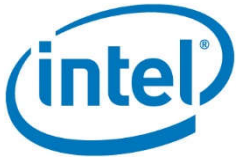
Internship subject
Fast Thermal Simulation of Full Electronics Devices



Our team
Within Intel, our team develops power and thermal simulation products, to enable early virtual prototyping for the next generations of Intel products. The Intel Docea simulation solutions we develop enable design optimization (longer battery life, more efficient architectures) by enabling the estimation of the power consumption 3 years before the products are shipped.
Our team, based in Moirans (Grenoble area) France, works in an exciting innovating and international context being tightly connected to other Intel teams architecting the future client and server Intel products, but also with external customers from different continents.

Internship description & objectives
The thermal simulation has become a key point in the design of modern microelectronic devices. For instance, the edge and mobile devices are more and more constrained (thin, light, …) while the CPUs are dissipating higher and higher power densities, resulting in hotspots, frequency reductions and in the end performance reductions.

To enable efficient products by design, the Intel Docea team provides solutions for fast thermal simulation, enabling the prediction of the temperature profile in the system during an application execution years before the products actually exist !

The high simulation speed we provide rely on model compaction technique based on a Model Order Reduction algorithm. This technique provides incredible speedup factors (x10000) while preserving a very good accuracy (more than 95%). The main drawback of the method is that it takes time to generate the model and changing design parameters has a significant cost in exploration phases. To reduce this penalty and keep on enlarging the number of configurations that can be simulated, we want to extend our models with more parameterization, enabling to change design parameters (eg fan speed, material conductivities, …) on the compact model itself instead of generating a new one. The challenge consists in augmenting the model capabilities while preserving its very high simulation speed.

The objective of the project is to identify the most sensitive parameters to preserve and to compare different parameterization solutions, based on state-of-the-art extensions of the Model Order Reduction technique or based on the modern and scalable machine learning technology.
Development/Research responsibilities will include theoretical analysis and validation of the developed methodology by a demonstrator.

Student qualification
Final year of French Engineering school or Master's degree, preferably with a focus on computer sciences.
The student must have proficiency in both written and spoken English. He/She must be proactive, autonomous and have problem solving ability, and willingness to learn.

Appreciated skills
- Software development and scripting (Matlab/Python)
- Numerical analysis
- Thermal/Fluid simulation (CFD)
- Machine learning

Other
Location: Moirans, France (Grenoble area)
Starting date: between february and april 2020.
Duration: ~ 6 months