

# Khalil Al Handawi, Ph.D.



Montréal Québec, Canada  
(514) 572-7367  
[khalil.alhandawi@mail.mcgill.ca](mailto:khalil.alhandawi@mail.mcgill.ca)  
[khalhandawi.github.io](https://khalhandawi.github.io)  
[github.com/khalhandawi](https://github.com/khalhandawi)  
[linkedin.com/in/khalhandawi](https://linkedin.com/in/khalhandawi)  
[scholar.google.com](https://scholar.google.com)

## PROFILE

Application domains	Aviation management, aerospace remanufacturing, multidisciplinary design optimization
Technical skills	Simulation, blackbox optimization, nonlinear programming, 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*

- Perform statistical analyses on IATA data involving flight schedules and passenger data.
- Apply community detection and graph representation learning algorithms on aviation networks.
- Maintain a mySQL database for archival, and retrieval of data.
- Extract insights and trends from learned representations relevant to air transportation.

### 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*

- Develop simulation-based decision-making tools for policy making during epidemics.
- Developed [statistical COVID-19 forecasting models](#).
- Developed a direct search-based hyperparameter tuning framework for non-parametric models.
- Develop GPU accelerated [agent-based models](#) for high simulation throughput.

JAN 2017 – JAN 2021 *Research assistant*

- Worked in a **Canadian/European industrial project** for investigating additive repair technologies within the aerospace industry.
- Developed parametric CAD modeling tools using NX Siemens and the NXOpen API to explore various design solutions for aerospace components.
- Developed parametric thermomechanical simulations in Abaqus to simulate additive manufacturing processes and assess residual distortion. The model was used for process optimization.
- Developed mathematical tools and [software](#) for design space exploration and visualization of high-dimensional design spaces that are based on blackbox optimization.
- Worked on 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 assessing the robustness of design solutions to changing requirements.
- Used said library in design space exploration to concurrently develop and analyze an aeroengine component design case and [visualize the results](#) using interactive tools.

### Khalifa University

ABU DHABI, UAE

DEC 2016 *Visiting researcher, Center for Autonomous Robotic Systems*

- Reverse engineer a drone for delivering an extinguishant payload for high-rise building fires.
- Work with the flight controls team to achieve stable flights against gust and extraneous factors.

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

- Developed fiber optic structural monitoring sensors for mitigating corrosion costs.
- Simulated a [fiber optic-based corrosion sensor](#) using waveguide equations and models.
- Developed accelerated corrosion testing setups to simulate said sensor prototypes.

## EDUCATION

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

## AWARDS AND RECOGNITION

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

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

## PUBLICATIONS

### Submitted preprints

**K. Al Handawi**, A. Brahma, D. Wynn, M. Kokkolaras and O. Isaksson (2023). Design space exploration and evaluation using margin-based trade-offs. *Journal of Mechanical Design*  
funded partially by NSERC and Area of Advance of Chalmers University

### Refereed Journal Articles

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**, M. Panarotto, P. Andersson, O. Isaksson and M. Kokkolaras (2021). Optimization of design margins allocation when making use of additive remanufacturing. *Journal of Mechanical Design*, 144(1): pp 012001. doi: [10.1115/1.4051607](#) funded partially by NSERC, FRQNT, CARIC and EU Horizon 2020 research and innovation programme

M. Chehadeh, M. Wahbah, M. Awad, O. AbdulHay, **K. Al Handawi**, L. Seneviratne, I. Greatbatch and Y. Zweiri (2021). Novel aerial firefighting system for suppression of incipient cladding fires. *Journal of Field Robotics*, (In Press)  
funded by Emaar Properties PJSC

**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

**K. Al Handawi**, N. Vahdati, O. Shiryayev and L. Lawand (2017). Analytical modeling tool for design of hydrocarbon sensitive optical fibers. *Sensors*, 17(10): pp 2227. doi: [10.3390/s17102227](https://doi.org/10.3390/s17102227)

*funded by Abu Dhabi National Oil Company*

L. Lawand, O. Shiryayev, **K. Al Handawi**, N. Vahdati and P. Rostron (2017). Corrosivity sensor for exposed pipelines based on wireless energy transfer. *Sensors*, 17(6): pp 1238. doi: [10.3390/s17061238](https://doi.org/10.3390/s17061238)

*funded by Abu Dhabi National Oil Company*

**K. Al Handawi**, N. Vahdati, P. Rostron, L. Lawand and O. Shiryayev (2016). Strain-based FBG sensor for real-time corrosion rate monitoring in pre-stressed structures. *Sensors and Actuators B: Chemical*, 236: pp 276 – 285. doi: [10.1016/j.snb.2016.05.167](https://doi.org/10.1016/j.snb.2016.05.167)

*funded by Abu Dhabi National Oil Company*

## Conference Papers

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**K. Al Handawi**, P. Andersson, M. Panarotto, O. Isaksson and M. Kokkolaras (2020). Scalable set-based design optimization and remanufacturing for meeting changing requirements. in *Proceedings of the International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, Virtual conference, IDETC2020.

L. Lawand, **K. Al Handawi**, M. Panarotto, P. Andersson, O. Isaksson and M. Kokkolaras (2019). A lifecycle cost-driven system dynamics approach for considering additive re-manufacturing or repair in aero-engine component design. in *Proceedings of the Design Society: International Conference on Engineering Design*, Delft, Netherlands, ICED19: pp 1343 – 1352. doi: [10.1017/dsi.2019.140](https://doi.org/10.1017/dsi.2019.140)

**K. Al Handawi**, N. Vahdati, O. Shiryayev, and L. Lawand (2016). Corrosion monitoring along infrastructures using distributed fiber optic sensing. in *Proceedings of SPIE Smart Structures/NDE, International Society for Optics and Photonics, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Las Vegas, USA, SPIE2016. doi: [10.1117/12.2218820](https://doi.org/10.1117/12.2218820)

L. Lawand, O. Shiryayev, **K. Al Handawi**, N. Vahdati and P. Rostron (2016). Corrosivity monitoring system using RFID-based sensors. in *Proceedings of SPIE Smart Structures/NDE, International Society for Optics and Photonics, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems*, Las Vegas, USA, SPIE2016. doi: [10.1117/12.2218813](https://doi.org/10.1117/12.2218813)

## COURSE WORK

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|------------------------------------|--|
| • Advanced mechanics of materials  | • Material engineering and corrosion   |
| • Engineering systems optimization | • Measurements and instrumentation     |
| • Continuum mechanics              | • Advanced vibrations                  |
| • Applied numerical methods        | • Fracture mechanics                   |
| • Applied finite element analysis  | • Viscous and compressible fluid flows |

## CONVERSATION STARTERS

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| • Competitive gaming | • 3D printing hobbyist           |
| • Tabletop games     | • 3D modeling and graphic design |