through Remote Monitoring of Storage Usage**, *32nd Annual Computer Security Applications Conference (ACSAC)*, Los Angeles, California, USA, December 8, 2016.
- [8] **Exploring and Mitigating Privacy Threats of HTML5 Geolocation API**, *30th Annual Computer Security Applications Conference (ACSAC)*, New Orleans, Louisiana, USA, December 11, 2014.

## Fellowships, Awards, and Honors

**CPS Rising Stars**, CPS-VO@National Science Foundation (NSF) 2023.

**Outstanding Reviewer Award**, ISOC Symposium on Vehicle Security and Privacy (VehicleSec) 2023.

**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)
- 2023 ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec)
- 2023 USENIX Workshop on Offensive Technologies (WOOT)

### Journal Reviewer

- 2023 IEEE Transactions on Dependable and Secure Computing (TDSC)

### Sub-reviewer/External Reviewer

- 2021-2022 IEEE Symposium on Security and Privacy (Oakland)
- 2021-2023 Network and Distributed System Security Symposium (NDSS)
- 2022-2023 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

- 2023 "Autonomous Driving Security" Session, ISOC Symposium on Vehicle Security and Privacy (VehicleSec)
- 2022 "Robotic Vehicles Security" Session, 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.
  - o Helped organization and progress of the conference

## University Services

### Services for Department

- 2023 "Discovering Faulty Patches in Robotic Vehicles", Prospective PhD Visit Day Poster Session, March 23, Purdue University, West Lafayette, Indiana, USA.

## 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.
  - o Assignment and project development.
- 2014 Fall **Teaching assistant** Software Design Methods (CSED332), POSTECH, Pohang, South Korea.
  - o Planned, taught, 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](#).

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## References

Available on Request