

Mohsen Salehi

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RESEARCH INTEREST

Security in **embedded devices**, **autonomous systems**, **cyber-physical systems**, and **industrial control systems**.

EDUCATION

University of British Columbia **GPA: 90/100 (A+)**
Ph.D. Computer Engineering, Systems Security, supervised by Prof. Karthik Pattabiraman 2021 - 2025

- **Thesis Title:** Enhancing Security in Critical Embedded and Cyber-physical Systems.
- **Relevant Courses:** CPSC 538M System Security: 92 (A+), EECE 571P Dependable, Secure Autonomous Systems: 88 (A).

Sharif University of Technology **GPA: 19.37/20 (ranked 1st in field)**
M.Sc. Computer Security, supervised by Dr. Siavash Bayat-Sarmadi 2018 - 2020

- **Thesis Title:** Improving Remote Attestation Techniques for IoT Devices using Physical Model (grade: Excellent).
- **Relevant Courses:** Advanced Computer Networks: 19.5, Database Security: 18.6, Mobile Communications: 19.1, Advanced Network Security: 18, Computer Network Management: 20, Hardware Security and Trust: 20, Cryptographic Engineering: 20.

University of Isfahan **GPA: 17.30/20**
B.Sc. Software Engineering, supervised by Prof. Behrouz Tork Ladani 2014 - 2018

- **Thesis Title:** Design and implementation of an access control solution for Hybrid Mobile Applications (grade: 20/20).
- **Relevant Courses:** Advanced Programming: 19, Computer Networks: 18.5, Operating Systems: 17, Software Engineering: 18, Multimedia Systems: 18.75, Computer Graphics: 18.4, Principles of User Interface Design: 19.25, Internship: 20.

PUBLICATIONS

AutoPatch: Automatic Hotpatching of Real-Time Embedded Devices 2024
Mohsen Salehi and Karthik Pattabiraman. **Acceptance Rate: 16.7%**
ACM SIGSAC Conference on Computer and Communications Security (ACM CCS).

Poster: AutoPatch: Automatic Hotpatching of Real-Time Embedded Devices 2022
Mohsen Salehi and Karthik Pattabiraman.
ACM SIGSAC Conference on Computer and Communications Security (ACM CCS).

PLCDefender: Improving Remote Attestation Techniques for PLCs Using Physical Model 2020
Mohsen Salehi and Siavash Bayat-Sarmadi. **Impact Factor: 10.6**
IEEE Internet of Things Journal (IOTJ).

PROFESSIONAL EXPERIENCE

PhD Researcher *Sep 2021 - Present*
Dependable Systems Lab, University of British Columbia

- *Proposed* an automated hotpatching framework using **LLVM compiler** to fix the security vulnerabilities in the **real-time embedded devices**, achieving a **50%** speedup over the state-of-the-art.
- *Implemented* two tools as **LLVM passes** to instrument programs and analyze the official patches automatically.
- *Proposed* a novel system for disabling unwanted hardware features (**debloating**) through automated firmware rewriting to decrease the attack surface of the **embedded devices**.

Graduate Research Assistant *Sep 2018 - Sep 2020*
Smart and Secure Systems (3S) Lab, Sharif University of Technology

- *Proposed* a mitigation method called **PLCDefender** that combines **hybrid remote attestation** technique with a **physics-based model** to preserve the **control behavior integrity** of industrial control systems (ICS).
- *Developed* a prototype of PLCDefender with the **OpenPLC** project, achieving **98%** accuracy in modeling the PLC physical behavior.
- *Evaluated* PLCDefender on a **real-world ICS** called **Secure Water Treatment Testbed (SWaT)** made by Singapore University of Technology and Design, achieving **99%** accuracy in detecting attacks.

Undergraduate Research Assistant *Sep 2016 - Sep 2018*
Software Security (SS) Lab, University of Isfahan

- *Designed* an access control solution for privilege separation for hybrid mobile applications.
- *Implemented* a prototype for **Apache Cordova** framework (PhoneGap) to block unauthorized accesses to bridged APIs.

