Dr. Vahram Martirosyan

Chief Scientist · Explainable AI · HPC & Compilers

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Profile

23+	25+	958×	0.88 ms
Years of experience	Publications	Peak GPU speed-up	On-device inference (ESP32)

Doctor of Computational Mathematics with **nearly 20 years of classroom teaching** across universities in Armenia and the UAE, combined with 23+ years of professional software engineering and active research. I believe rigorous computer-science education must connect theory to practice: my courses consistently move students from first principles to hands-on implementation using real systems. Current areas of instruction span **programming (C, C++, Python)**, **system architecture**, **data structures & algorithms**, **operating systems**, **IoT & security**, **machine learning & data science**, and **statistics**. Active researcher in intrinsically **explainable AI** via polynomial regression models, applied to medicine (ECG and clinical diagnosis), materials science, precision agriculture, and ocean/climate science, and in **HPC & compiler engineering**: LLVM-based automatic parallelisation (HPC++) and binary lifting of legacy code (LEAP). 25+ publications, including accepted and published IEEE-indexed conference papers, several manuscripts under review, and a pending patent, with a track record of integrating research directly into the classroom. Currently **Chief Scientist** at ExplainableAI.app and **Assistant Professor** (multi-campus) at Higher Colleges of Technology, Abu Dhabi.

Education & Teaching

Doctor of Computational Mathematics

2006 - 2009

Yerevan State University

> *Dissertation: "Construction of an Algorithm for the Pseudoinversion of Bidiagonal Matrices and an Investigation of its Parallelization"*

M.Sc., Informatics and Applied Mathematics

2004 - 2006

Yerevan State University

B.Sc., Informatics and Applied Mathematics

2000 - 2004

Yerevan State University

Course Team Leader

Jan 2025 - Jun 2026

Higher Colleges of Technology, Abu Dhabi, UAE

- Managing and guiding a team of lecturers across multiple HCT campuses for the System Architecture & Integration course.
- Developing and maintaining course materials, assessments, and standardised delivery frameworks.

Assistant Professor, Computer Information Science

Jan 2024 - Present

Higher Colleges of Technology, Abu Dhabi, UAE

- Courses: Fundamentals of Programming (Java), System Architecture & Integration, IoT & Security, Data Structures & Algorithms, Machine Learning, Data Science, Statistics & Probability.

Senior Lecturer (Contract)

Feb 2021 - Dec 2023

Yerevan State University, Faculty of Informatics & Applied Mathematics

- Courses: Operating Systems. Supervised undergraduate research projects.

Faculty Lecturer (Contract)

Jan 2023 - Dec 2023

Université française en Arménie (UFAR), Yerevan

- Courses: Computer Architecture I, C Programming.

Visiting Lecturer (Contract)

Aug 2022 - Jan 2023

American University of Armenia, Yerevan

- Course: Introduction to Computer Science.

Informatics Teacher (Contract)

Sep 2023 - Dec 2023

PhysMath School After A. Shahinyan, Yerevan, Armenia

- Taught Informatics at a specialist physics-mathematics secondary school.

Founder & Lecturer

Jan 2019 - Jun 2023

MutEx School, Yerevan

- Founded and ran an independent programming school; designed curricula and delivered public lectures.

Lecturer

Sep 2013 - Dec 2019

Armsoft CS Learning Center, Yerevan

- Course: Operating Systems.

Lecturer

Feb 2015 - Jun 2015

Armenian Code Academy, Yerevan

- Course: .NET / C# Programming.

Senior Lecturer

Feb 2007 - 2014

Russian-Armenian (Slavonic) University, Yerevan

- Courses: Linux/POSIX Programming, Win32 API, Linux Device Driver Development, GUI Software Development (GTK+), Operating Systems, System Programming, Database Management Systems.

Programming

Fundamentals of Programming, C Programming, C++ Programming, High-performance computing in C++, .NET/C# Programming, Intro to Computer Science.

