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Ansys, Montréal, Québec, Canada
Re: R&D Engineer II
w/m - 10867

Dear hiring manager,

I would like to express my enthusiasm and excitement for the opportunity to be a part of Ansys and work with leading industry experts on developing cutting-edge simulation and computational solutions. I have worked with complex engineering models for the better part of a decade since the beginning of my graduate studies and have a good understanding of the modeling needs and expectations of various industries ranging from energy, aerospace, and healthcare. I understand, that the position pertains to the computational electromagnetic (CEM) engines of the ANSYS HFSS simulation product. I have experience with other aspects of CAE but have not worked directly with electromagnetic simulations in the past.

The main emphasis of my doctoral dissertation was on mitigating uncertainty and change during engineering design. This task required access to a variety of simulation and data-driven models to inform decisions and estimate uncertainty at various stages of engineering design. This task also involved a lot of design automation and required the used automated tools to ingest engineering data and construct suitable surrogate models in terms of how well they approximate the performance and feasibility of the design during design space exploration.

I integrated other open-source surrogate modeling libraries as part of my framework to achieve the required objectives of my research. This exposed me to a lot of surrogate modeling software that can be used to inspire and improve existing postprocessing and data visualization workflows at the HFSS simulation product. These tools were developed in both C++, python, and MATLAB and can ported to the language of choice during development. I applied these solutions to real industrial problems in the aerospace industry at GKN Aerospace, Sweden and gained valuable practical experience as a result of doing so.

I also worked on public health projects during my postdoctoral studies and developed an epidemiological simulation application for predicting the trajectory of the pandemic. The simulation was interactive and employed a Qt user interface for displaying results and allowing the user to interact with the simulation in realtime. It is from this exercise that I am familiar with sockets and signals to communicate between the C++ backend and the UI. I have also used parallel computation as part of this software project. I used the CUDA C++ API to accelerate linear algebra operations. I also have some experience with the intel MPI API for parallel computation that I have used to run multiple simulations of said model in parallel during optimization studies. This experience helped familiarize me with Object-Oriented Programming (OOP) concepts in C++ development and should prove valuable when attempting to author useful digital solutions, where computational efficiency and cost are key.

I also have experience with a number of machine learning frameworks such as PyTorch and automatic differentiation which could prove useful in building models where training data is abundant and in more recent applications, assist with approximating the solutions to known Partial Differential Equations (PDEs) common in engineering simulation (e.g., Navier-Stokes equations).

I have recently started a position in the Computer Science and Operations Research Department at the Université de Montréal and believe that my network there will be valuable to Ansys when research and development are necessary to push the limits of CEM engines. I am working with Prof. Fabian Bastin, who would be very happy to form collaborations and provide useful insights and contributions to the Ansys development team.

Finally, I have worked on small scale software development projects at various research labs, particularly the systems engineering design lab at Chalmers University, Sweden to develop open-source python packages for translating theory into practice and software. This experience has taught me how to work in a team albeit not a large one as would be the case in industry. Nonetheless, I have learned a lot of sound coding practices and package development standards that ensure collaboration and development are possible by others. I am also experienced at using git for source control.

I believe that my strong mathematical and simulation skills, experience in software development, and understanding of the industry's simulation needs will add a lot of value to the development efforts of the Ansys. I hope you enjoy going through my profile and my projects on my website and I hope we can discuss all of this. Needless to say, I am a huge fan of the technologies and products of Ansys which were pivotal for my engineering education. I feel that this passion will push me far beyond my abilities.
(https://khbalhandawi.github.io/projects/)

Yours sincerely,

Khalil Al Handawi