

# KIJIN AN

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## (a) Education

- 2015.8-2021.5: Ph.D., **Virginia Tech**, Computer Science, Blacksburg, VA  
Advisor: Prof. Eli Tilevich, <https://people.cs.vt.edu/~tilevich>
- 2007.3–2009.2: M.S., **POSTECH**, Computer and Communication, Pohang, South Korea  
Advisor: Prof. Hwangjun Song, <http://mcnl.postech.ac.kr/professor>
- 2003.3–2007.2: B.E., **University of Seoul**, Electrical and Computer Engineering, Seoul, South Korea

## (b) Dissertation Topic and Interests

In my dissertation, I studied refactoring tools for distributed apps in the purpose of facilitating re-engineering of the distributed apps. My approach has a novelty in that it creates a centralized variant of the distributed apps first, then applies perfective and architectural changes of the original distributed apps. My idea solved non-trivial tasks for evolving distributed apps: localizing bugs, optimizing distribution granularity, and replicating a subset of distributed apps into different machines for enabling edge-based/centralized computings. I improved the latest software engineering's latest ideas such as fuzzing/checkpointing the HTTP executions (RESTful APIs) and declarative program analysis with the z3 constraints solver, and data replication techniques (i.g. relaxed consistency models). My dissertation research was presented in WWW 2020, ICWE 2019, SANER 2020, and ICWE 2021 with the Best Paper award.

**Keywords:** *Refactoring Tools for Distributed Web Apps, Software Engineering, Web-based Systems/Cloud Web Services, Serverless Computing, Networking, Software Security, Trusted execution, Machine learning, Full-Stack JS Apps*

## (c) Employment and Projects

- 2015.8–2021.5: **GTA/GRA**, Department of Computer Science, Virginia Tech, Blacksburg, VA  
**Understanding Heap-Spraying Attacks (1.5 years):** I was the main developer to build a core course project for the CS department, where I developed a victim server (C++) by extending JavaScript Virtual machine V8. I studied this work by employing pre-/post-surveys from 540 VT undergrads owning IRB approvals.  
<https://hosting.cs.vt.edu/CybersecurityEducation/gallery>  
<http://courses.cs.vt.edu/cs2506/Spring2018/C/HS/handout.pdf>  
**RT-Trust (1.5 years):** We developed LLVM C++ compiler tools to automate distributing embedded apps (drone firmware *PX4*) to support *optee-os/SGX* Environments. We dockerized our framework for repeating tests on Raspberry Pi environments. I'm the second author for *GPCE'18* and *COLA'20*.  
**tiInferer (1.5 years, Java):** To port from Android to iOS (Java->Swift), this tool learns syntactical translation rules from the equivalent codebases of cross-platform mobile apps and stores them in the relational database. This work was presented in *MobileSoft'18* with Best Paper nomination.
- 2012.9–2015.7: **Software Engineer/Researcher**, Robotics Research, KIST (Korea Institute of Science and Technology, *one of the top research institutions in South Korea*), Seoul, South Korea  
**SimonPiC:** I was a software engineer in a Korean national lab KIST to develop a scalable distributed system to process and fuse sensor data from multiple system units for real-time robot services. This system was designed not only as scaling to the number of sensor units but also but also being tolerant to a partial-failure of the unit. I implemented the core distributed system (Python/C++), Web-based UIs, 3D Simulator (Python/C++/Blender), and ML-based Leg detection (Python/C++). I annually led demonstrations and presented ten research papers.
- 2009.5–2012.9: **System Software Engineer**, SK telesys, Pankyo, South Korea  
I was a system software Engineer for developing and optimizing 3-4G-WiFi-VoIP Systems' protocols. I developed the WiFis-Repeater system for Metro supporting remote management with TR069 protocol. I developed business functions for the IPPBX-WiFi system based on Asterisk and SIP/RTP protocols.
- 2007.3–2009.2: **GRA**, Multimedia Computing and Networking lab, POSTECH, South Korea  
**Master thesis:** I studied an efficient cross layer protocol to transmit video over the ad hoc network with *ns-2* and *H.264/AVC JM(C/C++ platform)* and my work was published in *ICC'09*, and *ACM Wireless Networks'13*, etc.

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**Ptolemy II (Java) projects:** I implemented MAC/routing stacks for Sensor Network such as 802.15.4/ AODV over the *Ptolemy* framework (07.3-12, DGIST, UC Berkeley). Based on the successful completion of the work, I developed Location Recognition system over multiple base stations by using *Ptolemy* framework again (08.5-12).

#### (d) Skills

**Programming:** JavaScript (4 years, my dissertation), Java (**SCJP**, 5 years), C/C++ (5 years), Python (3 years), SQL, wasm, golang

**Package:** Node.js, V8, z3py, Heroku (AWS), tensorflow.js, angular, Docker, H.264/AVC JM, optee-os, LLVM, CRDT, ROS, Blender, Ptolemy, ns-2, Linux/Unix systems

