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# Mohannad Adel Ismail

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## EDUCATION

### Virginia Polytechnic Institute and State University

#### PhD in Computer Engineering

Research in system and software security. Specifically, utilizing the latest hardware security features to achieve memory safety. Supervised by Dr. Changwoo Min and Dr. Wenjie Xiong

Blacksburg, VA, USA  
2019 – 2024

### Virginia Polytechnic Institute and State University

#### M.Sc. in Computer Engineering

GPA 4.0/4.0

*Thesis:* PACTight – Tightly seal sensitive pointers with Pointer Authentication (Published in USENIX Security 2022)

Blacksburg, VA, USA  
2019 – 2021

### Mansoura University

#### B.Eng. in Communications and Information Engineering (Major in Computer Engineering)

Distinction with honor degree, GPA 3.9/4.0 (Ranked 1<sup>st</sup>)

Mansoura, Egypt  
2011 – 2016

## PUBLICATIONS

- Protect the System Call, Protect (Most of) the World with BASTION.  
Christopher Jelesnianski, **Mohannad Ismail**, Yeongjin Jang, Dan Williams, and Changwoo Min  
The 28th ACM Architectural Support for Programming Languages and Operating Systems (ASPLOS 2023)
- Tightly Seal Your Sensitive Pointers with PACTight.  
**Mohannad Ismail**, Andrew Quach, Christopher Jelesnianski, Yeongjin Jang, and Changwoo Min.  
In Proceedings of the 31st USENIX Security Symposium (Security 2022)
- VIP: Safeguard Value Invariant Property for Thwarting Critical Memory Corruption Attacks  
**Mohannad Ismail**+, Jinwoo Yom+, Christopher Jelesnianski, Yeongjin Jang, and Changwoo Min.  
In Proceedings of the ACM Conference on Computer and Communications Security (CCS 2021)
- WITCHER: Systematic Crash Consistency Testing for Non-Volatile Memory Key-Value Stores  
Xinwei Fu, Wook-Hee Kim, Ajay Shreepathi, **Mohannad Ismail**, Sunny Wadkar, Changwoo Min, Dongyoon Lee.  
In Proceedings of the ACM SIGOPS 28th Symposium on Operating Systems Principles (SOSP 2021)
- POSEIDON: Safe, Fast and Scalable Persistent Memory Allocator  
Anthony Demeri, Wook-Hee Kim, Madhava Krishnan, Jaeho Kim, **Mohannad Ismail**, Changwoo Min.  
In Proceedings of the 21st ACM/IFIP International Middleware Conference (Middleware 2020)

## TECHNICAL EXPERIENCE AND PROJECTS

- Project (1) – PACTight – Completed and published research project, providing robust and efficient memory safety to sensitive pointers using ARM's Pointer authentication mechanism. Published in USENIX Security 2022.
- Project (2) – Nvidia DOCA on Nvidia Bluefield-2 – Part of my 2nd internship at VMWare. Researching and implementing Nvidia DOCA offloads on Nvidia's Bluefield-2. Proposed a possible framework for integrating DOCA into ESXi.
- Project (3) – Pointer Authentication in ESXi – Part of my internship at VMWare. Successful implementation and adding support for ARM's Pointer Authentication security feature in ESXi-ARM.
- Project (4) – VIP: A research project (published in CCS 2021) that utilizes Intel Memory Protection Keys (MPK) to enforce efficient memory safety for security sensitive data.
- Project (5) – Attacking and evaluating the robustness of Federated Learning
- Project (6) – Linux Kernel CPU Profiler
- Project (7) – LLVM comprehensive compiler optimization framework
- Project (8) – Leap: an outing social platform on Android

## WORK EXPERIENCE

### Software Engineer, Intern

Apple

Sunnyvale, CA, USA  
05/2023 – 08/2023

- Member of the Security team in the Vision Products Group (VPG). Collaborated with many teams in VPG and in Apple.
- Enhanced data privacy by extending the LLVM compiler framework. Ported LLVM's DataFlowSanitizer to Darwin.
- Implemented a taint tracking scheme to enhance user data privacy and security. Tested the PoC on C, C++ and Obj-C.

### Graduate Research Assistant

Electrical and Computer Engineering Department, Virginia Tech

Blacksburg, VA, USA  
08/2019 – Present

- Research in system security, memory protection and software compartmentalization.
- Designing software protection techniques against a powerful threat model.
- Currently researching state-of-the-art memory safety, utilizing hardware assisted security features from ARM and Intel.

