

# Ahmed Bakkar

Mechanical Engineer, PhD  
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## Profile

- Mechanical engineer with 7+ years of experience in Computational Fluid Dynamics (CFD).
- Professional experience working in HVAC systems design.
- Research experience in aerospace and renewable energy.
- Comprehensive knowledge of the Finite-Element Method (FEM) and multi-phase flow modelling.
- Knowledgeable in the areas of Fluid Dynamics, Heat Transfer and Turbomachinery.

## Skills

**Coding:** FORTRAN, C, C++, Python, MPI, openMP.

**Libraries:** PETSc, Metis, MUMPS, LiS.

**Software:** FENSAP-ICE, Fluent, openFOAM, MATLAB, ICEM, AutoCAD, Tecplot, Paraview.

**Language:** English (native), Arabic (native), French (B2), Dutch (A1).

## Current Position

**Postdoctoral Research Fellow**

01. 2018

**CFD Lab, McGill University**

Current

Montréal, QC, Canada

- Developed a 2-year research plan in collaboration with partners (Bell Helicopter , NSERC .
- Estimated research timelines and established work plans to ensure delivery deadlines are met.
- Assisted in managing research budget (~600K CAD).
- Co-supervise graduate students (Ph.D. and M.Sc.) in the following research areas: fluid-structure interaction using XFEM, smoothed particle hydrodynamics for droplet dynamics, gappy reduced order modelling for data reconstruction, and ice accretion and shedding tools for helicopters.

## Professional Experience

**Mechanical Design Engineer**

11. 2008

**WS Atkins**

03. 2009

Sharjah, UAE

- Responded to RFIs from contractor.
- Investigated using natural ventilation instead of conventional AC systems for an eco-lodge (LEED).
- Reviewed and adjusted thermal load calculations for carpark smoke clearance system.
- Performed detailed thermal load calculations for the various projects.
- Coordinated design issues with the various in-house departmental teams.

**Junior Mechanical Design Engineer**

09. 2007

**Dar Al-Handasah**

10. 2008

Giza, Egypt

- Participated in meetings with client and in-house teams to negotiate designs issues.
- Performed detailed hospital room pressurization in accordance with building standards.
- Designed under-floor HVAC system for international airport control tower.
- Conducted thermal load calculations and system designs for various projects.
- Reviewed plumbing system design and calculations for a residential project.
- led a team of draftsmen delivering working drawings to contractors.

## Education

**Doctor of Philosophy (Ph.D.) in Mechanical Engineering** 09. 2011  
**McGill University** 02. 2018  
Montréal, QC, Canada

- Thesis: "A Finite-Element Level-Set Eulerian Model of Supercooled Large Droplet Dynamics" [↗](#).
- Supervisors: Prof. Wagdi Habashi [↗](#), and Dr. Marco Fossati [↗](#).
- Introduced a novel approach improving the conservation characteristics of the Level-Set method.
- Developed a general multi-phase numerical framework in Fortran using MPI.
- Conducted a preliminary parametric study into supercooled large droplet impingement.
- Graduate courses: Advanced Fluid Mechanics, Applied Mathematics 1, Computational Aerodynamics, Finite-Element Methods in CFD, Turbomachinery and Propulsion.
- Teaching Assistant: Thermodynamics I, Mechanical Laboratories I, Turbomachinery and Propulsion and Finite-Element methods in CFD.

**Master of Science (M.Sc.) in Mechanical Engineering** 06. 2009  
**Cairo University** 08. 2011  
Giza, Egypt

- Thesis: "Humidification-Dehumidification of Saline Water Using Solar Chimney" [↗](#).
- Supervisor: Prof. Abdalla Hanafi.
- Developed a numerical model for a novel desalination plant using the Solar Chimney in MATLAB.
- Conducted a feasibility study for the proposed plant.
- Graduate courses: Theory of fine Measurements, Computational Methods in Energy, Advanced Fluid Mechanics, Turbulent Flow, Heat Convection.
- Teaching Assistant: Powerplant Systems Design and Fundamentals of Heat Transfer.

**Bachelor of Science (B.Sc.) in Mechanical Engineering** 09. 2002  
**Cairo University** 06. 2007  
Giza, Egypt

- Graduated with Honors, ranked top 2%.

## Awards

**McGill Engineering International Tuition Award** 09. 2011  
**McGill University** 04. 2014

"Funding to attract high calibre international doctoral students to the Faculty of Engineering's PhD programs"- 8K CAD per year for a maximum of 3 years.

**Adel Barakat Graduation Project Award** 00. 2007  
**ASHRAE, Cairo Chapter**

Awarded to the best graduation project in the area of Air-Conditioning between Cairo University, Ain Shams University and Alexandria University.

## Extra-curricular Activities

**VP Finance** 01. 2014  
**Graduate Association of Mechanical Engineering Students (GAMES)** 01. 2015

Mechanical Engineering Department, McGill University

- Managed budget (~5K CAD) assuring that it was in good standing.
- Negotiated with service providers and decided on student contribution amounts.
- Worked with various team members to organizing social events for graduate students.

**Hobbies:** Football (soccer), kickboxing, yoga, travelling and cooking.

**Please check my webpage for a list of publications** [↗](#)