

Ali Rasteh

Ph.D. Candidate at New York University (NYU)

Research Assistant, NYU Wireless, NY, US

Last Updated on November 23, 2024

CONTACT INFORMATION

 [Personal Website](#)  [LinkedIn](#)  [GitHub](#)

PROFESSIONAL SUMMARY

Ph.D. candidate at NYU Wireless with expertise in **Wireless Communications**, **Machine Learning**, **Hardware Design**, **FPGA Development**, and **Embedded Systems**. Proven track record of managing **complex R&D projects** and delivering innovative solutions in telecommunications including successful delivery of **GPON OLT/FTTX** products, **Aggregation Router** hardware, and **POTN DWDM** system hardware. Strong leadership skills with experience in cross-functional team collaboration. Seeking to leverage research skills and technical expertise in a challenging engineering role.

PROFESSIONAL EXPERIENCES

Research Assistant January 2023–present

New York University (NYU), Wireless Center

Supervisor: Prof. Sundeeep Rangan

- Researching Wireless Spectrum Sensing, AI/ML for Wireless Comm, Development of Efficient Hardware and Methods for Spectrum Sensing, and FR3 Channel Modeling

Lead, Access Network Products Team Nov 2018–Dec 2022

Sina Communication Systems Co.

Supervisor: Mr. Alireza Ramez

- Led the successful development of a GPON mini-OLT (Optical Access Network/FTTX) from concept to industrialization, overseeing hardware schematic and PCB design, FPGA development, C/C++ development on Embedded Linux, SDK integration for key ASICs, Java Spring-based backend software development, and Web UI development using the Angular framework
- Supervised a team of 13 developers, including hardware designers, FPGA developers, C/C++ developers on the embedded Linux platform, SDK integrators, Java Spring and Angular developers, as well as test and integration experts

Machine Learning Researcher (Remote) Sep 2019-Sep 2021

CerCo/CNRS and University of Toulouse

Supervisor: Dr. Timothée Masquelier

- Researched Internet traffic classification using Spiking Neural Networks (Sep 2020-Sep 2021)
- Conducted research on image classification using Spiking Neural Networks, with a focus on latency-based methods. (Sep 2019-Sep 2020)

Lead, Router Hardware Design Team Nov 2018–Aug 2020

Sina Communication Systems Co.

Supervisor: Mr. Jalal Hadian

- Supervised a team of 5 hardware and FPGA developers, successfully leading the design of the hardware infrastructure for the Access & Aggregation Router project

Lead, POTN-DWDM Hardware Design Team

Apr 2017–Nov 2018

Sina Communication Systems Co.

Supervisor: Mr. Jalal Hadian

- Supervised a team of 10 developers including hardware, FPGA, and C/C++ developers, successfully leading the design of the hardware infrastructure for the POTN-DWDM project

Hardware, FPGA, and Embedded Linux Developer

Oct 2015–Apr 2017

Sina Communication Systems Co.

Supervisor: Mr. Jalal Hadian

- Successfully designed high-speed circuit schematics (10 Gbps-100 Gbps), supervised the PCB design process, developed FPGA firmware for Spartan-6 FPGA, and created Embedded Linux firmware for a PowerPC CPU as a COM on Muxponder cards in the POTN-DWDM project

EDUCATION

Ph.D. of Electrical and Computer Engineering

(Jan 2023-present)

New York University (NYU), Wireless Center

NY, USA

- **Research focus:** Wireless Spectrum Sensing, AI/ML for Wireless Comm, Development of Efficient Hardware and Methods for Spectrum Sensing, and FR3 Channel Modeling
- Supervisor: Prof. Sundeep Rangan
- **GPA:** 4.0/4.0 for 21 credits

