

Dara Rahmat Samii

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Summary

- M.Sc. student in Mechanical Engineering integrating machine learning with CFD for thermal spray coating analysis.
- Delivered 100× speedup over traditional solvers using Graph Neural Networks; published in IEEE Access.
- Executed RANS, DDES, and aeroacoustic simulations on HPC clusters (400+ CPU cores, Compute Canada).
- Led CFD analysis for two high-power rockets at SpaceConcordia; L2 Tripoli-certified rocketeer.

Education

- **Concordia University** Sep 2023 – Apr 2026 (expected)
M.Sc. in Mechanical Engineering (Advisor: [Prof. Moussa Tembely](#)) Montréal, Canada
GPA: **4.23/4.3**
Thesis: CFD Simulation of Cold Spray Process and Aeroacoustic-Based Particle Distribution Analysis
- **Iran University of Science and Technology** Sep 2018 – Sep 2022
B.Sc. in Chemical Engineering (Advisor: [Prof. HashemAbadi](#)) Tehran, Iran
GPA: **17.01/20 (3.58/4)**
Thesis: Design and Manufacturing of a Gas Rotameter Using CFD

Publications

- *Accelerating Thermal Homann Flow Simulation With Mesh-Based Graph Neural Networks.*
D. Rahmat Samii, M. Tembely (2025). IEEE Access. [DOI link](#)
- *CFD Based Design Gas Rotameters: Dynamic Mesh Transient Simulation.*
D. Rahmat Samii, S. H. HashemAbadi, P. Margan (2023). *Flow Measurement and Instrumentation*. [DOI link](#)

Professional Experience

- **SpaceConcordia, Solid Rocketry Team** – CFD Team Lead Dec 2024 – Present
Student Aerospace Engineering Organization Montréal, Canada
 - Executed OpenFOAM aerodynamics simulations for CR25 and CR26 (Icarus & Daedalus two-stage rocket).
 - Computed drag, lift, center of pressure, stability, thermal loads, and bending moments across Mach 0.8–2.5 and AoA $\pm 5^\circ$.
 - Performed Richardson extrapolation for mesh sensitivity; implemented multi-step scheme progression from stable schemes to accurate schemes.
 - Simplified geometries and 3D-printed test articles; validated against experimental data.
 - Collaborated with Flight Performance and Structures teams.
 - Contributed to CR25 manufacturing, composite infusion, assembly, and Launch Canada 2025 field operations.
- **Concordia University** – Research Assistant & Teaching Assistant Sep 2023 – Present
Multiphase Thermofluid Learning Lab (Advisor: [Prof. Moussa Tembely](#)) Montréal, Canada
 - Simulated cold spray process at 35–65 bar and 707–807 K.
 - Developed analytical model for preliminary aeroacoustic analysis.
 - Extended `sonicFoam` to `sonicDPMFoam` with Lagrangian particle tracking.
 - Executed RANS → DDES workflows on Compute Canada HPC (400+ cores).
 - Verified turbulence via Kolmogorov energy cascade; applied FW-H (`libAcoustics`) for aeroacoustics.
 - Validated simulations against literature benchmarks.
 - Processed results with Python/PyVista; managed CFD and ML batch jobs via Slurm.
 - Accumulated 1,200+ TA hours over 2 years: Lab Demonstrator (Fluid Mechanics, Heat Transfer, Thermodynamics); Tutorial Leader (C++/Arduino, Statics, Advanced Calculus, CFD for Aerospace).
- **Iran University of Science and Technology** – Teaching Assistant Feb 2022 – Jul 2022
Advisor: [Dr. Soroush Baradaran](#) Tehran, Iran
 - Delivered tutorial sessions and graded assignments for undergraduate Fluid Mechanics (~30 students).
- **JSPM Imperial College of Engineering** – Remote Research Intern Oct 2021 – Jan 2022
Advisor: [Dr. Sachin Borse](#) Pune, India (Remote)
 - Investigated multiphase solvers in OpenFOAM; collaborated with international research team on solver benchmarking.
- **Partian Battery** – Engineering Intern Jun 2021 – Oct 2021
Advisor: [Dr. Reza RiahiFar](#) Tehran, Iran
 - Designed and optimized a stirred mixer using COMSOL Multiphysics; validated simulation against experimental data.
 - Developed a parametric simulation app using COMSOL Application Builder (Java-based GUI) for rapid design iteration.

