

January 6, 2022

National Research Council of Canada (NRC)
Ottawa, Ontario, Canada
Re: Research associate application

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Dear committee member,

I would like to express my enthusiasm and excitement for the opportunity to be a part of Canada's largest research organization, The National Research Council of Canada (NRC). I am a strong believer in Canada's commitment to diversity and inclusiveness in the workforce which made me look towards Canada for my STEM education ever since I was a highschool student. I have recently completed my doctoral studies at McGill University and I feel that it is time to use my years of training and experience as a researcher to support Canada's vision in shaping this world into a better place for all people. The research associate position at NRC is the perfect place for me to project and share my ideas with Canada and the world.

I believe that my experience during my doctoral studies would be valuable to supporting Canada's manufacturing and production sectors. My PhD dissertation focused on surrogate modeling of complex aeroengine systems and the use of surrogate-based optimization to explore lots of different designs with relatively low computational effort. This work resulted in a design toolbox for my industrial collaborators at GKN Aerospace, Sweden. The design tools I developed emphasized flexibility and scalability of products for ease of remanufacturing in the future. This helps keep aircraft parts in service for longer periods of time without becoming obsolete. This can drastically reduce the lifecycle cost of such products and environmental impact by proxy.

I also worked on public health projects during my doctoral studies and developed an epidemiological simulation application for predicting the trajectory of pandemics. I managed to model a complex phenomena such as a human social network using 2D particle dynamics with collision, attraction, and repulsion behavior to simulate social distancing and large gatherings. I wrote a program to implement this model and made predictions about the course of the pandemic in Québec to provide informed public health policies about the best measures to control the spread of the COVID-19 pandemic.

I have worked with data science related fields as a volunteer in various industrial workshops and collaborated with the International Air Travel Association (IATA) during the Montreal Industrial Problem Solving (IPSW) workshop. I supervised a group of students with various backgrounds in STEM (including theoretical physicists) on how to use big data analysis tools to identify trends and useful insights from airline schedules and passenger data using unsupervised learning techniques such as k-means clustering. The work resulted in my students winning multiple awards during the workshop. I was very proud of how far my students have come along in a matter of weeks which made want to pursue academic career options even more. I believe that NRC will help me shape future generations of scientists and researchers allowing me to make an even bigger impact in the long term.

I believe that my strong mathematical and simulation skills, experience in software, understanding of the industry's needs, and supervision experience will add a lot of value to NRC and help us both realize our vision of a better tomorrow for everyone around the world. Please feel free to peruse my portfolio and projects on my website (<https://khbalhandawi.github.io/projects/>). Looking forward to hearing back.

Yours sincerely,
Khalil Al Handawi

