



# Dr Mohammad Ghaffari.

Engineer *Physics into practice*

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## PROFILE

Mechanical engineer with a PhD in Mechanical Engineering from UNSW and a career spanning research and engineering practice. My work covers fire safety engineering, fluid mechanics, computational mechanics, heat transfer and numerical methods, with a common foundation in physics and engineering analysis. I work across performance based fire engineering, CFD and multiphysics simulation, while continuing to develop computational methods and engineering software. More recently, I have extended the same approach into machine intelligence, working from the underlying mathematics to build practical tools and automated workflows. Across these areas, I focus on rigorous analysis, clear technical communication and engineering solutions that can be applied in practice.

## EXPERIENCE

### Fire Safety Engineer

2025 - present

*Arup, Sydney*

- Fire safety strategies, code compliance assessments and performance based solutions for complex buildings and infrastructure.
- Preparation of fire engineering reports, technical assessments and supporting analysis from design development through project delivery.
- Multidisciplinary design coordination with architects, building services engineers, certifiers, clients and other project stakeholders.
- Technical engagement and submissions to fire authorities and approval stakeholders.
- Fire and smoke modelling with FDS to support performance based design.

### Fire Safety Engineer and CFD Modelling

2022 - 2025

*Lote Consulting, Sydney*

- Fire safety strategies, DtS assessments and performance based solutions across NSW, ACT and VIC.
- Preparation of FERs, FEBQs, FECDRs, FSURs, FSUBs, compliance assessments and supporting technical documentation.
- Fire, smoke, tenability, egress and ventilation modelling using FDS and Pathfinder, including Spec 43 assessments.
- Hazard and consequence modelling and fire brigade intervention modelling for emergency access and response strategies.
- Fire engineering coordination with clients, design teams, certifiers and approval authorities.
- Projects across data centres, industrial processing, food manufacturing, waste facilities, bushfire prone infrastructure and battery energy storage.

### Fluid Dynamics Engineer

2018 - 2020

*Kohandezh Engineering, Iran*

- Development of proprietary CFD solvers for fluid flow and thermal analysis.
- CFD based analysis and optimisation of heat exchangers and thermal equipment.
- Development of a 3D turbulent adjoint optimisation framework for engineering design.
- Fluid dynamics and thermal analysis of rotating machinery, including investigation of equipment failure.

### Graduate Fluid Dynamics Engineer

2017 - 2018

*Binasan Yekodo, Iran*

- Aerodynamic analysis and development work for vertical axis wind turbines (VAWTs).
- Application and development of high order numerical methods for fluid flow simulation.
- Development of a coupled fluid structure interaction (FSI) solver.
- Parallel implementation of numerical solvers across GPU and CPU architectures.

## EDUCATION

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### PhD, Mechanical Engineering

2020 - 2024

*University of New South Wales*

Fully funded doctoral scholarship

- Research in high fidelity numerical modelling of nonlinear fluid structure interaction and heat transfer using parallelised turbulent Lattice Boltzmann methods.
- Developed a coupled fluid, solid and thermal solver for multiphysics problems, with applications including biofluid mechanics and shape optimisation.
- Integrated adaptive grid refinement, parallel computing and turbulence modelling within a scalable numerical framework.
- Applied the framework to biofluid mechanics, thermoregulation, heat exchanger performance and the aerodynamic and thermal optimisation of micro aerial vehicles.

### Graduate Diploma, Fire Safety Engineering

2025 - present

*Western Sydney University*

- Part time postgraduate study undertaken alongside professional fire engineering practice.

### MSc, Mechanical Engineering

2014 - 2016

*Ferdowsi University of Mashhad*

- Advanced study in fluid dynamics, numerical analysis, CFD, heat transfer and combustion.
- Teaching Assistant in fluid mechanics and heat transfer, and Assistant Lecturer in Fortran and C++ programming applied to CFD and conjugate heat transfer.
- Master's thesis research on cavitating flows, using numerical modelling to investigate multiphase flow behaviour and cavitation characteristics.

### BSc, Mechanical Engineering

2009 - 2013

*Shiraz Azad University*

- Developed finite difference solvers in Fortran for heat transfer analysis, including a final year project on finned surface thermal performance.
- Completed practical training in pneumatics and hydraulics in collaboration with FESTO, with applications to industrial automation.
- Applied CFD using ANSYS Fluent, alongside practical training in industrial automation.

## MEMBERSHIPS

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Engineers Australia, Member

Society of Fire Safety (SFS), Engineers Australia

## ENGINEERING PRODUCTS

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- EngToolbox ([engtoolbox.org](http://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](https://ghaffari.me)

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

[hello@ghaffari.me](mailto:hello@ghaffari.me)