Research Assistant at Electrical and Computer Engineering

Sep 2017-Dec 2022

Sharif University of Technology

Tehran, Iran

- **Research focus:** Developing a framework for investigating the effect of uncertain parameters on the convergence of the third generation of neural networks
- Supervisor: Prof. Saeed Bagheri Shouraki
- Cooperated with CerCo/CNRS from Sep 2019 to Sep 2021, co-supervised by Dr. Timothée Masquelier
- **GPA:** 18.78/20 (4.0/4.0 for 18 credits)

M.Sc. of Electrical and Computer Engineering

Sep 2015-Sep 2017

Sharif University of Technology

Tehran, Iran

- Majored in Electronics-Integrated circuits
- **M.Sc. Thesis subject:** Analysis and design of a high-speed embedded SRAM
- Supervisor: Prof. Sharifkhani
- **GPA:** 17.0/20 (3.87/4.0 for 23 credits)

B.Sc. of Electrical and Computer Engineering

Sep 2011-Sep 2015

Sharif University of Technology

Tehran, Iran

- Majored in: Electronics
- **B.Sc. thesis subject:** Eye-gaze detection headset for assistive technology
- Supervisor: Prof. Saeed Bagheri Shouraki
- **GPA:** 17.11/20 (3.61/4.0 for 147 credits)

PUBLICATIONS

Rasteh, Ali et al. (2024a). “Near-Field Measurement System for the Upper Mid-Band”. In: *Accepted and will be presented In 2024 58th Asilomar Conference on Signals, Systems*.

Rasteh, Ali et al. (2024b). “Tracking Real-time Anomalies in Cyber-Physical Systems Through Dynamic Behavioral Analysis”. In: *arXiv preprint arXiv:2406.12438, Submitted to IEEE Transactions on Smart Grid*.

Ghazanfari, Sara et al. (2022). “Isoform function prediction using a deep neural network”. In: *arXiv preprint arXiv:2208.03325*.

Rasteh, Ali et al. (2022). “Encrypted internet traffic classification using a supervised spiking neural network”. In: *Neurocomputing* 503, pp. 272–282.

SKILLS

- **Programming Languages:** Python, C++, C, TCL, MATLAB, Bash-Scripting
- **Machine Learning Tools:** Pytorch, TensorFlow, Keras, Scikit-Learn
- **Hardware Description Languages:** VHDL, Verilog
- **Electronic Design Automation (EDA) tools:** Vivado Design Suite, ISE Design Suite, Quartus, Cadence Virtuoso, Spectre (analog design) Ocean script, OrCAD PSpice, HSPICE, Proteus, Altium Designer, ModelSim, HyperLynx PCB Simulation, CodeVision AVR
- **Image Processing Libraries:** OpenCV
- **Operating Systems:** Linux, Linux Driver and Kernel Module Development, Embedded Linux, Yocto & LTIB (Linux Image Build Systems)
- **Development Tools:** Pycharm, Visual Studio, Jupyter Notebook
- **Project Management:** Microsoft Project, Jira, Redmine
- **Others:** FPGA Dev, Object-Oriented Design and Programming

RESEARCH INTERESTS

- Wireless Communications, Communication Networks, Hardware Design for Communication Systems
- Applied Machine Learning/Deep Learning
- Hardware Acceleration

TEACHING EXPERIENCES

- Course Assistant for the 'Linear Systems' course, advised by Prof. Khorrami (Fall 2023).
- Head Teaching Assistant for the 'Neural Networks' course, advised by Prof. Bagheri Shouraki (Fall 2020).
- Head Teaching Assistant for the 'Pulse Technique' course, advised by Prof. Bagheri Shouraki (Spring 2020, Spring 2019, Spring 2018).
- Head Teaching Assistant for the 'Computer and Microprocessors Architecture' course, advised by Prof. Bagheri Shouraki (Fall 2020, Fall 2019, Fall 2018).

- Teaching Assistant for the 'Electronic Principles' course, focusing on the HSPICE workshop and final project, advised by Prof. Sharif Bakhtiar and Prof. Kavehvash (Spring 2016).
- Teaching Assistant for the 'Digital Electronics' course, responsible for designing and grading assignments and the final project, advised by Prof. Sharifkhani (Fall 2016).
- Laboratory Assistant (VHDL coding) for the 'Computer and Microprocessors Architecture' course, advised by Prof. Hashemi (Fall 2015).

