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# Seyed **Abolfazl Sajadi** Hezaveh

*Curriculum Vitae*

## Education

09/2018 – 09/2021 **University of Tehran, Tehran, Iran**, *M.Sc. in Electrical Engineering-Digital Electronic System*, GPA:18.28/20(4/4), scored the first rank amongst graduate students.
Thesis: "*Implementation of Machine-Learning-based Attacks on PUF(Physically Unclonable Function)*"

01/2014 – 01/2017 **Mohajer Technical University of Isfahan(MTU), Isfahan, Iran**, *B.Sc. in Electrical Engineering-Electronic Technology*,
GPA: 16.87/20 (3.53/4), ranked within the top 1% of my graduating class.
Thesis: "*Detecting and tracking special moving objects in public environments on the ZYNQ platform*"

## Publication

**A. Sajadi**, *A. Shabani, B. Alizadeh,"DC-PUF: Machine Learning-Resistant PUF-Based Authentication Protocol Using Dependency Chain for Resource-Constraint IoT Devices", Journal of Network and Computer Applications, submitted in Feb., 2022.*.

**A. Sajadi**, *B. Alizadeh,"SQ-PUF: A Resistant PUF-Based Authentication Protocol against Machine-Learning attacks", Iranian Journal of Electrical and Computer Engineering, submitted in Feb., 2022.*.

## Professional Experince

2018–2021 **Implementation of machine-learning-based attacks on PUF (Physically unclonable function)**, *(Thesis)*.

- Description: Today's IoT systems are widespread, and one of the most critical aspects in these systems is security and authentication. In my master's thesis, I try to challenge IoT's hardware security by examining the resistance of state-of-the-art types of PUF against some powerful machine learning methods attacks such as LR, SVM, CNN, MLP, etc. Considering the drawbacks of these models, we proposed a novel arbiter-based PUF that is more powerful in resisting machine learning attacks. (Supervisor: Dr. Bijan Alizadeh)

2014-2017 **Detecting and tracking special moving objects in public environments on the ZYNQ Platform.**, *(Thesis)*.

- Description: The present thesis is Detect and track a moving object in public environments on the Zynq®-7000 SoC family integrates the software programmability of an ARM®-based processor with the hardware programmability of an FPGA platform (Realtime processing), work with HLS Tools, VGA port, HDMI port, UART port, Image processing. (Supervisor: Dr. Mohammadreza Zakerhghighi)

• Research Assistant

2018-2021 **Full-time RA in Debug, Verification,and Design of Embedded Systems Lab**, *Dr. B. Alizadeh*, University of Tehran.

• Teaching Assistant

Spring2022 **Core-based Embedded System Design (**Undergrad**)**, *Chief TA*.
Fall2021 **Digital Electronic Circuits (**Undergrad**)**.
Spring2021 **ESL Design Automation (**Undergrad).
Fall2020 **Methodologies and Algorithms for ESL Design Automation (**Grad.**)**.
Spring2020 **Formal Verification and Debug of Digital Systems, (**Grad.**)**.
Fall2019 **FPGA-based Embedded Systems Design (**Undergrad**)**.
Fall2019 **Methodologies and Algorithms for ESL Design Automation (**Grad.**)**.

• Work Experience

01/2020 - 03/2021 **Ryan iMachines**.

- Hardware Engineer
  - Machine Learning algorithms design (Implement based on RTL)

01/2020 - 06/2020 **Shahab Co**.
- Design and Implement Home Meter Monitoring Device
  - Project Based (Arduino, ST Controller, AVR, PCB)

01/2016- 04/2018 **Ista Sanat Tabriz Co**.
- Electronic Online Voting System
  - IoT
  - Raspberrypi[Python (Py-Qt)]

## Research Interests

Hardware implementation of cryptographic primitives.

Lightweight authentication using physical unclonable functions.

Hardware Security, offensive and defensive approach.

Hardware implementation of machine learning algorithms.

System-level HW/SW Co-design.

## Selected Courses

2018-2021 **Grad**.

| | |
|---|---|
| Methodologies and Algorithms for ESL Design Automation. | Grade: 20.0/20 (4/4) |
| Digital Systems Verification and Debug. | Grade: 19.6/20 (4/4) |
| Digital System Test and Testable Design(HDL Models). | Grade: 16.6/20 (4/4) |
| Fault Tolerant. | Grade: 18.3/20 (4/4) |
| Neural Network and Deep learning. | Grade: 17.8/20 (4/4) |
| Chip Multiprocessor. | Grade: 19.3/20 (4/4) |
| High Performance Computing. | Grade: 17.9/20 (4/4) |
| Adv. VLSI Design. | Grade: 16.3/20 (4/4) |

2011-2017 **Under Grad**.

| | |
|---|---|
| Computer Networks. | Grade: 20.0/20 (4/4) |
| Computer Programming. | Grade: 20.0/20 (4/4) |
| Communication Systems. | Grade: 17.0/20 (4/4) |
| Numerical Computations. | Grade: 17.0/20 (4/4) |
| Communication Transmission Lines. | Grade: 17.5/20 (4/4) |
| Principles of Microcomputer. | Grade: 20.0/20 (4/4) |

## Honors & Awards

2021 **Ranked $1^{st}$ amongst graduate students, Digital Electronic Systems,)**, *University of Tehran*.