**Member of Technical Staff, Intern**

VMWare

Palo Alto, CA, USA

05/2022 – 08/2022

- Return offer, Member of the ESXi-ARM team
- Researched and deployed Nvidia DOCA SDK framework and architecture on Nvidia Bluefield-2.
- Drove weekly VMWare/Nvidia joint engineering call, focused on DOCA
- Experimented with various DPU offload capabilities, like host DMA, App security, regular expressions, etc., using DOCA
- Explored ESXi kernel capabilities and proposed a reference architecture for potential DOCA integration with ESXi
- Explored Intel Mt. Evans Lookaside Crypto Engine (LCE) DMA capabilities and attended weekly meetings with Intel.

**Member of Technical Staff, Intern**

VMWare

Palo Alto, CA, USA

05/2021 – 08/2021

- Member of the ESXi-ARM team
- Implemented and added support for ARM's hardware security feature Pointer Authentication in ESXi-ARM.
- Contributed a fix for ESXi-ARM on QEMU to QEMU open source.
- Participated in various tasks with the team and contributed to the ESXi source code.

**Graduate Teaching Assistant***Electrical and Computer Engineering Department, Virginia Tech*

Blacksburg, VA, USA

08/2019 – 01/2023

- Teaching and mentoring students, holding office hours and grading.

**Associate Project Manager***Product Delivery (International Markets), Mastercard*

Cairo, Egypt

04/2019 – 08/2019

- Managed the delivery of the Mastercard Reward System (MRS) to Banque Du Caire:
  - Liaised with sales and marketing teams to align on time frames for product launch.
  - Established time schedules with technical teams and followed up with them on progress to complete the tasks.

**Teaching Assistant***College of Computing, Arab Academy for Science, Technology and Maritime Transport*

Cairo, Egypt

02/2019 – 06/2019

- Taught two courses related to programming and software engineering.

**Lecturer (Tenured)***Computer Engineering Department, Faculty of Engineering, Mansoura University*

Mansoura, Egypt

07/2016 – Present

- Helping lecturers in teaching set of courses and supervising a set of graduation projects.

**Online Android Tutor***One million Arab coders initiative by Sheikh Mohammed bin Rashid Al Maktoum, Udacity*

UAE

01/2018 – 06/2019

- Engaging with students in a variety of ways, including clearing problems with code syntax, and explanation of concepts.

**Android Freelance Developer***Freelance*

Egypt

12/2015 – 08/2019

- Integrated several APIs such as Google Maps, Firebase, Social Platforms (Facebook, Twitter, etc.)
- Designed effective UML diagrams and integrated business aspects within the project

**Software Engineer, Intern***Google, Mobile Application Launchpad (MAL)*

Cairo, Egypt

02/2016 – 03/2016

- Training program for the Google Initiative. The focus was to training Android development and startup business aspects.

**Junior Assistant to Sales Manager***AL-IEDAH Saudi Trading Est*

02/2010 – 03/2011

- Assisted in developing and winning a bid for a trade agreement with Saudi Aramco.
- Produced balance sheets and published advanced shipping notices (ASN) using Saudi Aramco logistics website.

**SERVICE ACTIVITIES**

- Reviewer: Computers and Security Journal
- External Reviewer, USENIX OSDI 2021 and ATC 2022

**COMPUTER AND LANGUAGE SKILLS**

- English ~ Excellent/Fluent (TOEFL iBT: 110, IELTS: 8)
- **Computer languages:** C, C++, Bash, Python, Objective-C, Assembly, C#, JAVA, PHP, HTML, CSS, XML.
- **Compilers and tools:** GCC, Clang, LLVM, Make, CMake, Git
- **Project management:** Jira, Scrum, Agile epics, Git post and code review

**LEADERSHIP AND VOLUNTEERING EXPERIENCE**

- Individual student Mentoring: Andrew Quach, Oregon State University – Undergraduate 2020, Graduate 2021
- Member of the Graduate Student of the year committee for 2021
- Member of the International Student Advisory Board (ISAB) at Virginia Tech since September 2020.
- Graduate Residential Fellow (GRF) at the Honors Residential Commons (HRC)
- Founding member and team leader of the CIEians group at Mansoura University:
  - Providing food to those in need during Ramadan, in collaboration with the Egyptian Food Bank