Research Intern *May 2018 - Sep 2018*
IRISA Company

- *Conducted* research on the **Spring** framework to enhance their web applications security through the implementation of **authentication** and **authentication** using **Spring Security**.

ACADEMIC WORK EXPERIENCE

Undergraduate Student Supervisor

University of British Columbia

- Students: Jerry Shao, Luke Matson
- Co-Supervisor: Prof. Karthik Pattabiraman

Subreviewer & Committee Member

University of British Columbia

- IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'25)
- Artifacts member of the First Artifact Evaluation Track of IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'24)
- DeepTest'23 (co-held with ICSE)
- International Symposium on Reliable Distributed Systems (SRDC'23)
- IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'22)

Teaching Assistants

University of British Columbia

- Software Engineering Project, *Lecturer:* Dr. Jerry Jim
- Computer Engineering Capstone Design Project, *Lecturer:* Dr. Paul Lusina
- Vancouver Summer Program (VSP) Building Modern Web Applications, *Lecturer:* Prof. Karthik Pattabiraman
- CPEN 400P Program Analysis for Reliability and Security Engineering, *Lecturer:* Prof. Karthik Pattabiraman
- CPEN 322 Software Construction 2, *Lecturer:* Prof. Karthik Pattabiraman

Teaching Assistants

Sharif University of Technology

- Head of Teaching Assistant in CE40749 Hardware Security and Trust (Graduate), *Lecturer:* Dr. Siavash Bayat-Sarmadi
- CE40744 Cryptographic Engineering (Graduate), *Lecturer:* Dr. Siavash Bayat-Sarmadi

TALKS and WORKSHOPS

Poster Presentation in ACM CCS 2022

Poster: *AutoPatch: Automatic Hotpatching of Real-Time Embedded Devices*

Los Angeles, US

2022

Talk in 3S Lab

Reviewing Remote Attestation Techniques in IoT Devices

Sharif University of Technology

2019

HONORS & AWARDS

University of British Columbia

- **Selected** for the highly competitive Ph.D. fellowship (**Four Year Fellowship**), Given to the **top 10** students in each incoming class of graduate students 2021-2025
- **Selected** for the competitive Ph.D. award (**Academic excellence award**) 2021-2025
- **Selected** for the competitive Ph.D. award (**Faculty of Applied Science Graduate Award**) 2023-2025
- **2nd place** in Vancouver Unikraft Hackathon Sep 2023
- **Selected** for the UBC President's Academic Excellence Award 2021-2025

Sharif University of Technology

- **1st place** among M.Sc. graduated students in Secure Computing major 2018-2020
- **Member** of the Iran's National Elites Foundation 2019-2020
- **Selected** for the fellowship of the Iran's National Elites Foundation 2019-2020
- **Member** of Exceptional Talent Center 2019-2020
- **7th place** among M.Sc. graduated students in Computer Engineering 2018-2020
- **60th place** in the Iranian nation-wide computer engineering M.Sc. entrance exam among 20000+ participants 2018

University of Isfahan

- **3rd place** for participating in the Artificial Intelligent Challenge, Sharif University of Technology 2016 and 2017
- **3rd place** among B.Sc. graduated students in Software Engineering 2014-2018
- **Honorable Mention** for participating in ACM-ICPC 2016 Regional Contest, Tehran Site, Asia Region 2016
- **Top 1%** among more than 250,000 participants of the Iranian university entrance exam for the B.Sc. degree 2014

TECHNICAL SKILLS

Languages/Frameworks: Python, C/C++, LLVM IR, Java, Android, Java EE, PHP, HTML, JavaScript, Node.js, Bash

Analysis/Simulation Tools: MATLAB, Weka, RapidMiner, LibSvm, NS2, Mininet

Electronic Softwares: Proteus, Codevision AVR, OpenPLC Editor, STM32CubeMX/IDE

Technologies: Docker, PostgreSQL, SQLite, MongoDB, Git