2018 **Ranked $102^{nd}$ in the Iranian university entrance exam for master's degree in electronics engineering**, *Among more than 30000 participants*.

2018 **Ranked $53^{rd}$ in the nationwide university entrance exam for Associate to Bachelor degree in Technical and Vocational University (TVU)**, *Among more than 7000 participants*.

2013 **Ranked $1^{st}$ in the $14^{th}$ National skills competition in Iran Technical & Vocational Training Organization**, *Markazi Province*, Electronic Engineering field, (Provincial stage of WorldSkills competition).

2012 **Ranked $3^{rd}$ in the National Scientific-Practical competition Provincial stage**, *Markazi Province*, Electronic Engineering field.

## Skills & Abilities

Engineering Softwares: Pycharm, Keil, Vivado, Intel Parallel Studio, LabView, MATLAB, Altium Designer, QUARTUS II, ISE Design, Modelsim, Cadence Allegro, Catapult Hls Tool, Proteus, orCAD, PSpice, Hspice, CodeVision AVR, SoC Encounter, SAT Solvers, LaTeX, VISIO.

Programming Languages: Python (TensorFlow, Keras, PyTorch, Scikit-learn, PyQt, ...), C++, Arduino, Verilog, VHDL

Instruments: Oscilloscope, Digital logic analyzer, Pattern generator, Impedance Analyzer, Waveform generator, JTAG, Multimeter

Evaluation Boards: Zynq-7000 SoC (ZC706, Zybo Z7), Spartan 6 (ALINX), Cyclone II (Altera DE2), CPLD (XC9572XL), AVR (Atmega8,32,64), ARM (ST,AT91SAM)

## Top Projects

2021 **Designe a CNN accelerator with cyclone-II and Quartus**.

2020 **CSI-Based Human Activity Recognition Using Deep Learning**.

- Extract CSI from a BCM43455C0 wireless chipset, which is used in the Raspberry Pi 4B.
- extract spatial features of activities with CNN.

2015-2021 **Multiple Hardware Implementations on FPGA**.

- Implement based on RTL written in HDL.
- Projects such as FIR filter, VGA Controller, CNN accelerator, Simple CPU.

2020 **Design and Implement Home meter monitoring Device**.

- Implement on ESP32 and AVR (Atmega8) Microcontroller.
- PCB Design by Altium Designer

2019 **Generate digits and photo by training a GAN Network**.

- Using DCGAN and CGAN based on MNIST, and Fashion-MNIST Dataset to Generate digits, and Objects, written in Python with Numpy, Keras, Libs.
- Using DCGAN based on Cifar-10 Dataset to Generate Photo, written in Python with Numpy, Keras Libs

2018 **High Performance Computing**.

- CUDA, OpenMP, POSIX, SIMD, Intel Parallel Studio.
- Projects: Sobel Filter & Stereo Vision (SIMD), Motion Detection (OpenMP), N-Queens (CUDA).

2017 **Implementation of a system for detection fire based on image processing**.

2015 **Implementation of a system for lethal gas detection**.

## Memberships & Volunteer Activity

2019 - 2021 **Review Paper**.

- 2019 - "*F-DNA: Fast Convolution Architecture for Deconvolutional Network Acceleration*."
- 2021 - "*An Energyefficient Spiking Multiconvolution Architecture for EventDriven Vision Sensors on FPGA*".

09/2020 - 04/2021 **Ostadsalam**.

- Tutoring for high school and undergrad (VHDL and FPGA Lessons)

2012 **Member of 4th Iranian Machine Design Competition**, *(volunteer work)*.

## Languages

Persian: Native

English: Professional Proficiency — *Institute Certificate, IELTS: Will be taken, April, 2022*

## References

* **Dr. Bizhan Alizadeh**, *Associate Professor*, School of Electrical and Computer Engineering (ECE), University of Tehran (UT), Tehran, Iran.

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* **Dr. Mehdi Kamal**, *Associate Professor*, School of Electrical and Computer Engineering (ECE), University of Tehran (UT), Tehran, Iran.

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* **Dr. Ahmad Shabani**, *Adjunct Professor*, School of Electrical and Computer Engineering (ECE), University of Tehran (UT) Tehran, Iran.

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