Khalil Al Handawi, PhD
500 Avenue Des Pins Ouest
H2W 1S7, Montréal, Québec, Canada
+1 (514) 572-7367
khalil.alhandawi@mail.mcgill.ca

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ANSYS, Inc., Montréal, Québec, Canada, H3A3G4
Subject: R&D Engineer II - Thermal Systems

Dear Hiring Manager,

I am writing to express my interest in the R&D Engineer in Thermal Systems at ANSYS, Inc. I am excited about the opportunity to leverage my optimization, simulation, and modeling experience for helping reshape the simulation industry and enable new innovations and design in a digital era.

I understand that as part of the role, I will be solving software engineering problems pertinent to thermal management design and simulation. I have relevant experience in the field of thermal modeling and software development as a researcher at McGill University and Université de Montréal. I have 6 years of experience doing research on aerospace, aeroengine, and aviation related projects at said institutions, where thermal modeling and structural simulation are an integral part of design.

During my doctoral and postdoctoral research, I modeled additive manufacturing (AM) processes on aeroengine components using thermomechanical modeling to capture the residual stress and deformation due to the localized temperature gradients caused by a moving heat source. The entire simulation and design workflow was automated using API scripting in various commercial software to generate and analyze parametric CAD models (generated using NX Seimens and analyzed using Abaqus CAE using structural and thermal simulation) which gave me the necessary exposure to simulation tools that are commonly used in the industry. I also solved robust design optimization problems where some of the design requirements are modeled by probabilistic functions. I authored a Python library and a web application to support the design activities of our industry partner, GKN Aerospace engine systems.

In addition to my simulation skills, I have authored several software and simulation programs for research purposes in various application domains (such as healthcare and commercial aviation). I wrote a CUDA accelerated C++ simulation for the simulation of pandemics giving me exposure to high performance computing and multithreading. I was also an adjunct lecturer at McGill University, teaching the engineering systems optimization course (MECH559) to engineering students. I authored several notebooks in Python and Julia to help the students understand the implementation of said algorithms and solve real-world engineering problems in their projects.

I am currently a post-doctoral researcher at the department of computer science and operations research (DIRO) at the Université de Montréal as part of an industrial project with the international air transport association (IATA). My current research focuses on graph representation learning from aviation data collected over the last decade to assess the effectiveness and impact of the IATA operation safety audit (IOSA) on air travel accessibility and cooperation between airlines.

I believe these experiences are relevant to the role in the following ways:

- I can apply software development best-practices such as unit-testing, documentation, and maintenance given my experience in authoring a Python library for use by other researchers.

- I have a good understanding of the industry's simulation needs given my experience working with various industry partners such as GKN Aerospace that regularly employ thermal modeling.
- I can navigate thermal modeling software given my experience with non-ANSYS commercial packages (Abaqus CAE) and perform static and transient thermal simulation.
- I can develop and validate models (both simulation-based, and statistical) given my previous modeling and simulation experience during aerospace design, healthcare, and aviation related projects.
- I can combine my domain knowledge in mechanical engineering and physics-based modeling with software engineering given the multidisciplinary nature of my research.

Thank you for considering my application. I would be honored to have the opportunity to discuss my qualifications further and show you my portfolio of projects. Please feel free to contact me through any of the channels at the top of this letter.

Best regards,

Khalil Al Handawi