Honors & Awards

- Mitacs Globalink Research Award – Awarded CAD 6,000 for international research collaboration (France–Canada). *Feb 2025*
- Concordia Merit Scholarship – Awarded CAD 5,000 for academic excellence. *Sep 2023*
- 8th Place, 27th National Chemical Engineering Olympiad (Iran). *Oct 2022*
- Pre-qualified for Direct M.Sc. Admission (Top 10% of 2018 cohort) in Thermo-Kinetics, Chemical Engineering. *May 2022*
- 2nd Place, Internship Poster Competition (80 participants). *Sep 2021*
- 1st Place, “Rahneshan” National Competition (Team Lead) – CFD modeling of particle crystallization and growth. *Feb 2021*

Technical Skills

- **CFD & Simulation:** OpenFOAM (custom solver development), ANSYS Fluent, COMSOL, ParaView
- **CAD & Meshing:** SpaceClaim, DesignModeler, FreeCAD, Salome, Onshape, SolidWorks
- **Programming:** Python (NumPy, Pandas, PyVista, SciPy), C/C++, MATLAB, Bash scripting
- **ML/DL Frameworks:** PyTorch, PyTorch Geometric, scikit-learn, fast.ai, Stable-Baselines, Optuna
- **HPC & DevOps:** Slurm, Linux, Git, Docker, SSH, tmux, vim
- **Documentation:** L^AT_EX, Microsoft Office, Manim (animation)

Languages

- English: IELTS 7.5 (L 8, R 8.5, W 6.5, S 7) French: Intermediate (B1) Persian: Native

Certifications

- L2 Rocketry Certificate, Tripoli Rocketry Association *Oct 2025*
- L1 Rocketry Certificate, Tripoli Rocketry Association *May 2025*
- Machine Learning, Stanford Online ([Credential](#))
- Deep Learning Specialization, DeepLearning.AI ([Credential](#))
- Fundamentals of Reinforcement Learning, University of Alberta ([Credential](#))
- Game Theory, Stanford & UBC ([Credential](#))
- From Nand to Tetris, Hebrew University of Jerusalem ([Credential](#))

Selected Projects

- **Aeroacoustic CFD Simulation of Cold Spray (Thesis Project)** *Ongoing*
Extended `sonicFoam` with DPM to create `sonicDPMFoam`; validated particle–shock interaction against literature. Executed RANS-to-DDES workflow with field mapping; verified turbulence via Kolmogorov energy cascade. Applied FW-H acoustic analogy (`libAcoustics`) to link particle distribution with aeroacoustic signatures.
- **Mesh-Based GNN for Accelerating CFD – [GitHub](#)**
Generated large-scale CFD dataset via parameterized CAD, meshing, and OpenFOAM simulation. Converted `polyMesh` to graph inputs; tuned GNN architectures with Optuna. Achieved **100× speedup** over traditional solvers; published in IEEE Access.
- **Gas Rotameter Design and Manufacturing with CFD – [Report](#)**
Performed transient ANSYS Fluent simulations with dynamic mesh; validated against experimental data. Compared triangular vs. quadratic mesh deformation schemes; published in *Flow Measurement and Instrumentation*.
- **A.I.education Analytics – [GitHub](#)**
Merged FER2013 & FER+ datasets; implemented face emotion recognition CNNs. Conducted cross-validation and bias analysis by gender and age.
- **Arduino PID Ball Balancer – [GitHub](#)**
Built 3D-printed PID control system using Arduino Uno; tuned PID gains for ping-pong ball stabilization with ultrasonic sensors and servo-controlled plate.

Conferences

- Numerical Simulation and Prediction of Particle Distribution Based on Aeroacoustics Signals Emitted by the HVAF Process. *32nd Annual CSME-CFDSC-CSR 2025, ([abstract](#))* *May 2025 – ÉTS, Montréal*
- Accelerating Simulations of Plasma Flow and Substrate Interaction in Thermal Spray. *31st Annual CSME/CFD 2024, ([abstract](#))* *May 2024 – University of Toronto*

Volunteer Work

- **International Student Office (ISO)**, Concordia University *Sep 2024*
Welcomed and guided new international students during orientation week.
- **International Aerospace Innovation Forum**, Aéro Montréal *May 2024*
Event organizer; welcomed and guided industry attendees.
- **5th National Fluid Flow Measurement Conference & Exhibition**, IUST *Jul 2022*
Event organizer; coordinated logistics and guided participants.