KIJIN AN

https://kjproj84.github.io. ankijin@vt.edu. Github: kjproj84. +1-540-838-1453.

(a) Education

2015.8-2021.5 (expected): Ph.D. Candidate, **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, https://mcnl.postech.ac.kr

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

(b) Dissertation Topic and Interests

My research is to facilitate the evolutionary modifications of distributed apps via architectural refactorings. My work enables localizing bugs in distributed apps, optimizing distribution granularity. And it dynamically replicates/allocates cloud web services (*e.g. object detection of transmitted images by using CNN*) into different machines for edge-based/centralized computing. My approach improves software engineering's latest ideas such as declarative program analysis, fuzzing/checkpointing execution, sandboxing, and program transformation. My dissertation idea was presented in *theWebConf'20*, *SANER'20*, and *ICWE'19·'21* and etc.

Keywords: *Refactoring/Optimizing Distributed Web Apps, Software Engineering, Web-based Systems/Services, Software Security, Machine learning, Mobile/Full-Stack JS Applications, Networking*

(c) Employment and Projects

2015.8–now: **GTA/GRA**, Department of Computer Science, Virginia Tech, Blacksburg, VA
Understanding Heap-Spraying Attacks: I was the main developer to build a core course project for the CS department, where I developed a victim server (C++ addons) 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: We developed LLVM C++ compiler tools to automate distributing embedded applications (e.g. drone firmware *PX4*) to support *optee-os*/*SGX* Environments. I'm the second author for *GPCE'18* and *COLA' 20*.

2012.9–2015.7: **Software Engineer/Researcher**, Robotics Research, KIST, Seoul, South Korea
SimonPiC: I was the main developer for implementing a scalable web-based distributed system for an interactive robot service. To that end, I implemented the core distributed system (python/C++ modules), Web-based UIs, 3D Simulator (python/Blender), and a machine learning-based Leg detection. The government awarded this project as the *Industry Technology of this Month*. I also annually led demonstrations and presented several research papers.

http://www.robot-intelligence.kr/index.php/3W_for_HRI

2009.5–2012.9: **Network System Engineer**, SK telesys, Pankyo, South Korea
I was a system Engineer for developing 3·4G·WiFi·IPPBX Systems to optimize and develop protocols.

WiBro Base-station (19.5-19.12, SK telecom), Ethernet Inbuilding System–eIBS (10.4-11.1, SK telecom), WiFi-IPPBX–WIP-300 (11.3-11.10, SK telink), 4G RF/Optic repeaters–MiBoS&TRIO-LM (11.12-12.09, SK telecom)

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 data over the ad hoc network by using ns-2 (C/C++ platform) and my work was published in *ICC'09*, and *ACM/Springer 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, Java, C/C++, Python, Datalog, SQL, wasm, Swift, golang
Package: V8, tensorflow.js, angular/cordova, z3, optee-os, LLVM, CRDT, ROS, Blender, PCL, Ptolemy, ns-2
Hardware: L2 Switch, 802.11, 802.15.4, rpi, Android/iOS, turtlebot, Kinect/Hokuyo, PSA/RF signal generator

(e) Publication

1. (submitted) **Kijin An** and Eli Tilevich, "EdgeFy: Automatic Replication of Cloud Services at the Edge," *ICDCS 2021*.
2. **Kijin An** and Eli Tilevich, "Communicating Web Vessels: Improving the Responsiveness of Mobile Web Apps with Adaptive Redistribution," accepted to *ICWE 2021*. **(22%, 25/118)**
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 (Dotoral 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 a 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 a 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)
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.

(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)