

Embedded Solution Product of the Year: Electronic Industry awards 2021

## Xilinx Introduces Kria Portfolio of Adaptive System-on-Modules for Accelerating Innovation and AI Applications at the Edge

### Innovation

The pace of AI development is increasing, but hardware is a limiting factor. Heterogeneous adaptive compute is needed to keep pace with innovation, and most importantly, to deploy those innovations into the applications that will benefit from them. Kria™ SOMs are meant to rapidly deploy ideas into edge AI applications such as smart cities, security, retail analytics, and machine vision. Furthermore, they enable the update of those ideas over time through over-the-air (OTA) updates. Unlike other edge AI products that allow software updates but are limited by fixed accelerators, Kria SOMs offer two degrees of flexibility—software and hardware over time. Users can adapt the I/O interfaces, vision processing, and AI accelerators to support some or all of the following: MIPI, LVDS, and SLVS-EC interfaces; higher quality, specialized high-dynamic range imaging algorithms for day or night; 8-bit deep learning processing units, or in the future, 4-bit or even binary neural network approaches. The intersection of multi-modal sensor fusion with real-time AI processing has never been more accessible than this, starting with the Xilinx® KV260 Vision AI Starter Kit and deploying into production with the Kria™ K26 SOM.



The Xilinx KV260 Starter Kit takes a credit-card sized Kria K26 SOM and pairs it with a vision AI-focused carrier card to rapidly get developers on the path to production. The heart of the system is a Kria-specific variant of a Xilinx® Zynq® UltraScale+™ MPSoC with quad-core A53 application processor, dual-core R5F real-time processors, GPU for graphics, H.264/265 video codec, numerous peripherals, copious amounts of high-speed parallel and serial I/O, and unique FPGA fabric, among other features. The K26 SOM includes 4GB of 64-bit DDR4 memory, eMMC and QSPI flash memory, power supplies, and TPM2.0 to augment the hardware root-of-trust built into the Zynq UltraScale+ MPSoC—making the K26 the most cyber secure SOM on the market.

The carrier card portion of the KV260 Starter Kit focuses the K26 on vision AI applications through a trio of MIPI sensor connectors, dedicated ISP chipset, HDMI and display port outputs, Ethernet, multiple USB3.0, Pmod expansion, and SD card connectors. The ecosystem can develop different carrier cards to focus the K26 on a broader scope of applications.

The hardware is the first thing the user experiences, but significant innovation occurs in the design flow. Xilinx and its ecosystem partners have loaded an expanding set of applications onto the Xilinx App Store that provide pre-built hardware-accelerated applications for them to base their development. Available to the user are apps including smart camera, AI box, shopper re-identification, defect detection, license plate recognition, high-dynamic range ISP, with more on the way. In today's market, typical apps deliver more than unique software utilizing the same hardware engines. Additionally, apps are designed with customized pre-built hardware acceleration optimized and targeted for the application's individual needs. This precludes the need for AI and embedded software designers to leave their comfort zone of Caffe, Pytorch, C++, and Python frameworks and languages to wade into the uncharted waters of FPGA design.

### Differentiation

The Xilinx KV260 Starter Kit, when compared to the Jetson Nano Developer Kit (<https://bit.ly/2MEeZiB>) and the Jetson TX2i Developer Kit (<https://bit.ly/3rw23Nz>), offers several key differentiating elements. The KV260 Starter Kit offers 3X or better, AI performance with significantly lower latency than the Nano across neural networks such as Resnet-50, Inception-v4, and SSD MobileNet-v2. Additionally, there is a 2X performance/watt advantage over the TX2i.

### Customer Impact

Kria SOMs, starting with the KV260 Starter Kit, enable embedded and AI software developers that want to adopt the benefits of FPGA technology in production systems but don't know where to begin. Xilinx has established itself by offering this exclusive value proposition. However, until Kria SOMs, this wasn't accessible to the majority of AI and embedded developers, with no FPGA experience. The concept of accelerated applications breaks the stalemate by having the FPGA design completed for the user, partly or wholly, as desired.



### Testimonial

Kutleng is one of our early access customers (pre-launch), based in South Africa. Past Xilinx projects have included a wildlife tracking camera for game parks.

“The Kria SOM helped us save more than 12-18 months of development time and complexity. We did not have to deal with all the complex issues surrounding a good PCB design with the MPSoC and DDR4 memory. It is self-contained with power supplies, memory, and many essential interfaces. All we needed to do was add 5V power and connect the I/Os,” said Benjamin Hlophe, director technology operations at Kutleng Engineering Technologies. “We are now able to fast track the launch of several new products within 2 months thanks to the Kria SOM. We are using it for vision applications, and with almost each and every vision function, Xilinx has answered with available Accelerated Applications for its SOM. There is hardly a need to write any HDL code. We can just imagine how many products we will be able to launch and open new markets within 24 months. The Kria SOM is a game changer. I expect it to quickly become the highest volume selling Xilinx product.”

### Market Impact

According to Global Market Insights, the SOM (System on Module) Market size was estimated at around 1.5B USD in 2019 and is poised to grow at a compound annual growth rate (CAGR) of 10 percent from 2020 to 2026, reaching \$2.5B in 2026.

“The proliferation of AI technology in embedded development is boosting the market revenue. The AI-infused embedded modules are widely adopted in object & facial recognition, virtual assistance, speech recognition, and other applications. SOMs offers high-performance, low-power requirements, and improved connectivity, accelerating their demand in mobile devices, smart homes, and IoT devices. These benefits have led major market players to accelerate the development of AI integrated modules to gain high competitiveness among other companies.”

Source <https://www.gminsights.com/industry-analysis/system-on-module-market>