

Khalil Al Handawi

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PROFILE

Application domains	Aviation management, aerospace remanufacturing, multidisciplinary design optimization
Technical skills	Numerical simulation, optimization, statistical modeling, machine learning
Software skills	MATLAB, Python (pandas, numpy, scipy, PyTorch, Flask), C++ (CUDA, Qt), R, MySQL
IDEs	VSCode, Visual Studio, RStudio, XCode (basic)
Engineering software	Abaqus, NX Siemens, ANSYS Fluent (basic usage)

EXPERIENCE

Department of Computer Science and Operations Research, Université de Montréal MONTRÉAL, CANADA
MAY 2022 – PRESENT *Postdoctoral Researcher*

- Analyze IATA data involving **25M flight schedules** using graph representation learning.
- Develop community detection algorithms for graphs with over **10K nodes** and **100K edges**.
- Organize flight schedule data into a mySQL database for archival, and retrieval of data.
- Perform research on graph representation learning methods for analyzing the data.

Department of Mechanical Engineering, McGill University MONTRÉAL, CANADA
SEP 2022 – DEC 2022 *Adjunct Lecturer*

- Was the sole instructor of the Engineering Systems Optimization course (MECH559).
- Developed [Python notebooks](#) as teaching aids for the students to understand the implementation of modern optimization algorithms and received an engagement rate of **70%** with the students.
- Hosted **two guest** lectures with aerospace industry professionals to demo optimization applications.

JAN 2021 – APR 2022 *Postdoctoral Researcher*

- Researched simulation-based decision-making in public health and policy making during epidemics.
- Developed [deep learning COVID-19 forecasting models](#) with an accuracy of ± 50 daily cases.
- Developed a hyperparameter optimization framework for machine learning based on direct search.
- Develop GPU accelerated [epidemic models](#) for high simulation throughput (**1000X**).

JAN 2017 – JAN 2021 *Research assistant*

- Part of **Canadian/European industrial project** investigating additive repair technologies for aeroengine parts. I focused on optimization of aerospace design for AM remanufacturing.
- Developed mathematical tools and [software](#) for design space exploration and optimization achieving a **99.8% reduction** in effort to explore a 4-dimensional design space relative to full factorial design.
- Participated in a [technology transfer](#) at GKN Aerospace, providing Python training on said tools.
- Resulted in the **best paper** award by the ASME Journal of Mechanical Design in 2021.

Systems Engineering Design Lab, Chalmers University of Technology GÖTEBORG, SWEDEN
SEP 2021 – DEC 2021 *Postdoctoral Researcher*

- Research change propagation and absorption in engineering design (applied to aeroengine systems).
- Authored a [Python library](#) for margin and change propagation management in engineering systems.
- Used said library in design space exploration to concurrently develop and analyze **6,552 conceptual designs** of an aeroengine component and [visualize the results](#) using interactive tools.

Khalifa University ABU DHABI, UAE
DEC 2016 *Visiting researcher, Center for Autonomous Robotic Systems*

- Reverse engineer a UAV for firefighting and carrying an extinguishant payload of **6 litres**.
- Achieved a flight time of **18 minutes** and resisting winds with speeds upto **8m/s**.

AUG 2013 – DEC 2016 *Research Assistant, Asset Integrity Management Systems Lab*

- Developed fiber optic structural monitoring sensors for mitigating upto **\$1M of corrosion costs**.
- Developed and simulated a [fiber optic-based corrosion sensor](#) with an accuracy of $\pm 2\text{mm/s}$.
- Developed a new accelerated corrosion testing setup to simulate **2 years of corrosion in 2 hours**.

EDUCATION

JAN 2017 – DEC 2020	Doctor of Philosophy Mechanical Engineering , CGPA: 4.00 CONCENTRATION Engineering design and optimization DISSERTATION <i>Optimization driven set-based design under uncertain requirements</i>	McGill University
AUG 2013 – DEC 2015	Master of Science Mechanical Engineering , CGPA: 4.00 CONCENTRATION Instrumentation and photonics DISSERTATION <i>Internal corrosion detection of oil and gas pipelines using fiber optics</i>	Khalifa University
AUG 2009 – JUNE 2013	Bachelor of Science Mechanical Engineering , FIRST CLASS HONOURS, CGPA: 3.97 CAPSTONE PROJECT <i>Development of a human operated mobile hexapod platform</i>	Khalifa University

AWARDS AND RECOGNITION

MAY 2022 – APR 2024	Postdoctoral fellowship (PDF) <i>National Sciences and Engineering Research council Canada</i>	90,000 CAD
MAY 2019 – DEC 2021	Doctoral Research award (B2X) <i>Fonds de Recherche du Québec - Nature et Technologies</i>	56,000 CAD
JAN 2017 – DEC 2019	McGill Engineering Doctoral Award (MEDA) <i>McGill University</i>	96,000 CAD

Our paper on scalable designs was selected for the 2021 ASME Journal of Mechanical Design Editor's Choice award	ASME IDETC 2022, ST. LOUIS, USA
Winner of best data visualization and was ranked 2nd for best presentation in the 11th Montreal Industrial Problem Solving Workshop	IVADO, MONTREAL, CANADA

SELECTED PUBLICATIONS

A. Khalil, **K. Al Handawi**, Z. Mohsen, A. Abdel Nour, R. Feghali, I. Chamseddine and M. Kokkolaras (2022). Weekly nowcasting of new COVID-19 cases using past viral load measurements. *Viruses*, 14(7): pp 1414. doi: [10.3390/V14071414](#)

K. Al Handawi and M. Kokkolaras (2021). Optimization of infectious disease prevention and control policies using artificial life. *IEEE Transactions on Emerging Topics in Computational Intelligence*, doi: [10.1109/TETCI.2021.3107496](#) funded by an NSERC discovery grant

K. Al Handawi, P. Andersson, M. Panarotto, O. Isaksson and M. Kokkolaras (2020). Scalable set-based design optimization and remanufacturing for meeting changing requirements. *Journal of Mechanical Design*, 143(2): pp 021702. doi: [10.1115/1.4047908](#)
funded partially by NSERC, FRQNT, CARIC and EU Horizon 2020 research and innovation programme

COURSE WORK

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| <ul style="list-style-type: none">• Advanced mechanics of materials• Engineering systems optimization• Continuum mechanics• Applied numerical methods• Applied finite element analysis | <ul style="list-style-type: none">• Material engineering and corrosion• Measurements and instrumentation• Advanced vibrations• Fracture mechanics• Viscous and compressible fluid flows |
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CONVERSATION STARTERS

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| <ul style="list-style-type: none">• Competitive gaming• Tabletop games (Warhammer) | <ul style="list-style-type: none">• 3D printing hobbyist• Tinkering and restoration of old machines |
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