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Khalil Al Handawi, PhD

EDUCATION

2017 – 2020 **Doctor of Philosophy**
Mechanical Engineering
McGill University

2013 – 2015 **Master of Science**
Mechanical Engineering
Khalifa University

2009 – 2013 **Bachelor of Science**
FIRST CLASS HONOURS
Mechanical Engineering
Khalifa University

EXPERTISE

Optimization
Machine learning
CAD/3D modeling
Software development
Uncertainty quantification
Scientific computing

AWARDS

2018 **Doctoral research award**
Fonds de Recherche du Québec

2017 **McGill engineering doctoral award**
McGill University

2013 **ADNOC graduate fellowship**
Khalifa University

RESEARCH INTERESTS

Artificial intelligence in design
Design for changing requirements
Numerical simulation
Systems optimization
Surrogate modelling

PUBLICATIONS

Google Scholar Profile

RESEARCH

"Optimization of infectious disease prevention policies using agent-based modeling"

How can we apply the principles of design and decision-making to help bring the pandemic under control? To answer this question, I modeled how an infectious disease spreads in a small population. Diseases such as COVID-19 spread through social interaction. I programmed intelligent agents to model a complex social system. I used optimization to determine the critical amount of intervention necessary to keep the disease in check. I used GPU acceleration for the agent-based simulation and obtained performance enhancements of up to **100X** a CPU simulation. The policies I obtained had a socio-economic impact that is **5 times less** than that of a complete lock-down.

`C++` `CUDA` `python` `Qt` Online open-source code

"Optimization-driven set-based design for dynamic design requirements"

How do you design a component when the design requirements can change at any moment and without advance notice? That is the question my dissertation tries to answer. To do so, I came up with design metrics for qualitative descriptions such as flexibility and robustness. I used optimization, and machine learning to obtain thousands of designs. This is a **1000 fold** increase in the number of alternatives presented to clients in the aerospace industry. This culminated in a technology transfer at GKN aerospace to provide them with a **competitive edge** and shorten lead times.

`python` `C++` `MATLAB` `R` Online open-source code Online news article

WORK EXPERIENCE

Systems Optimization Lab, McGill University — CURRENT, FROM JAN 2021
Postdoctoral Researcher

- Built and implemented a COVID-19 predictive model in a time of uncertainty.
- Came up with a project for students to understand multidisciplinary optimization.

McGill University — JAN 2017 – DEC 2020 (FT)
Research and teaching assistant

- Came up with new ways to teach programming skills to engineering students.
- Used design optimization and set-based design to give designers a competitive edge.

GKN Aerospace Engine Systems — SUMMER 2017, 2018, 2019 (PT)
Visiting researcher

- Transfer academic research to the industry by providing training and workshops.
- Collect information about industrial workflows to guide academic research.

SKILLS

OPERATING SYSTEMS
SCIENTIFIC LIBRARIES — Qt, PyTorch, TensorFlow, CUDA, Intel MPI, OpenCL
SOURCE CONTROL — Git, Perforce
INTERACTIVE DEVELOPMENT ENVIRONMENTS — VSCode, Xcode, Visual Studio

SPOKEN LANGUAGES

ENGLISH	VERBAL	●●●●●●●
	WRITTEN	●●●●●●●
ARABIC	VERBAL	●●●●●●●
	WRITTEN	●●●●●●●
FRENCH	VERBAL	●○○○○○○
	WRITTEN	●●●●○○○

PROGRAMMING LANGUAGES

PYTHON	●●●●●●●
C++	●●●●●●○
VB	●●●●○○○
R	●●●○○○○
MATLAB	●●●●●●●
JAVASCRIPT	●●●●○○○

COMMUNICATION SKILLS — Excellent written and verbal presentation skills.
Data analysis, proposal writing, and questionnaire design.