Mohammad ABDI
Electrical and Computer Engineering PhD Candidate

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ℹ Born on March 31, 1994 in Shiraz, Fars, Iran

⚡ OBJECTIVE

My current focus is on **Distributed Inference** where devices collaboratively execute a computational task while maximizing communication efficiency, **DNN Adaptation** to dynamic wireless environments, and **Efficient AI** enabling the deployment of ML models on resource-constrained IoT devices. I am looking for internship opportunities in related fields.

⭐ RESEARCH INTERESTS

> Mobile Edge Computing/Split DNN Computing
> AI/ML for Wireless Communications
> Efficient AI
> Test-Time Adaptation
> Thrust-Worthy Machine Learning
> GAN-based MIMO Channel Modeling

🎓 EDUCATION

2022 - Present	**Ph.D. in Computer Engineering, Northeastern University, Boston, United States** > Concentration: Communications, Control, and Signal Processing > Advisor: Prof. Francesco Restuccia
2016 - 2019	**M.Sc. in Electrical and Computer Engineering - Communication Systems, Shiraz University, Shiraz, Iran** > GPA: **18.27**/20 (1st Rank) > Admitted as an **Exceptional Talent** > Thesis Title: *Analysis, Design and Development of Doppler-shifted Interference Signal Cancellation Algorithms Using Adaptive Filters* > Advisor: Prof. Abbas Sheikhi, Prof. Mahmoud Farhang
2012 - 2016	**B.Sc. in Electrical and Computer Engineering - Control, Shiraz University, Shiraz, Iran** > GPA: **18.63**/20 (1st Rank) > Project Title: *Time-Frequency Analysis of Signals with Spectrogram and Implementation of Various Audio Effects and a Graphic Equalizer with the C6416 DSK (TMS320C6416 DSP Starter Kit)* > Advisor: Prof. Mohammad Ali Masnadi-Shirazi
2008 - 2012	**Shahid Dastgheib High School, Shiraz, Iran** > GPA: **19.66**/20 > Affiliated with the *National Organization for Development of Exceptional Talents* (NODET)

🏆 ACADEMIC ACHIEVEMENTS

> Ranked **1st** among B.Sc. Electrical Engineering students admitted to Shiraz University in 2012
> Ranked **1st** among M.Sc. Electrical Engineering students admitted to Shiraz University in 2016
> Exempted from M.Sc. entrance exam and admitted as a talented graduate student to Shiraz University
> Member of *Exceptional Talents Community* at Shiraz University
> Manager of *Shiraz University Research and Entrepreneurship Center* (a.k.a *Radioamateury Lab*)
> Member and project manager at *Premier Ideas Support Center*

💻 PROJETS

SPACECRAFT SUN SENSOR   2016 - 2018
🔗 Iranian Space Research Center

Sun sensor is a navigational instrument used by spacecrafts to detect the position of the sun. Sun sensors are used for attitude control, solar array pointing, gyro updating, and fail-safe recovery. In addition to spacecraft, sun sensors find use in ground-based weather stations and sun-tracking systems, and aerial vehicles including balloons and UAVs.

> Using STM32 microcontrollers for the commercial version and RPC56 (defence-grade MCU for aerospace applications) for the main version
> Making use of CCD linear image sensor (Toshiba TCD1304AP, TCD1205D and TAOS TSL1402) to locate the sun
> Utilizing microcontroller peripherals efficiently to guarantee the data acquisition and processing at high rates without blocking the CPU
> Implementation of a communication protocol similar in design to NewSpace Systems Sun Sensor (SS411) over a RS-485 link
> Developing a GUI application in C# for Linux to plot the data in real-time

`Signal Processing` `C++` `Keil` `Eclipse` `PowerPC` `SPC5 Studio` `Altium Designer` `Raspberry Pi` `C#`

Spacecraft Scanning Earth Horizon Sensor   2016 - 2018

[↗] Iranian Space Research Center

Scanning Earth horizon sensor uses a spinning mirror or prism and focuses a narrow beam of light onto a sensing element usually called a bolometer. The spinning causes the device to sweep out the area of a cone, and electronics inside the sensor detect when the infrared signal from Earth is first received and then lost. The time interval is used to determine Earth's width, based on which the roll angle can be determined.

