Hossein (Aria) Seyedzadeh
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PROFESSIONAL SUMMARY

Highly accomplished computational thermo-fluid engineer specializing in the fluid mechanics and thermal analysis of energy systems for AI/HPC workloads. Expert in scalable CFD and HPC cluster optimization. Driven end-to-end thermal modeling and validation, streamlining complex data pipelines. Proven engineer in cross-functional R&D, translating advanced analysis and optimization findings for DOE sponsors and engineering teams. Seeking a Thermal Engineer role to drive next-generation cooling strategies.

TECHNICAL SKILLS

Computational Modeling & Thermal Design: VFS Geophysics, OpenFOAM, ANSYS (Fluent, Mechanical), Heat Transfer, Thermal Analysis, FSI, Fluid Dynamics, Convection/Conduction, High Temperature Multiphysics Modeling

High-Performance Computing (HPC) & Software: C/C++, Fortran, HPC Workflows, Linux/Unix, Slurm, MPI, OpenMP, Git, GitHub, Version Control

Data Science & AI/ML: Python (Pandas, NumPy, Scikit-learn), PyTorch, TensorFlow, Data Pipeline Development, Prompt Engineering, Test Automation/Scripting (MATLAB), Jupyter Notebook

Design, Meshing & Visualization: SolidWorks, Fidelity Pointwise, ANSYS Meshing, BlockMesh, SnappyHexMesh, Parametric Optimization, Tecplot, Paraview

PROFESSIONAL EXPERIENCE

Atlantic Marine Energy Center | Stony Brook, NY
Research Assistant (Digital Twin & CFD Modeling) | *Aug 2022 – Present*

- Built complex multi-physics models from geometry clean-up and meshing, to simulating and post-processing complex real-world phenomena, integrating experimental data for model validation.
- Working at the intersection of CAE and Data Science to generate high-quality simulation datasets for training Machine/Deep Learning models.
- Implement and document new algorithms into computational modeling systems as needed.
- Run simulations on high-performance computing (HPC) systems for both idealized and real-world scenarios.
- Applied scripting tools (e.g., MATLAB, Python) to automate model setup and output analysis.
- Used and manage version control systems (Git) for code development and collaboration, as well as documented all codes, workflows, and analysis procedures.
- Conducted research and developed advanced computational models and simulation tools for complex physical systems, including multiphysics and multiscale phenomena.
- Developed controls solutions for industrial applications e.g. wind/tidal turbines.
- Experienced applying AI/ML for simulation acceleration, optimization, or predictive maintenance.
- Managed and mentored a team of 4 Ph.D. students on code development and manual writing.
- Authored 5+ technical reports and publications for Department of Energy (DOE) sponsor reviews, demonstrating capacity for high-stakes technical communication to executive audiences.

Handshake AI | Remote
Engineer fellow | *AI tutor* | *Sep 2025 – Oct 2025*

- Created and assessed complex problems in engineering across subdomains such as civil, mechanical, aerodynamics.
- Evaluate AI-generated responses for conceptual accuracy, technical rigor, and domain relevance.
- Provide clear written feedback on engineering problem sets, designs, and solutions.
- Collaborate asynchronously with AI researchers and engineers to iterate and improve model performance.
- Ensure technical accuracy and academic precision in all engineering content used to train or evaluate AI systems.
- Achieved Model Validation expert and trainer certifications.