Systems & Architecture

System Architecture & Integration, Computer Architecture I, Operating Systems, Linux/POSIX Programming, Win32 API Programming, Linux Device Driver Development.

Data & Mathematics

Data Structures & Algorithms, Discrete Mathematics, Applied Discrete Mathematics, Database Management Systems, Statistics & Probability.

Machine Learning & Data Science

Machine Learning, Data Science, Applied Machine Learning, Data Analysis & Visualisation.

Emerging Topics

IoT & Security, Computational Thinking, GUI Development (GTK+), System Programming.

Experience

Director of Software Engineering

Sep - Dec 2023

Plat.AI, Yerevan

Associate Software Development Manager

Oct 2021 - Jun 2022

HelpSystems Armenia, Yerevan

Principal Software Engineer / Team Lead

Feb 2017 - Oct 2021

HelpSystems Armenia, Yerevan

Software Architect (Contract)

2018 - 2020

Priotix, Yerevan · smart-home IoT system

Principal / Senior Software Developer

Aug 2015 - Feb 2017

Optym, Yerevan · logistics optimisation

Senior Software Developer

Aug 2013 - Jul 2015

ArdInnoTekh LLC, Yerevan

Software Developer

Oct 2006 - Dec 2008

ISMoTech, Yerevan · firmware, C++/C#, ASP.NET

Software Developer

Mar 2005 - Oct 2006

Lycos Europe · PHP/MySQL

Chief Scientist

Jan 2026 - Present

ExplainableAI.app

- Directing scientific strategy and model architecture for a no-code ML platform built entirely on intrinsically interpretable polynomial regression models — no black-box neural networks.
- Platform combines browser-side WebAssembly training (data never leaves the device), a hand-written C++ inference engine with sub-millisecond latency, and an AI App Builder (powered by Gemini) that turns any trained model into a shareable live web app.
- Applicable to any domain: users train models on any CSV or image dataset and deploy them as shareable live apps — no code, no infrastructure required.
- Authored 15+ research papers in 2026 advancing the theory and application of PRMs across computer vision, healthcare (multi-class ECG), materials science, precision agriculture, ocean/climate monitoring, and structural engineering; several under review, one published and two accepted at IEEE-indexed conferences, plus a pending high-entropy-alloy design patent.
- Delivered production-oriented results: interpretable multi-variable ocean models running in 0.88 ms on an ESP32, a 657 KB Sentinel-1 oil-spill detector at 11,500 tiles/s, and a 123M-parameter ECG classifier compressed 99.7% (1.3 MB) with negligible loss.

Chief Executive Officer

Jun 2022 - Jul 2023

System View Armenia, Yerevan

- Developed LLVM/Clang-based auto-vectoriser for Xilinx ACAP (Visual System Integrator toolchain); peak speedup 2009× on GPU, 32.1× on CPU.

Head of System Programming Laboratory

Jan 2009 - Jul 2013

Russian-Armenian University / ISP RAS, Yerevan

- Led RAS System Programming Lab; directed Linux Foundation verification of system libraries and kernel modules; managed a team of researchers and engineers.

Junior Research Scientist

2003 - 2005

Institute of Mathematics, National Academy of Sciences of RA

- Parallelisation of numerical algorithms for integral equations using MPI.

Publications

Martirosyan, V. "Accuracy and Interpretability from a Single Solver: Polynomial Regression up to Degree 5 for Concrete Compressive Strength Prediction."
ICACTE 2026 (IEEE-indexed conference), 2026.

> Degree-5 R^2 = 0.859, RMSE 6.25 MPa; 88% term reduction with 74% of the retained terms aligning with known concrete physics; single closed-form solve, no gradient descent.

Martirosyan, V. "Efficient and Interpretable On-Device Polynomial Inference for Multi-Variable Ocean Profiling."
eICocean 2027 (IEEE-indexed conference, accepted), 2027.

> R^2 = 0.973 temperature, 0.794 salinity, 0.895 dissolved oxygen; 4.4 µs desktop inference; 0.88 ms on ESP32 and 1.12 ms on RP2350; 180 µJ/96 µJ per inference.