> Sinusoidal driving of a three-phase permanent magnet motor (Gimbal) for mirror rotation
> Reading inductive absolute angle encoder (Zettlex Midi IncOder) to measure the angles in which the radiation from Earth is received and lost
> Using photodiodes (Thorlabs FDS100) for the visibile light version and pyroelectric thermal detectors (Gentec-EO QS2-IL and QS5-IL) for the infrared version to sense the intensity of light coming from Earth
> Development and implementation of an algorithm to filter the data and extract the information accurately utilizing the processor features
> Using a DNN to compute the spacecraft transformation about its principal axes using the data captured and labeled in a simulated environment

`AI` `Signal Conditioning` `Altium Designer` `C++` `Keil` `IAR Embedded Workbench` `BLDC Motor` `C#` `MATLAB` `BeagleBone`

C-Pay Parking Meter   2013 - 2015

[↗] C-Pay   [↗] Atishahr Hooshmand Iranian

A set of handheld devices are designed and built that allow parking enforcement officers to collect revenue from cars based on the length of their stay in controlled parking zones. These devices are capable of reading and writing the RFID tags attached to windshields as digital wallets, taking photos of the vehicle license plate using the incorporated camera, and entering the information manually. The collected data along with the vehicle location are then transferred to the server and recorded, and a parking violation ticket is issued if necessary. The tags can be charged by particular devices in the corresponding kiosks which are capable of performing secure transactions using the bank SAM cards. Such devices are now widely used in different cities of Iran.

> Using ARM® Cortex M4-based microcontroller (STMicroelectronics STM32F4 MCU series)
> Including a 3.2" TFT LCD with touch screen
> Rendering GUI forms according to XML files in memory card (GUI and settings can be changed easily similar to Android front-end programming)
> Authenticating/Reading/Writing RFID tags using NFC controller (NXP PN532)
> Determining vehicle geographic location by GPS Device (SIMCom SIM908)
> Sending encrypted data to the server with wireless module (ZigBee ZE10S and NRF)
> Logging all the information in memory card
> Capturing image by embedded camera
> Printing parking violation ticket using the intergrated printer
> Data entry using common USB keyboards
> Reading customer payment cards and performing secure transactions using the bank SAM card
> Adding extra features like USB mass storage mode, data synchronization using Ethernet, wireless firmware update and bootloader

`Embedded Systems` `Altium Designer` `C++` `Eclipse` `32-bit ARM` `Wireless Network` `RFID` `GPS` `Camera` `Printer` `TFT LCD` `SAM` `XML`

Luna Amusement Park Cashless Payment   2013 - 2015

A set of devices are developed to make the ticketing system paperless falling into 5 different categories:

1. Charger: These devices enable employees to add credit to customer cards and issue new cards;
2. Discharger: These portable and interchangeable devices are installed on different rides and games. They sync all the transactions with the server, while writing the contactless cards and tags offline;
3. Display: These devices show the clients their remaining balance;
4. Repeater: These devices are responsible for preventing network failure and packet loss;
5. Server: All transactions are tracked by the server. It can also modify prices automatically (discounted events) or manually (user promotion);

As the features of such devices are similar to *C-Pay Parking Meter* devices (different in scenario only), the firmwares and programs are developed efficiently to facilitate the code porting between two projects.