HONORS AND AWARDS

- Awarded competitive **full-funding scholarships** for Ph.D. studies at New York University (NYU), University of Southern California (USC), and **Northeastern University**
- Achieved top national rankings in competitive university entrance exams: **68th out of over 420,000** for the Engineering major (B.Sc., 2011), **25th out of 50,000** for Electrical Engineering (M.Sc., 2015), and **3rd out of 3,000** for Electrical Engineering (Ph.D., 2017)
- Recipient of the Fellowship Award from the **National Elite Foundation**, 2011-2015
- Ranked **1st** in high school diploma and pre-university education out of 60 students
- Recognized as **Exceptional Talent**, since 2004

LANGUAGE SKILLS

- English: Fluent, TOEFL exam score (16 Oct 2021): 102/120
- Persian: Native language

GENERAL EXAMS' SCORES

- GRE general exam (2 Nov 2021): Overall score: 317/340, Quantitative Reasoning score: 170/170, Verbal Reasoning score: 147/170, Analytical Writing score: 3.5/6

SELECTED ACADEMIC PROJECTS

- **Near-Field Measurement System for Upper Mid-Band (FR3) Wireless Communication (2024)**
This project presents a near-field measurement system for upper mid-band (FR3) frequencies (6-24 GHz) to support next-generation mobile networks. The platform captures MIMO channel parameters at various displacements using a combination of Vivaldi antennas, an RF transceiver board, and an RFSoc 4x2 baseband system using Xilinx Zynq subsystem. The system enables accurate measurement of near-field propagation by recovering paths and spherical characteristics, overcoming the limitations of traditional plane wave approximations in channel modeling.
- **Encrypted Internet traffic classification using a supervised Spiking Neural Network (2022)**
Joint project with CNRS (French National Center for Scientific Research) and University of Toulouse, Spring 2022. In this project, a simple Spiking Neural Network (SNN) was utilized to classify the ISCX dataset. The results were compared to state-of-the-art networks, demonstrating that an SNN, with its significantly simpler architecture, achieved a significantly superior accuracy due to its inherent temporal awareness.

- TRAPS: Real-time Anomaly Detection in Cyber-Physical Systems (2023)**
 Introduces TRAPS, a real-time monitoring and anomaly detection framework for cyber-physical systems, specifically targeting smart grid substations and SCADA systems. Using dynamic behavioral analysis and signal temporal logic, processes real-time network data to identify anomalies across controllers, network communications, and physical processes. The system is evaluated on a hardware-in-the-loop testbed, demonstrating its ability to detect various types of cyberattacks, including false data injection and denial-of-service attacks.
- Analysis and Design of a High-Speed Embedded SRAM (2017)**
 M.Sc. Thesis, advised by Prof. Sharifkhani, from autumn 2015 to spring 2017. This project involved the design of an SRAM circuit with an integrated leakage compensation mechanism. The design enabled the SRAM to operate in the subthreshold regime, allowing for reduced working voltage and increased speed within that regime.
- RoDINO: Enhancing Robustness of Vision Transformers with Adversarial Training (2023)**
 We developed RoDINO, a robust self-supervised representation learning model based on DINO with Vision Transformer architecture. We leveraged adversarial training using Projected Gradient Descent (PGD) attacks to improve the robustness of DINO's representations against adversarial perturbations. The effectiveness of RoDINO was evaluated through downstream tasks, showing significant improvements in robustness compared to the original DINO model.
- Eye-Gaze Detection Headset for Assistive Technology (2015)**
 B.Sc. Thesis, advised by Prof. Bagheri Shouraki, spring 2015. Designed a headset for individuals with disabilities to detect eye-gaze and select keys on a headset keyboard through blinking. Developed a MATLAB-based eye-gaze detection code to capture eye images while focusing on various subjects and created a framework to detect the selected key on the keyboard.
- Streaming Decryption Engine Security and Side-Channel Analysis (2023)**
 implemented a streaming decryption engine using STM32F042, handling XOR, DES, and AES encryption protocols. Conducted side-channel attacks, retrieving encryption keys via power analysis using the ChipWhisperer platform, and then applied security hardening techniques to mitigate these vulnerabilities.
- Vision and IMU-Based Robot Localization and Navigation (2024)**
 Developed a localization and navigation system for a drone using a combination of vision-based AprilTag tracking and IMU data. The system was implemented using both an Extended Kalman Filter (EKF) and an Unscented Kalman Filter (UKF) to fuse pose and velocity measurements from the camera and IMU. Results demonstrated accurate state estimation and successful sensor fusion.
- Deep Neural Network for Visual Question Answering (2017)**
 Designed a deep neural network for visual question answering, using Word2Vec and LSTM techniques within an RNN for processing the questions, and a CNN for image processing.
- GPU-Based Acceleration of the FFT Algorithm (2016)**
 Developed an efficient implementation of the FFT algorithm on GPU.
- C++ Implementation of a Visual Game with Graphical User Interface (2014)**
 Implemented a visual game (similar to Aura Lux) with a graphical user interface using C++ and its features.
- Transistor-Level Design and Simulation of a Viterbi Decoder (2015)**
 Designed and simulated a Viterbi decoder at the transistor level.
- Circuit-Level Design and Simulation of a 10-bit Pipeline ADC (2016)**

