

Computational Software Meets Generational Industry Drivers

By Anirudh Devgan 07.13.2020

Technology invokes change, but truly disruptive technology is normally only experienced once in a generation. It is unprecedented that today there are five disruptive technology drivers, simultaneously exerting significant forces on vertical markets.

Uncertainty is all part of a dynamic, commercial landscape, but its effect can be offset by recognizing and aligning with industry drivers. In the area of electronic system design, these drivers are horizontal, and they shape the predominant vertical sectors: automotive, industrial, aerospace, consumer and medical. The larger and more dynamic the end market is, the more strongly the drivers' influence is felt.

Those five generational drivers are well-known: 5G, artificial intelligence/machine learning (AI/ML), hyperscale computing, the industrial internet of things (IIoT), and autonomous vehicles. The common denominator among them, at a macro level, is perhaps less well known. Computational software is the enabling technology upon which all these drivers rely, and it is innovation in computational software that is helping shape the future.

Most people can appreciate that, individually, each of the five high-level drivers will completely transform its immediate environment. 5G, for example, will fundamentally change not just mobile communications but all forms of wireless

connectivity, resulting in entirely new applications and shifting business models. Manufacturing gets smarter, as the IIoT is reshaping the industrial platform. AI and ML now scale down to the smallest edge devices and are no longer restricted to Internet-oriented business models. Advanced driver-assistance systems (ADAS) continue to progress and will ultimately deliver full autonomy; their influence is now being felt in the development of all vehicle types.

These technologies have followed their own individual development paths. And yet they are now becoming intimately codependent. Autonomous vehicles cannot exist in a controlled environment; they must interact with an untamed world, and this will rely heavily on the features of AI and ML and the high-speed, wide bandwidth of 5G connectivity. In the background, there will be racks of hyperscale computing handling the terabytes of data generated by autonomous vehicles and the supporting infrastructure.

Computational software

This complexity is underpinned, supported and managed by computational software. Innovations here are advancing the state of the art of electronic design in each of the five drivers, providing engineers with the necessary tools to meet the challenges involved.

Computational software innovation is occurring in three key areas. First, we're seeing fully integrated EDA tool flows, including the introduction of ML capabilities with the goal of producing the best possible silicon. Second, the growing prevalence of distributed computing and multi-core computation on a broader scale is resulting in gains in both scalability and throughput while utilizing less expensive servers. Finally, system complexities make it necessary to perform multi-physics analysis of silicon, packages, PCBs, and connectors. Co-design and co-optimization have become essential to meet escalating system performance requirements.

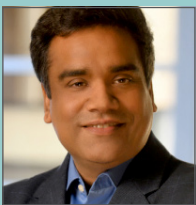
The tremendous level of complexity involved demands a new approach to the underlying design methodologies. These innovations in computational software better support the development of the semiconductor and software technologies now fundamental to each of the drivers. In order to achieve their design goals in this new normal, designers are demanding this kind of increased excellence in semiconductor design. The systems built using these tools comprise semiconductors, integrated with software, extended through communications and made dynamic with sensors. They are enabling new applications and form factors, which compose part of a larger, wider network of

devices, collecting, transmitting and processing data to make intelligent decisions and take action.

This is a watershed moment, from which everything else will flow. When we consider how they must now interact and work together, it is clear that the inherent complexity associated with each of these technology drivers is increasing exponentially and can only be managed using computational software.

These drivers are already stimulating a high degree of integration and application optimization in electronic design. Many of the companies actively leading in the five technology drivers now take ownership of the entire stack, all the way down to the embedded software and underlying silicon. With the expansion of computational software to address new and broader requirements of Intelligent System Design, implementation of the five drivers is not only attainable, but also scalable and manageable.

We are now living through a fundamental moment in the evolution of electronics design. Without the best computational software, there really is no way of addressing the scope of these systems or the enormity of the design challenges involved. For this reason, Cadence is leveraging its expertise in computational software to address these most pressing design challenges.



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