`Embedded Systems` `Altium Designer` `C++` `ARM Cortex-M` `Wireless Network` `NFC` `Printer` `TFT LCD` `USB Host` `USB Device` `Ethernet`

MeyGol Production Efficiency Booster   2014 - 2017

While all the sensors and actuators in a mushroom farm are being monitored and controlled by industrial automation tools such as PLCs and HMIs, the controllers are interconnected to make up an industrial network within which the server is responsible for recording all the parameters in the database and finding the correlation between these measurements and the quantity and quality of the products entered by a data entry clerk (using both classic and modern methods). The feedback from such observations are further used to send proper commands to PLCs. Furthermore, the client app enables the users to monitor and change the parameters remotely.

> Utilizing Microsoft SQL Server to record the data
> Using Modbus TCP to send commands to PLCs
> Programming the PLCs and HMIs with ladder logic and macros
> Using Microsoft Office Interop APIs to generate graphical reports

Machine Learning | Software Development | C# | C++ | Ladder Logic | Microsoft SQL Server | Android | PLC | Network | Industrial Ethernet

Intelligent Walker   2014 - 2016

A walker is designed to assist the elderly using various sensors such as strain gauges and force sensors installed on its handles and a Kinect. It can adapt to specific user requirements by training a model on user's sensory data.

> Model training and system identification based on the data from sensors and motion capture using both active and passive markers
> Using Kinect to find and track the user's skeleton
> Controlling motors by minimizing the interaction force between the walker and the user, and controlling brakes after detecting possible falls
> Sending the user's state in case of an emergency using the integrated GSM module

Image Processing | Robotics and Control | C# | C++ | MATLAB | GSM

💼 Teaching & Professional Experience

January 2019
December 2015
Project Manager | Developer, Iranian Space Research Center, Iran
> Design and development of a sun sensor which meets the highest standards for reliability and performance in harsh environments
> Building an Earth horizon sensor and developing an efficient processing algorithm
> Debugging and testing the sensors in the simulated environments
> Support and technical supervision of the development team

AI | Embedded Systems | Signal Processing

September 2015
October 2013
Hardware Team Manager, Atishahr, Iran
> Design and build portable embedded devices with various modules
> Design and development of Android apps
> Providing support and fixing bugs

Board Design | Embedded Software | Signal Processing | Android Software Development

Teaching Assistant, Shiraz University, Iran
| | |
Spring 2018 > Advanced Communication Theory, Dr. Mahmoud Farhang
Spring 2016 > Communication Systems I & II, Dr. Abbas Sheikhi
Fall 2015 > Principles of Microcomputers, Dr. Navid Yasrebi
Fall 2015 > Engineering Mathematics, Dr. Maryam Dehghani
Spring 2015 > Signals and Systems, Dr. Mahmood Karimi
Fall 2014 > Signals and Systems, Dr. Mahmood Karimi

Instructor, Shiraz University, Iran
Spring 2018 > Computer-Aided Control Systems Design, School of Electrical and Computer Engineering
Summer 2014 > Introduction to Electronics and Digital Circuits, Electrical Engineering Scientific Association
Fall 2013 > Embedded Systems, IEEE Shiraz University Student Branch

👥 Research Experience

Ongoing

> **Abdi, Mohammad**, Khandaker Foysal Haque, Francesca Meneghello, and Francesco Restuccia. "`MIMODistNets`: Multiple-Input Multiple-Output Distributed Deep Neural Networks" in *Proc. of the 26th International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (*MobiHoc*), 2025.*

Submitted

> **Abdi, Mohammad**, Diptashree Das, Minghan Liu, Marvin Onabajo, and Francesco Restuccia. "FEARL: AI-Assisted Energy-Aware Real-Time Receiver Adaptation to Dynamic Environments" in *Proc. of IEEE International Conference on Communications (**ICC**), 2025.*

> Zhang, Milin, **Mohammad Abdi**, Venkat R. Dasari, and Francesco Restuccia. "Semantic Edge Computing and Semantic Communications in 6G Networks: A Unifying Survey and Research Challenges" in *ACM Computing Surveys (**CSUR**).*