Martirosyan, V. "Automated Multi-Class ECG Arrhythmia Classification Using an Ensemble of Polynomial Regression Models."
IEEE ICCA 2026 (accepted), 2026.

> 78.32% balanced accuracy, 68.23% macro-F1; sparsification reduces 123.1M terms to 330K — 1.3 MB, a 99.7% reduction — within ≈1 pp.

Martirosyan, V. "LEAP: Lifting Legacy x86-64 Binaries to Recompilable IR for Automatic Parallelization."
ITCA 2026 (accepted), Dec 2026.

> 43-program liftability study: 100% at `-O0` and 98% at `-O1`/`-O2`/`-O3`; 3.7× geomean from source IR; uplifted binary 10.4× over `-O0` and 2.2× over `-O2`; 958× peak GPU offload; 377/377 tests pass.

Martirosyan, V. “Deterministic and Auditable On-Device Polynomial Inference for On-Board SAR Oil-Spill Screening.”
IEEE EIECS 2026 (accepted), 2026.

> 657 KB → 82 KB int8 model at G-mean 0.822; 15 KB model at G-mean 0.803 fits an ATmega328P; 3.76-9.2 ms/tile on real microcontrollers.

Tsyvarev, A. V., Martirosyan, V. A. “Testing of Linux File System Drivers.”
Proceedings of the Institute for System Programming of the RAS, vol. 23, pp. 413-426, 2012.

Tsirunyan, K., Martirosyan, V., Tsyvarev, A. “The Spruce System: Quality Verification of Linux File Systems Drivers.”
SYRCoSE 2012, May 2012.

Martirosyan, V., Gishyan, S., Shatokhin, E. “Dynamic Verification of Linux File System Drivers.”
Computer Science and Information Technologies Conference (CSIT 2011), Yerevan, Sep 2011.

Martirosyan, V. et al. “The Spruce System: Linux Kernel Module Verification Automation (in Russian).”
7th Annual Conference of RAU, Dec 2012.

Martirosyan, V. et al. “Fault Simulation in Linux Kernel Module Verification (in Russian).”
7th Annual Conference of RAU, Dec 2012.

Martirosyan, V. “Linux Verification - Challenge of Today.”
7th Annual Conference of RAU, Dec 2012.

Martirosyan, V. et al. “X2C - XML To Code: Advantages of Standards.”
4th Scientific Annual Conference of RAU, Dec 2009.

Martirosyan, V. et al. “X2C: Code Generation Technology.”

Martirosyan, V. “Programming via Operating Systems.”
Hilfmann Press, Feb 2022.

Martirosyan, V. “Programming via Operating Systems, Second Edition.”
Hilfmann Press, Sep 2024.

Martirosyan, V., Shatokhin, E., Rubanov, V. “Basics of Programming in OS Linux Environment (in Russian).”
MIPT, Apr 2011.

Martirosyan, V. et al. “Tutorial: Programming in GNU/Linux Environment - From System Calls to the GUI (in Russian).”
RAU Publishing, Dec 2010.

Martirosyan, V. “Parallelization of the Moore-Penrose Inverse Algorithm for a Special Bidiagonal Matrix (in Russian).”
Herald of Russian-Armenian (Slavonic) University, 2009.

Hakopian, Yu. R., Martirosyan, V. “On the Parallelization of the Matrix Pseudoinversion Algorithm (in Russian).”
2009.

Martirosyan, V. “An Algorithm for the Pseudoinversion of Bidiagonal Matrices (in Russian).”
Herald of Russian-Armenian (Slavonic) University, 2008.

Martirosyan, V. “On the Pseudoinversion of Bidiagonal Matrices (in Russian).”
Annual Scientific Conference of Russian-Armenian University, 2007.

Martirosyan, V. “Interpretable Polynomial Zone Ensembles for Global Ocean Temperature and Salinity Profile Reconstruction.”
Under review, Q1 journal (TGRS / JAMES / Comput. Geosci.), 2026.

