Khaled Ahmed

6335 Thunderbird Crescent, Vancouver, Canada, V6T 2G9

📞 +1 778-751-8116 ✉ k.e.elsayed@gmail.com 🔗 linkedin.com/in/kessam ⬤ github.com/khaled-e-a

Summary

Ph.D. candidate in Electrical and Computer Engineering at the University of British Columbia (UBC). Expertise: static and dynamic program analysis, security analysis, and malware detection. Solid background: FPGAs, Computer Architecture, High Level Synthesis, and Networks-on-Chips.

Education

Ph.D. in Electrical and Computer Engineering, *The University of British Columbia.*   **Sep. 2017 – 2024 (Expected)**
- Advised by Professor Julia Rubin and Professor Mieszko Lis   *Vancouver, Canada.*
- Research Area: Dynamic Program Analysis, Compositional Software Development, Mobile Security.

M.Sc. in Electrical Engineering, *Alexandria University*   **Sep. 2014 – Jul. 2017**
- Advised by Professor Mohammed M. Farag and Professor Mohamed R. Rizk.   *Alexandria, Egypt*
- Research Area: Networks-on-Chip FPGA Design, Hardware/Software Co-Design using High Level Synthesis.
- Grade: Distinction with the degree of honor (GPA: 3.95/4).

B.Sc. in Electrical Engineering, *Alexandria University*   **Sep. 2010 – Jul. 2014**
- Thesis Project: Design and layout of VLSI DSP chip.   *Alexandria, Egypt*
- Grade: Distinction with the degree of honor (GPA: 3.94/4).
- **Ranked second** among all 332 graduates of the 2014 class.

Experience

Formal Methods Research Intern, *Huawei Technologies Canada*   **May 2023 – Sep. 2023**
- Wrote stateful property-based tests in C++ drivers of next-gen routers.   *Markham, Ontario*
- Detected 3 critical, **system-crashing bugs**.

Research Intern, *Ecolé Polytechnique Fédérale de Lausanne*   **Jul. 2014 – Sep. 2014**
- Built infrastructure for automatically re-configurable map-reduce accelerator using High Level Synthesis.   *Lausanne, Switzerland*
- Evaluated the throughput of different configurations of the accelerator on a Xilinx Zynq FPGA.

Selected Research Projects

Dynamic Program Slicing of Android and Java Programs *with Mieszko Lis, Julia Rubin*   **during Ph.D.**
- Proposed a trace-based alias analysis dynamic slicing technique that offloads alias analysis from tracing time to slicing time.
- Achieved **10X lower overhead** than state-of-the-art with higher accuracy.
- Open-sourced the approach as tools called Mandoline (github.com/resess/Mandoline) and Slicer4J (github.com/resess/Slicer4J).
- Mandoline was awarded the **distinguished paper award** at the International Conference on Software Testing (ICST).
- Slicer4J is utilized by several research groups for fault localization, dependency analysis, and test suite reduction.
- Collaborated with colleagues to explore the use of slicing in helping developers troubleshoot regression failures.

Dynamic Taint Analysis of Android Apps *with Yingying Wang, Mieszko Lis, Julia Rubin*   **during Ph.D.**
- Proposed accurate, low-overhead dynamic taint analysis for Android that reports data flow paths to analysts.
- The analysis builds dynamic data flow graphs efficiently by leveraging garbage collections for graph pruning.
- Revealed a password encryption vulnerability in a popular Google Play app and a private **key leak in WhatsApp clones**.
- Open-sourced the approach as a tool called ViaLin (github.com/resess/ViaLin).

Malware Analysis and Detection *with Michael Cao, Sahar Badihi, Peiyu Xiong, Julia Rubin*   **during Ph.D.**
- Analyzed and reverse-engineered Android malware, and characterized their behavior and resilience to existing detectors.
- Developed an automatic detection evasion technique for Android malware to evaluate the effectiveness of detectors.

High Throughput Networks-on-Chip *with Mohammed M. Farag, Mohamed R. Rizk*   **during M.Sc.**
- Developed techniques that improved Code-Division Multiple-Access Networks-on-Chip (NoC) **throughput by 100%**.
- Developed FPGA prototype for hardware/software co-design of SHA-3 accelerators using High Level Synthesis (HLS).

Selected Publications

FSE 2023   "ViaLin: Path-Aware Dynamic Taint Analysis for Android" *Khaled Ahmed, Yingying Wang, Mieszko Lis, Julia Rubin. (26% acceptance rate).*

ICSE 2023   "Responsibility in Context: On Applicability of Slicing in Semantic Regression Analysis" *Sahar Badihi, Khaled Ahmed, Yi Li, Julia Rubin. (26% acceptance rate).*

ICSE 2022   "Rotten Apples Spoil the Bunch: an Anatomy of Google Play Malware" *Michael Cao*, Khaled Ahmed*, Julia Rubin. (26% acceptance rate). * Equal contribution.*

ICST 2021   "MANDOLINE: Dynamic Slicing of Android Applications with Trace-Based Alias Analysis" *Khaled Ahmed, Mieszko Lis, Julia Rubin.* **Distinguished Paper Award** *(28% acceptance rate).*

TVLSI 2017   "Overloaded CDMA Crossbar For Network-on-Chip" *Khaled Ahmed, Mohamed R. Rizk, Mohammed M. Farag.*

Awards

- **Distinguished paper award** at the International Conference on Software Testing (ICST), 2021.
- Natural Sciences and Engineering Research Council - Canada Graduate Scholarship (NSERC CGS-D), 2020-2021.
- Four-Year Fellowship (FYF) from the University of British Columbia, 2017-2020.
- President's Academic Excellence Initiative Ph.D. Award from the University of British Columbia, 2020-2023.
- Honored by Alexandria University for **ranking second** among all graduates of the 2014 B.Sc. in Electrical Engineering class.

Invited Talks

- **Google, 2022.** Guest speaker in "Malware Detection and Analysis" tech talk.
- **Huawei Technologies Canada, 2022.** Guest speaker in "Introduction to Program Analysis Techniques" workshop.
- **UBC, 2022.** Guest lecturer in the "CPEN 400P: Program Analysis for Reliability and Security" course.

Teaching Experience

Teaching Assistant, *The University of British Columbia*   **Sep. 2017 - Apr. 2023**

- Software Engineering (CPEN 321):
  Supervised student groups through the design, implementation, and testing of **full-stack mobile apps**.
- Computing Systems I (CPEN 211), Computer Architecture (CPEN 411), Computing Systems II (CPEN 212):
  Supervised labs, graded assignments, and held office hours.

Teaching Assistant, *Alexandria University*   **Sep. 2014 - Jul. 2017**

- Logic Circuit Design (EE242), Modeling and Design of VLSI Integrated Circuits (EE432), Computer Architecture (CSx35), Digital Integrated Circuits (EE431), Semiconductor Devices (EE336):
  Gave lectures, supervised labs, graded assignments, and held office hours.