**Hardware:** RPI3/4, Kinect, PTZ, Hokuyo, L2 Switch, RF Spectrum Analyzer/Signal Generator

#### (e) Publication

1. **Kijin An** and Eli Tilevich, Submitted one work to *Middleware 2021*.
2. **Kijin An** and Eli Tilevich, "Communicating Web Vessels: Improving the Responsiveness of Mobile Web Apps with Adaptive Redistribution," *21st International Conference on Web Engineering (ICWE 2021)*, May 2021. **(17%, 22/118), Best Paper Award.**
3. **Kijin An** and Eli Tilevich, "Client Insourcing: Bringing Ops In-House for Seamless Re-engineering of Full-Stack JavaScript Applications," *Proceedings of the Web Conference (WWW)*, April 2020. **(19%, 217/1129).**
4. **Kijin An**, "Enhancing Web App Execution with Automated Reengineering," *Proceedings of the Web Conference (Doctoral Symposium WWW)*, April 2020.
5. **Kijin An** and Eli Tilevich, "D-Goldilocks: Automatic Redistribution of Remote Functionalities for Performance and Efficiency," *Proceedings of the 27th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2020)*, February 2020. **(21%, 42/199)**
6. Yin Liu, **Kijin An**, and Eli Tilevich, "RT-Trust: Automated Refactoring for Different Trusted Execution Environments under Real-Time Constraints," *Journal of Computer Languages (COLA)*, Volume 56, 100939, 2020 *Journal Article, Nominated for the Best Paper Award.*
7. **Kijin An** and Eli Tilevich. "Catch & Release: An Approach to Debugging Distributed Full-Stack JavaScript Applications", *19th International Conference on Web Engineering (ICWE 2019)*, June 2019. **(25%, 26/106)**
8. **Kijin An**, "Facilitating the Evolutionary Modifications in Distributed Apps via Automated Refactoring," *19th International Conference on Web Engineering (Doctoral Symposium ICWE 2019)*, June 2019.
9. Yin Liu, **Kijin An**, and Eli Tilevich, "RT-Trust: Automated Refactoring for Trusted Execution Under Real-Time Constraints," *Proceedings of the 17th International Conference on Generative Programming: Concepts & Experience (GPCE 2018)*, Nov 2018.
10. **Kijin An**, Na Meng, and Eli Tilevich, "Automatic Inference of Java-to-Swift Translation Rules for Porting Mobile Applications," *MobileSoft*, 2018, **Nominated for the Best Paper Award.**(6%, 3/52)  
*(Robotics Research at KIST)*
11. **Kijin An**, Geunjae Lee, Sang-Seok Yun, and JongSuk Choi, "Multiple Humans Recognition of Robot Aided by Perception Sensor Network," *URAI 2015*.
12. Geunjae Lee, **Kijin An**, Sang-Seok Yun, and JongSuk Choi, "A Simultaneous Robot Service Scheme for Multi-Users," *In. Proc. Int. Conf. Ubiquitous Robots and Ambient Intelligence (URAI)*, pp. 373-374, Oct. 2015.
13. Anh Vu Le, **Kijin An** and JongSuk Choi, "Multiple Human Tracking on Robot Operation System," *In. Proc. Int. Conf. Ubiquitous Robots and Ambient Intelligence (URAI)*, Oct. 2015.
14. **Kijin An**, Hyeon-woo Park and JongSuk Choi, "Reliable Fusion method of multiple Human information over a Heterogeneous Sensor Network," *IEEE RO-MAN*, 2015. (extended abstract)
15. Anh Vu Le, **Kijin An** and JongSuk Choi, "Group-based multiple people tracking in perception sensor network," *IEEE RO-MAN*, 2015. (extended abstract)

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16. JiGwan Park, **Kijin An**, and JongSuk Choi, "Low-Body-Part Detection using RGB-D camera." *Proceedings of the Tenth Annual ACM/IEEE International Conference on Human-Robot Interaction(HRI)*, Extended Abstracts. ACM, 2015. (video presentation)
  17. **Kijin An**, JiGwan Park, Minh Do Hoang and JongSuk Choi, "Dispensing Materials of mobile Robot cooperating with Perception Sensor Network," URAI 2014.
  18. JiGwan Park, **Kijin An**, and JongSuk Choi, "Realistic 3D simulation of multiple human recognition over Perception Sensor Network," *ROMAN*, 2014.
  19. JiGwan Park, **Kijin An**, Daijin Kim and JongSuk Choi, "Multiple Human Tracking using Multiple Kinects for an Attendance Check System of a Smart Class," *URAI*, 2013. (video presentation)
  20. **Kijin An**, JongSuk Choi, "A 3D Simulation Approach for Multi-human Detection using a Multi-sensor frame," *ROMAN*, 2013.

(Multimedia Networking Lab at POSTECH)

21. Wan Kim, Hyunchul Joo, **Kijin An**, Inkyu Lee, and Hwangjun Song, "Urgency-based scheduling and routing algorithms for delay-sensitive data transmission over mobile ad hoc networks," *ACM/Springer Wireless Networks*, Vol. 19, No. 7, pp. 1595-1609, 2013. (Master thesis, Journal Article)
22. Wan Kim, Hyunchul Joo, **Kijin An**, and Hwangjun Song, "A novel packet urgency metric-based cross-layer design for video streaming over multi-rate MANETs," *IIWCMC* 2013.
23. Hyunchul Joo, **Kijin An**, and Hwangjun Song, "Urgency-based Packet Scheduling and Routing Algorithms for Video Transmission over MANETs," *CCWMC* 2011.
24. **Kijin An** and Hwangjun Song, "An effective cross-layer packet scheduling and routing algorithm for delay-sensitive media transmission over MANET," *International Conference on Communications (ICC)*, 2009.
25. **Kijin An** and Jaeho Lee, "Graphical TopicMaps Editor (GTM Editor)," *Proceedings of the Korean Information Science Society Conference*, 2006.

**(f) Teaching and Services:**

- GTA for CS2505 and CS2506 in CS@VT (Two lecture sessions for *Understanding Heap Spraying*)
- Co-Reviewer for TSE 2018, ECOOP 2020, RO-MAN 2020, MPLR 2020
- President for *Korean Computer Scientists (KCS)* in CS@VT (2019.6 - 2020.5)