



Dr Mohammad Ghaffari.

Engineer *Physics into practice*

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PROFILE

Mechanical engineer by training, with a PhD in computational mechanics from UNSW. My work spans fire safety engineering, fluid mechanics, solid mechanics, heat transfer and thermodynamics: different fields, the same physics underneath. Today I practise performance-based fire engineering in Sydney, on projects from data centres and hospitals to transport and heritage buildings, and in parallel I keep building and delivering CFD, thermal and structural work, from simulation studies to solver development. Machine intelligence is the newest instrument in the set, and I work with it the same way: from the mathematics up. I care about careful analysis, clear reporting, and answers that hold up in front of authorities.

EXPERIENCE

Fire Safety Engineer

2025 - present

Arup, Sydney

- Performance-based fire safety strategies for public, commercial and infrastructure projects, including data centres, hospitals, rail stations, education and heritage buildings.
- Performance Solutions, fire engineering reports and consultation with certifiers and Fire and Rescue NSW through the approval pathway.
- Fire, smoke and evacuation modelling with FDS and Pathfinder under the NCC and Australian Standards, coordinated across multidisciplinary design teams.

Fire Safety Engineer and CFD Modelling

2022 - 2025

Lote Consulting, Sydney

- Performance-based fire safety solutions across NSW, the ACT and Victoria: assessing Deemed-to-Satisfy departures and developing qualitative and quantitative alternative solutions under the NCC.
- Authored fire engineering documentation, FEBQs, FERs, FECDRs, consultant advice, FSURs and FSUBs, in coordination with certifiers, design teams and fire authorities.
- Fire, smoke and consequence modelling: FDS and Pathfinder on HPC systems, Spec 43 simulations, FBIM strategies, and fire, explosion and toxic release assessment (Gexcon EFFECTS, DNV Phast) across data centres, industrial processing, bushfire-prone infrastructure and battery energy storage.

Fluid Dynamics Engineer

2018 - 2020

Kohandezh Engineering, Iran

- Led development of a proprietary CFD solver and a validated 3-D turbulent adjoint optimisation framework covering compressible and incompressible regimes.
- Designed and optimised thermal equipment, including heat exchangers, using open-source CFD tools and custom in-house solvers.

Assistant Fluid Dynamics Engineer

2017 - 2018

Binasan Yekodo Company, Iran

- Researched vertical axis wind turbines, improving aerodynamic performance and startup torque within the renewable energy programme.
- Developed a customised fluid-structure interaction solver and implemented GPU and CPU parallelisation to accelerate coupled simulations.

EDUCATION

PhD, Mechanical Engineering

2020 - 2024

UNSW Sydney

- Full-scholarship research position developing high-fidelity numerical models for nonlinear fluid-structure interaction and heat transfer using parallelised turbulent Lattice Boltzmann methods.
- Built a coupled fluid, solid and thermal solver applied to biofluid mechanics, thermoregulation and shape optimisation.
- Combined adaptive grid refinement, parallel computing and turbulence modelling into a stable, scalable solver for highly nonlinear simulations.

Graduate Diploma, Fire Safety Engineering

2025 - present

Western Sydney University

- Deepening the fire safety specialisation alongside practice.

MSc, Mechanical Engineering

2014 - 2016

Ferdowsi University of Mashhad

- Advanced coursework in fluid dynamics, numerical analysis, CFD, heat transfer and combustion.
- Teaching assistant in fluid mechanics and heat transfer; assistant lecturer for Fortran and C++ programming applied to CFD and conjugate heat transfer.

BSc, Mechanical Engineering

2009 - 2013

Shiraz Azad University

- Custom finite difference solvers in Fortran for heat transfer, applied to finned surface analysis.
- FESTO industrial automation training; applied CFD with ANSYS Fluent.

MEMBERSHIPS

Engineers Australia, Member

Society of Fire Safety (SFS), Engineers Australia

ENGINEERING PRODUCTS

- EngToolbox (engtoolbox.org): a free, vendor-neutral engineering platform with hundreds of validated calculators and reference data across fire, CFD and general engineering.
- FireToolbox and CFDTtoolbox: two YouTube channels on fire safety engineering and CFD.
- Engineering apps and automated workflows built around modern AI tooling, in development.

Portfolio ghaffari.me

The projects, the platform and the work, in full.

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