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Khalil Al Handawi, PhD

ABOUT ME

I am a researcher with 4 years of experience in simulation-based design, optimization, and high-performance computing. I enjoy working with large multidisciplinary teams and projects and love the prospect of mentoring and supervising other aspiring engineers.

EDUCATION

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

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

2009 – 2013 **Bachelor of Science**
Mechanical Engineering
Khalifa University

RESEARCH EXPERIENCE

SYSTEMS OPTIMIZATION

Multi-disciplinary optimization
Gradient-based optimization
Stochastic optimization
Derivative-free optimization

NUMERICAL SIMULATION

Finite element modeling
Agent-based modeling
Surrogate modeling

MACHINE LEARNING

Hyperparameter optimization
Feature engineering
Classification and regression
Sequence completion models (RNNs)

UNCERTAINTY QUANTIFICATION

Reliability-based design
Monte Carlo simulation

AWARDS

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

2017 **McGill engineering doctoral award**
McGill University

PUBLICATIONS

Google Scholar Profile

RESEARCH

"Optimization of infectious disease prevention policies using agent-based modeling"
RESEARCH QUESTION: *How can we apply the principles of design and decision-making to help bring the pandemic under control?*
OUTCOMES: C++ CUDA python Qt Open-source code

- Epiodomological model based on intelligent agents that can model **complex social systems**
- Optimal health policies to keep the disease in check
- GPU-accelerated agent-based simulation at least **100X** faster than CPU simulations
- Policies with socio-economic impact that is **5 times less** than that of a complete lock-down

"Optimization-driven set-based design for dynamic design requirements"
RESEARCH QUESTION: *How do you design a component when the design requirements can change at any moment and without advance notice?*
OUTCOMES: python C++ MATLAB R Open-source code Online news article

- **Design metrics** for qualitative descriptions such as flexibility and robustness
- Machine learning model to **encode expensive structural simulations**
- Inference engine for generating **thousands** of feasible conceptual designs
- Technology transfer at GKN aerospace to help **shorten product lead times**

WORK EXPERIENCE

Systems Optimization Lab, McGill University — CURRENT, FROM JAN 2021 (FT)
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, CUDA, Eigen, dlib
SOURCE CONTROL Git, Perforce
INTERACTIVE DEVELOPMENT ENVIRONMENTS VSCode, Xcode, Visual Studio

DATA MANIPULATION

PYTHON	VISUALIZATION	●●●●●
	DATA MINING	●●●○○
	MACHINE LEARNING	●●●●○
MATLAB	TRANSFER LEARNING	●●○○○
	SIMULINK	●●●●●

SOFTWARE AND HPC

C++	OOP	●●●●●
	USER INTERFACE	●●●○○
	PARALLEL PROCESSING	●●●○○
	GPU COMPUTING	●●●●○
	IMAGE PROCESSING	●●●○○

SPOKEN LANGUAGES English (Fluent), Arabic (Fluent), French (Basic)
COMMUNICATION SKILLS Excellent written and verbal presentation skills. Data analysis, proposal writing, and questionnaire design.
INTERPERSONAL SKILLS Love working with others as a team, learning from them, and teaching others.