Dr. Vahram Martirosyan

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Abu Dhabi, UAE

Chief Scientist & ML Lead · Explainable AI · Edge AI · HPC

Professional Summary

Doctor of Computational Mathematics with **23+ years of experience** spanning explainable AI research, high-performance computing, edge/on-device deployment, and software engineering. Inventor and lead researcher behind **Polynomial Regression Models (PRMs)** — a family of intrinsically interpretable models that deliver results competitive with deep learning at a fraction of the computational cost, across computer vision, healthcare (ECG and clinical diagnosis), materials science, agriculture, and ocean/climate monitoring.

Currently **Chief Scientist** at ExplainableAI.app, leading the full scientific and technical strategy of a no-code Explainable AI platform: browser-side WebAssembly training (data never leaves the device), a hand-written C++ inference engine with sub-millisecond latency, and a Gemini-powered AI App Builder that turns any trained model into a shareable live web app. Research translated into deployable systems: models that run in **0.88 ms on an ESP32**, a **657 KB satellite oil-spill detector** processing 11,500 tiles/s, and a **99.7% model compression** pipeline for 123M-parameter ECG classifiers. Author of **25+ publications** and co-inventor on a pending patent. Former head of a Russian Academy of Sciences laboratory and serial technical leader across research and industry.

Technical Skills

- **Machine Learning & Data Science:** Supervised learning, regression modelling, interpretable model design, feature engineering, model compression/sparsification, cross-validation, Python, PyTorch, scikit-learn, Statistics & Probability.
- **Explainable AI (PRMs):** Polynomial Regression Models, stagewise and L2/elastic-net regularization, feature importance, interpretable classification across vision, tabular, time-series, and remote-sensing data; no-code XAI platform design and deployment.
- **Edge / On-Device AI:** int8/int16 post-training quantization, fixed-point kernels, tiny models (sub-MB) for microcontrollers and edge hardware (ESP32, RP2350, Arduino), latency/energy budgeting, on-board anomaly monitoring.
- **HPC & Parallelism:** LLVM/Clang (compiler pass development), binary lifting, OpenCL, MPI, POSIX Threads, auto-vectorisation (SIMD), heterogeneous CPU-GPU execution, Xilinx ACAP.
- **Systems & Inference Engineering:** C/C++ (expert), WebAssembly, sub-millisecond inference engines, Linux kernel modules, device drivers (Ext4, XFS, JFS, BTrFS).
- **Web & Databases:** PHP/MySQL, ASP.NET/C#/MS SQL Server, NoSQL, SQL.
- **Tooling:** Git, Linux/Unix, LaTeX.
- **Languages:** Armenian (native), Russian (fluent), English (fluent).

Experience

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.

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.

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

Selected Applied Projects

Satellite Oil-Spill Detection 2026
ExplainableAI.app

- Built an interpretable PCA + sparse-polynomial detector for Sentinel-1 Deep-SAR imagery that outperformed a raw-image CNN baseline (G-mean 0.606 → 0.822); a 657 KB model running at ≈87 µs/tile (∼11,500 tiles/s) enabling on-board triage with a 76 KB downlink for 3,163 flagged tiles.

Food-Security & Agricultural Forecasting Corridor 2026
ExplainableAI.app

- Deployed interpretable models for soil–crop suitability (accuracy 0.948), crop-yield forecasting ($R^2 = 0.656$), and agricultural commodity prices ($R^2 = 0.839$, up to 0.929 with a price anchor) as low-footprint, auditable alternatives to black-box pipelines.

On-Device Ocean Profiling (TinyML) 2026
ExplainableAI.app

- Designed quantized polynomial models for multi-variable ocean profiling that run in 0.88 ms on an ESP32 and 1.12 ms on an RP2350 at 180 µJ/inference, targeting autonomous marine platforms with no cloud dependency.