> Das, Diptashree, Minghan Liu, **Mohammad Abdi**, Francesco Restuccia, and Marvin Onabajo. "Digitally Tunable CMOS Mixer Design for Machine Learning Controlled Adaptive RF Front-Ends" in *2025 IEEE International Symposium on Circuits and Systems (**ISCAS**).*

Published

> **Abdi, Mohammad**, Khandaker Foysal Haque, Francesca Meneghello, Jonathan Ashdown, and Francesco Restuccia. "`PhyDNNs`: Bringing Deep Neural Networks to the Physical Layer" in *Proc. of IEEE Conference on Computer Communications (**INFOCOM**), 2025.*

> Zhang, Milin, **Mohammad Abdi**, Shahriar Rifat, and Francesco Restuccia. "Resilience of Entropy Model to Intentional and Unintentional Interference in Distributed Deep Neural Networks." in *Proc. of the 18th European Conference on Computer Vision (**ECCV**), 2024.*

> Zhang, Milin, **Mohammad Abdi**, and Francesco Restuccia. "Adversarial Machine Learning in Latent Representations of Neural Networks." *arXiv preprint arXiv:2309.17401 (2023).*

> **Abdi, Mohammad**, Jonathan Ashdown, Kurt Turck, and Francesco Restuccia. "Channel-Adaptive Dynamic Neural Networks for Low-Complexity Distributed Signal Awareness." in *MILCOM 2023-2023 IEEE Military Communications Conference (**MILCOM**), pp. 27-32. IEEE, 2023.*

> Liu, Minghan, Diptashree Das, **Mohammad Abdi**, Francesco Restuccia, and Marvin Onabajo. "A Digitally Reconfigurable Low-Noise Amplifier with Robust Input Impedance for Machine Learning-Based Receiver Optimizations." in *2024 IEEE 67th International Midwest Symposium on Circuits and Systems (**MWSCAS**), pp. 392-396. IEEE, 2024.*

> Das, Diptashree, **Mohammad Abdi**, Minghan Liu, Marvin Onabajo, and Francesco Restuccia. "Toward Wireless System and Circuit Co-Design for the Internet of Self-Adaptive Things." in *2024 IEEE International Symposium on Dynamic Spectrum Access Networks (**DySPAN**), pp. 540-547. IEEE, 2024.*

> Taghvaei, Sajjad, Ali Tavasoli, Navid Feizi, Zahra Rajestari, and **Mohammad Abdi**. "A control-oriented dynamic model for sit-to-stand motion with fixed support." in *Proceedings of the Institution of Mechanical Engineers, Part K: Journal of Multi-body Dynamics 232, no. 2 (2018): 265-273.*

☰ SKILLS

Programming	C, C++, Microsoft .Net (**C#**, VB, ASP), **Java**, **Python**, **Verilog**, HTML CSS, **Ladder logic**, SQL, **x86 and AVR8 Assembly**
Softwares	MATLAB (+ **Simulink**), **Altium Designer**, **LabVIEW**, NI Multisim, OrCAD PSpice
Database Management Systems	**Microsoft SQL Server**, MySQL
Development Tools	Microsoft Visual Studio (+ Xamarin), Eclipse (**SW4STM32**, **SPC5 Studio**), **Keil**, IAR Embedded Workbench, CodeVisionAVR, **Code Composer Studio**, IntelliJ IDEA, **Android Studio**, **Xilinx ISE**
Operating Systems	Windows, **Linux** (**Ubuntu**, **Raspbian**, **BeagleBone Debian IoT**), Mac OS X, **Android**, **iOS**
AI/ML Libraries	PyTorch, TensorFlow
Other	LaTeX, Embedded Systems Design and Programming, DSP Programming, FPGA Programming, PLC Programming, Network Programming

🌐 LANGUAGE SKILLS

Persian ● ● ● ● ●
English ● ● ● ● ○

✚ STRENGTHS

> Passionate
> Motivated
> Independent

❝ REFERENCES

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