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

2003.3–2007.2: B.E., **University of Seoul**, Electrical and Computer Engineering, Seoul, South Korea

(b) Dissertation Topic and Interests

My research proposed a new refactoring to create a *variant* of distributed apps to facilitate re-engineering of distributed apps/cloud services. My idea solved none-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 computing*. (related to *Serverless computing*). My approach improves software engineering's latest ideas such as declarative program analysis with z3 engine, fuzzing/checkpointing web execution, and replication in distributed systems. My idea was presented in *WWW'20* (a top-tier), *SANER'20*, and *ICWE'19·'21* and etc.

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–now: **GTA/GRA**, Department of Computer Science, Virginia Tech, Blacksburg, VA
Understanding Heap-Spraying Attacks(1 year): 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 could study this work employing pre-/post-surveys from 540 VT undergrads owning IRB approvals.
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. I'm the second author for *GPCE'18* and *COLA' 20*.

tInferrer(1.5 years, Java): To port from Android-to-iOS, this tool learns syntactical translation rules from the equivalent codebases of cross-platform mobile apps, 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 the main developer for implementing a scalable web-based distributed system for an interactive robot service. I implemented the core distributed system (Python/C++ modules), Web-based UIs, 3D Simulator (Python/Blender), and a machine learning-based Leg detection (Python/C++). The government awarded this project as the *Industry Technology of this Month*. 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.

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.

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), Java (4 years), C/C++ (5 years), Python (3 years), SQL, wasm, Swift, golang
Package & Hardware: Node.js, V8, z3py, Heroku(AWS), tensorflow.js, angular, H.264/AVC JM, optee-os, LLVM, CRDT, ROS, Blender, Ptolemy, ns-2, Raspberry PI, Kinect, PTZ, Hokuyo, RF Spectrum Analyzer/Signal Generator

(e) Publication

1. **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**.
2. **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**).
3. **Kijin An**, "Enhancing Web App Execution with Automated Reengineering," *Proceedings of the Web Conference (Dotoral Symposium WWW)*, April 2020.
4. **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**)
5. 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 a best paper award**.
6. **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**)
7. **Kijin An**, "Facilitating the Evolutionary Modifications in Distributed Apps via Automated Refactoring," *19th International Conference on Web Engineering (Doctoral Symposium ICWE 2019)*, June 2019.
8. 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.
9. **Kijin An**, Na Meng, and Eli Tilevich, "Automatic Inference of Java-to-Swift Translation Rules for Porting Mobile Applications," *MobileSoft*, 2018, **Nominated for a best paper award**.(6%, 3/52)

   (*Robotics Research at KIST*)

10. **Kijin An**, Geunjae Lee, Sang-Seok Yun, and JongSuk Choi, "Multiple Humans Recognition of Robot Aided by Perception Sensor Network," *URAI 2015*.
11. 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.
12. 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.
13. **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)
14. Anh Vu Le, **Kijin An** and JongSuk Choi, "Group-based multiple people tracking in perception sensor network," *IEEE RO-MAN*, 2015. (extended abstract)
15. 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)
16. **Kijin An**, JiGwan Park, Minh Do Hoang and JongSuk Choi, "Dispensing Materials of mobile Robot cooperating with Perception Sensor Network," URAI 2014.
17. JiGwan Park, **Kijin An**, and JongSuk Choi, "Realistic 3D simulation of multiple human recognition over Perception Sensor Network," *ROMAN*, 2014.
18. 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)
19. **Kijin An**, JongSuk Choi, "A 3D Simulation Approach for Multi-human Detection using a Multi-sensor frame," *ROMAN*, 2013.

(*Multimedia Networking Lab at POSTECH*)

20. 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**)

21. 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.

22. Hyunchul Joo, **Kijin An**, and Hwangjun Song, "Urgency-based Packet Scheduling and Routing Algorithms for Video Transmission over MANETs," *CCWMC* 2011.

23. **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.

24. **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 - now)