Publications

Applied Machine Learning & Explainable AI

- **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. 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.** "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.** "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.** "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.** "Stagewise Regularized Polynomial Regression: A Hybrid Optimization Strategy for Medical Diagnosis on Small Datasets." Prepared manuscript, Feb 2026.
  (86.7% accuracy on UCI Cleveland Heart Disease; 93% model compression; ≈36 FLOPs/prediction.)

- **Martirosyan, V.** "Heart Disease Diagnosis Using Third-Order Polynomial Regression Models with L2 Regularization." Prepared manuscript, Feb 2026.
  (81.8% accuracy, 10-fold CV; full interpretability via explicit polynomial coefficients.)

- **Martirosyan, V.** "Polynomial Regression Models for Interpretable Machine Learning: Theory, Optimization, and Medical Applications." Prepared manuscript, Feb 2026.

- **Martirosyan, V.** "Explainable and Efficient Digit Classification via Polynomial Regression Networks: A Transparent Alternative to Deep Learning." *arXiv*, Jan 2026.
  (96.85% average MNIST accuracy; 84% parameter reduction at <1% accuracy loss.)

Edge AI, Ocean & Climate Monitoring

- **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.** "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.** "Auditable Kilobyte-Scale Surrogates for the Global Significant-Wave-Height Climatology." *Prepared for IEEE JSTARS*, 2027.
  ($R^2 = 0.945$, RMSE 0.262 m; cell-holdout $R^2 = 0.933$; coastal R^2 improves from 0.34 to 0.52 with in-situ buoys.)

- **Martirosyan, V.** "Blended Ocean Visualization: Combining Sparse Polynomial Regression with Residual Fields." Working paper, 2026.

- **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.)

HPC, Compilers & Systems

- **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.** "hpc++: An LLVM-Based Automatic Parallelization System for C++ with GPU Acceleration." *arXiv*, Dec 2025.
  (7 parallelisation strategies, zero source modification; peak 2009.4× on GPU and 32.1× on CPU; numerical correctness across 134 unit + 18 integration tests.)

- **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.
- **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.
- *Jinnetic Engineering by Richard Stallman, translated into Armenian.* Dec 2010.

Education

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

Professional Development & Certifications

AI, Machine Learning & Data Science

- Fundamentals of Deep Learning — **NVIDIA**, Apr 2025
- Artificial Intelligence Foundations: Thinking Machines — *LinkedIn*, Jul 2024
- Introduction to Artificial Intelligence — *LinkedIn*, Jul 2024
- Advanced NoSQL for Data Science — *LinkedIn*, Jan 2025
- Statistics Foundations 1: The Basics — *LinkedIn*, Sep 2024

Embedded Systems, FPGA & Hardware

- C Programming for Embedded Applications — *LinkedIn*, Nov 2024
- Introduction to FreeRTOS and Basic Task Management — *LinkedIn*, Nov 2024
- Getting Started with RISC-V — *LinkedIn*, Jul 2024
- Learning Verilog for FPGA Development — *LinkedIn*, Jul 2024
- Learning FPGA Development — *LinkedIn*, Jul 2024
- Introduction to Quantum Computing — *LinkedIn*, Jul 2024

Software Architecture & Engineering

- Software Architecture: Domain-Driven Design — *LinkedIn*, Jul 2024
- Microservices Foundations — *LinkedIn*, Jul 2024
- Microservices: Asynchronous Messaging — *LinkedIn*, Jul 2024
- Microservices: Security — *LinkedIn*, Jul 2024

Leadership & Communication

- How to Be an Effective Manager to Drive Impact — *LinkedIn*, Jul 2024
- Storytelling to Influence Leadership and Decision Makers — *LinkedIn*, May 2024
- Improving Your Thinking — *LinkedIn*, Jul 2024
- Leading with Emotional Intelligence — *LinkedIn*, Apr 2019
- Public Speaking Foundations — *LinkedIn*, Feb 2019