

Mohsen Salehi

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RESEARCH INTEREST

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

• **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

2023

Mohsen Salehi and Karthik Pattabiraman.

Submitted.

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

Dependable Systems Lab, University of British Columbia

Sep 2021 - Sep 2025

• Proposed an automated hotpatching framework using **LLVM compiler** to fix the security vulnerabilities in the **real-time embedded devices**, achieving a **45%** 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

Smart and Secure Systems (3S) Lab, Sharif University of Technology

Sep 2018 - Sep 2020

• 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

Software Security (SS) Lab, University of Isfahan

Sep 2016 - Sep 2018

• 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

IRISA Company

May 2018 - Sep 2018

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

ACADEMIC WORK EXPERIENCE

Undergraduate Student Mentor

University of British Columbia

- Student: Jerry Shao
- Supervisor: Prof. Karthik Pattabiraman

Subreviewer

University of British Columbia

- IEEE/IFIP International Conference on Dependable Systems and Networks (DSN'22)
- International Symposium on Reliable Distributed Systems (SRDC'23)
- DeepTest'23 (co-held with ICSE)

Teaching Assistants

University of British Columbia

- 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

Nov 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 (**Faculty of Applied Science Graduate Award**) 2023
- 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 2017
- Honorable Mention for participating in the Artificial Intelligent Challenge, Sharif University of Technology 2016
- 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