Performed systematic and circuit-level design and simulation of a 10-bit pipeline ADC with defined specifications.

- **FPGA and ASIC Implementation of a JPEG Encoder Using HDL (2015)**
Designed a JPEG encoder using HDL and implemented the design on FPGA, as well as through the ASIC flow.
- **Design and Simulation of a Complete 5GHz RF Receiver for WLAN Applications (2016)**
Designed and simulated a complete RF receiver for WLAN applications, including LNA, MIXER, VCO, divide-by-two circuit, and filter, operating at 5GHz with defined specifications.
- **Augmented Reality System with 3D Object Placement via Edge Detection (2018)**
Developed an augmented reality system by detecting the edges of a card in a recorded video and placing a 3D subject on it.
- **Design and Simulation of a High-Performance Sample and Hold Circuit for 13-bit ADCs (2015)**
Designed and simulated a sample and hold circuit suitable for 13-bit ADCs, achieving THD \geq 74dB under various process corners and across non-ideal temperatures and voltages.

VOLUNTEER EXPERIENCES

Chair, Student Union Council (Dec 2013-Dec 2014)

Sharif University of Technology, Electrical Engineering Department

- Led efforts to address student concerns by liaising with department management and resolving issues.

Administrative co-chair and executive sponsorship co-chair (Dec 2014-Sep 2015)

SharifCup 2015 (University Robotic competitions, Sharif University of Technology)

- Led efforts in securing sponsorships and raising funds to support the competition. Successfully managed relationships with sponsors while overseeing the organization and logistics of the competition venue to ensure smooth operations.

Member, Resana (Dec 2014-Sep 2015)

Scientific and cultural group, Electrical Engineering Department, Sharif University of Technology (Resana)

SPORTS AND HOBBIES

- Sports: Proficient in Volleyball, Basketball, Swimming, and Chess
- Member of the Basketball Team at Sharif University of Technology
- Hobbies: Watching movies, Reading books, Exercising

REFERENCES

- **Prof. Sundeep Rangan** (Professor at New York University (NYU))
- **Prof. Brandon Reagen** (Assistant Professor at New York University (NYU))
- **Prof. Marco Mezzavilla** (Associate professor at Politecnico di Milano)
- **Dr. Timothée Masquelier** (Researcher in Computational Neuroscience AI at CNRS, France)
- **Details and other references available upon request.**