> WOA 2018, 534,090 samples; pooled R^2 = 0.9703 temperature / 0.8376 salinity; sub-millisecond inference, sub-megabyte footprint.

Martirosyan, V. “Depth-Zone Polynomial Regression for Global Ocean Climatology.”
Under review, IEEE journal (Q1 attempt), 2026.

> IAP T/S Climatology 2024; elastic-net degree-6 models per zone: mixed layer, thermocline, deep ocean; spatially adaptive subsampling 534K → 177K rows.

Martirosyan, V. “Efficient Multi-Class ECG Classification Using Polynomial Regression with an Analytical Solver.”
Applied Computational Intelligence and Soft Computing (major revision), 2026.

> 82.75% ± 1.03% six-class accuracy, macro-F1 0.758; 12 µs inference; outperforms CNN, random forest, XGBoost and SVM baselines.

Martirosyan, V. “Sparse Polynomial Regression for Interpretable Yield-Strength Prediction in High-Entropy Alloys.”
Under review, IEEE ITT 2026, 2026.

> Degree-3 R^2 = 0.738 on n=1,014, statistically tied with random forest and XGBoost and significantly above a neural network (0.618); 8 of 11 retained terms map to known hardening mechanisms; BCC-only R^2 = 0.841.

Martirosyan, V. “Efficient Crop Type Mapping via Degree-2 Polynomial Feature Expansion of Multi-Temporal Optical and SAR Data.”
Submitted to *IEEE TGRS*, 2026.

> 98.67% test accuracy and macro-F1; 2.3 s training on 16 cores; 17× SIMD speedup.

Martirosyan, V. and N. Martirosyan “Physics-Informed Polynomial Regression for Certified Concrete Mix Design.”
Under review, ICACTE 2027, 2026.

> Physics-informed degree-3 SRPR: R^2 = 0.919, RMSE 4.73 MPa; certified global inverse design with 10.6-14.5% cost and 16.7% CO_2 savings versus the best measured mixes; interpretable SCM-substitution design rules.

Martirosyan, V. “High accuracy, no signal: an identifiability and external-validation audit of climate and nitrogen response in China's cereal yield data.”
Computers and Electronics in Agriculture (submitted), 2026.

> 5,316-row province panel for maize, rice and wheat in China (1961–2024) plus a 12,534-row 0.5° cropland panel; level R^2 0.50–0.92 but anomaly R^2 mostly −0.09 to 0.08; external validation does not support temporal climate or nitrogen-response claims.

Martirosyan, V. and N. Martirosyan “Interpretable polynomial surrogates for halide-perovskite screening: domain-cleaned bandgaps, ideal tandem limits, and the limits of forward prediction.”
Solar Energy Materials and Solar Cells (submitted), 2026.

> 31,618 domain-cleaned halide perovskites; coefficient-shrunk cubic SRPR reaches 21.0 meV MAE / R^2 0.794 under grouped CV; a 101,871-point grid yields 34,014 candidates and a 362-point Pareto front; best ideal two-terminal tandem 43.73% (not a device claim).

Skills & Certifications

Explainable AI (PRMs):
Polynomial Regression Models, feature importance, interpretable classification for clinical, materials science, and agricultural data; Statistics & Probability.

Machine Learning:
Supervised learning, regression modelling, interpretable model design, Python, PyTorch.

HPC & Parallelism:
LLVM/Clang (compiler pass development), OpenCL, MPI, POSIX Threads, auto-vectorisation, heterogeneous CPU-GPU execution, Xilinx ACAP.

Systems Programming:
C/C++ (expert), Linux kernel modules, device drivers (Ext4, XFS, JFS, BTrFS), WIN32 API, GTK+, IoT/embedded systems.

Web & Databases:
PHP/MySQL, ASP.NET/C#/MS SQL Server, SQL.

Tooling:
Git, Linux/Unix, LaTeX.

Languages:
Armenian (native), Russian (fluent), English (fluent).