Evidence of Excellence for Tesla's Thermal Systems Aerodynamicist Position

As a master’s student in Aerospace Engineering at the University of Michigan Ann Arbor, I believe my academic and industry experiences align perfectly with the requirements of the Thermal System Aerodynamicist position.

During my internship at Zoox Inc., I took charge of a stagnant coolant flow-mapping test rig for the L5 vehicle motor and battery cooling system. Within a span of 9 weeks, I led the project to output critical flow data for the team, which includes pressure drops across each thermal hardware and system flow rates across each parallel flow branch. I tested 175 different system configurations, extracting valuable insights that led to design recommendations capable of potentially improving the system flow rate by 7.5%.

Furthermore, my time at Volvo Group Truck Technology saw me utilizing Star CCM+ and RANS turbulence model to conceptualize a swirl expansion tank. This tank was not only optimized to attain a 99% separation efficiency but also achieved a substantial 40% reduction in mass from its original conception. I also simulated water-injection within air-intake using PowerFLOW, ensuring that the water separation satisfies the requirement outlined by SAE J554. It also provided me with insights into advanced LES turbulence model and the Lattice-Boltzmann method.

On a personal initiative, I coded a custom CFD solver to improve my understanding of the fundamental mathematics behind numerical solvers. This solver, built using a combination of C++ and MATLAB, is capable of solving Euler’s Equation by integrating both first and second-order Finite Volume Methods and higher-order Discontinuous Galerkin methods. To optimize computational efficiency, I also introduced an adaptive meshing algorithm that refines flow regions exhibiting a combination of high Mach number gradients and large cell sizes. For all simulations, I was able to converge down to a 5th or even 6th degree order of accuracy. This project has given me tremendous insights into the operating principles behind these numerical solvers and, most importantly, their limitations in solving complex problems compared to physical testing.