Antora Energy | Sunnyvale, CA
Heat to Power R&D Intern | *Jun 2024 – Aug 2024*

- Optimized the performance of a novel electric-discharge module for thermal energy storage by implementing multi-physics thermal analyses (ANSYS Mechanical), identifying design modifications that increased system efficiency in high-temperature R&D modules.
- Streamlined computational workflows by developing optimized SolidWorks CAD designs, resulting in a reduction in overall meshing and simulation computing cost.
- Collaborated with cross-functional R&D teams, documenting and presenting complex simulation workflows to guide thermal battery and Thermophotovoltaic system designs.
- Perform design calculations, FEA, and trade studies for structural, thermal, and fluid systems

Isfahan University of Technology | Isfahan, Iran
Graduate Research Assistant | Sep 2018 – Sep 2020

- Designed and executed microscale CFD simulations for flow modeling and heat transfer of an electroosmotic micropump using both commercial and open-source software.
- Participate in verification and validation activities to ensure model accuracy and robustness against experimental data.
- Built complex multi-physics models including phenomena like fluid mechanics, electric and magnetic fields, and electrochemistry from geometry buildup and meshing, to simulating and post-processing.

Combined Cycle Power Plant | Rasht, Iran
Mechanical Engineer Intern | Jun 2016 – Aug 2016

- Contributed to the installation, testing, and inspection of HVAC systems across the facility, gaining hands-on experience in critical plant infrastructure and safety protocols.
- Assisted lead engineers in performing preventative maintenance inspections of key rotating and stationary components (e.g., gas turbines, boilers) to support operational reliability.
- Prepared supporting documentation for maintenance logs and contributed to technical reports, streamlining compliance and knowledge transfer within the mechanical engineering team.

SELECTED PROJECTS (See Portfolio for details)

- **Battery Thermal Architecture Optimization (R&D)**
  - Conducted high-temperature thermal modeling of an Electric Discharge Module (ANSYS Mechanical), leading parametric optimization studies to optimize insulation and TPV panel geometry, resulting in reduced heat losses and improved TPV system efficiency.
- **Software Development for high-fidelity CFD simulations**
  - Engineered core VFS Geophysics code (C/C++, MPI) leveraging the Immersed Boundary Method on Slurm-managed HPC systems for large-scale Multiphysics simulations.
  - Extended existing implementation of immersed boundary method to complex geometries and non-periodic boundary conditions.
- **Digital Twin Development & Validation (Complex Flow Paths)**
  - Developed a validated Digital Twin of a tidal energy farm, integrating field data to predict environmental impact and optimize turbine placement/flow dynamics.
  - Utilize GIS, MATLAB, and Python to manipulate bathymetry, topography, and other datasets to support project requirements.
  - Prepare model grids using bathymetric data and create model input (e.g., tides, inflow).
- **Human Respiration CFD Modeling (Aerosol Dynamics)**
  - Executed detailed CFD simulations of human respiration using Eulerian–Lagrangian particle tracking (VFS Geophysics) to analyze airflow dynamics and aerosol transport within the respiratory tract.
  - Developed custom Python tools, including a specialized particle generator, to accurately simulate aerosol dynamics and particle deposition, enhancing model fidelity for health applications.

EDUCATION

Stony Brook University (SBU) | Stony Brook, NY
PhD in Civil Engineering | Expected May 2026

- GPA: 3.8/4.0
- Award: Best poster award at the UMERC + METS 2024 conference

Isfahan University of Technology (IUT) | Isfahan, Iran

Master of Science in Mechanical Engineering | *Sept 2020*

University of Guilan | Rasht, Iran
Bachelor of Science in Mechanical Engineering | *Sept 2016*

WORKSHOPS & CERTIFICATES

- Model Validation 1 - Trainer - Handshake (Badge)
- Model Validation II - Expert - Handshake (Badge)
- Navigating the Clean Energy Transition (Badge)
- A Hands-on Introduction to Engineering Simulations – EdX (ANSYS) (Badge)
- Intro to Heat Transfer in Mechanical Structures – Ansys (Badge)
- Topics in Heat Transfer Analyses – Ansys (Badge)
- Fundamentals of Fluid-solid Interaction - Coursera (Badge)
- PCB/Electronics: Thermal Management, Cooling and Derating (Badge)
- Data Center Essentials: Mechanical & Cooling (Badge)

SELECTED PUBLICATIONS

Google scholar URL