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Khalil Al Handawi, PhD

Engineer, designer, and researcher

ABOUT ME

I believe that physics and artificial intelligence should be two sides of the same coin. One cannot exist without the other. How? By cross-validation. In this way, the toughest physics and mathematics problems can be solved! This philosophy is what drives my research.

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
56,000 CAD

2017 **McGill engineering doctoral award**
McGill University
96,000 CAD

REFERENCES

Prof. Michael Kokkolaras

POSITION Associate Professor
EMPLOYER Department of Mechanical Engineering, *McGill Univeristy*
EMAIL michael.kokkolaras@mcgill.ca

RESEARCH

"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 dissertations 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. This culminated in a technology transfer at GKN aerospace.

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

"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. 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

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.

COMPUTER SKILLS

OS's
LIBRARIES Qt, PyTorch, TensorFlow, CUDA, Intel MPI, OpenCL
SOURCE CONTROL Git, Perforce
IDE's VSCode, Xcode, Visual Studio

PYTHON
C++
VB
R
MATLAB
JAVASCRIPT

SKILLS

Goal Oriented

I believe in action over long-winded discussions. I listen to everyone's viewpoints and use my judgement to immediately act based on consensus to achieve goals quickly and efficiently.

Passionate

I have been interested in computers and video games for as long as I can remember. I love using my physics and engineering knowledge to bridge the gap between real and virtual computer worlds.

Physical Dexterity

I specialize in gymnastics and calethtinics training for sound body and mind necessary to maintain the focus needed for innovative problem-solving.