



Xilinx System-on-Module Product Announcement

Evan Leal, Director of Product Marketing, Boards & Kits

Chetan Khona, Director of Industrial, Vision, Healthcare & Sciences

Announcing Adaptive System-on-Modules for Edge Applications

- ▶ Production System-on-Modules for Faster Time to Deployment in Smart Vision Applications
- ▶ Enabling Millions of SW Developers in Their Familiar Design Environment
- ▶ Out-of-the-Box Ready, Low-Cost Development Kit to Get Started



Adaptive SOMs: Accelerating Innovation at the Edge

System-on-Module (SOM): Now Becoming Mainstream

What is a SOM

Small form factor embedded PCB
at the heart of the system
(processor, DDR, peripherals)



11%
SOM Market CAGR

Abstracts the Hardware

Design at the board level
instead of the chip-level

Production-Ready

Plugs directly into end-product
for production deployment



\$2.3B
SOM TAM by 2025*

*Source: Experts Interview, Secondary Sources and QYR Electronics Research Center, July 2019

Rising Complexity in Vision AI



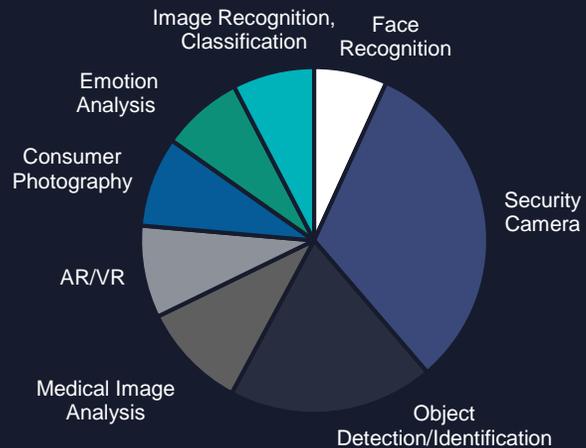
Vision Market is Diverse and Fragmented

Over 70 Vision use cases, no one solution
Evolving AI, sensor fusion, and vision pipeline

AI Challenges at the Edge

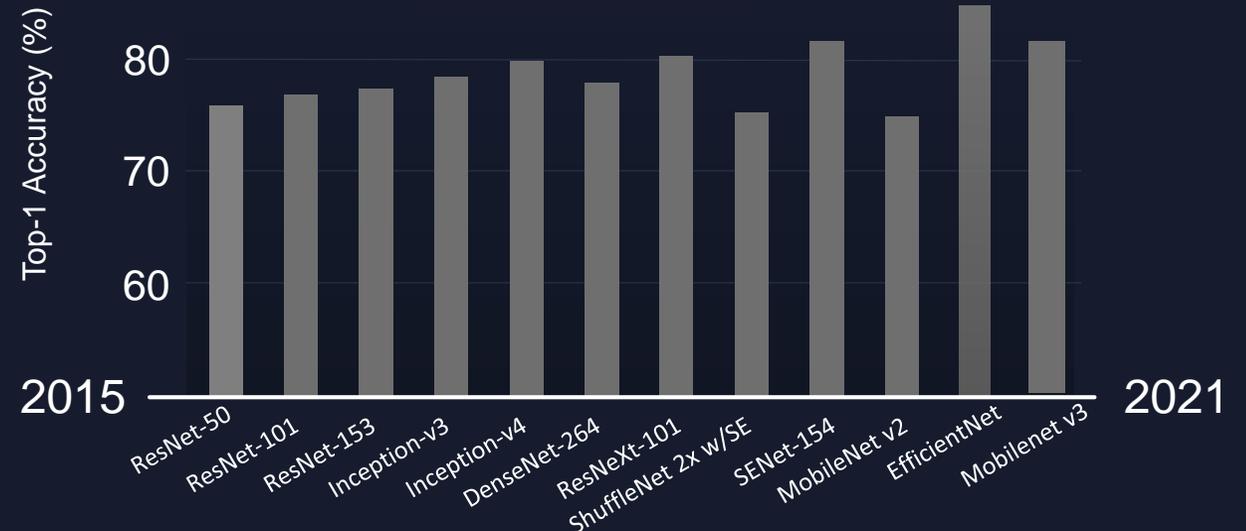
How to keep pace with rapidly evolving AI in vision market
How to make AI models optimal *and deployable* at the Edge

Top Vision Use Cases by Revenue



Source: Market Report: Computer Vision Technologies and Markets

AI Innovation Cycle



Sources: <https://arxiv.org/pdf/1611.05431.pdf>, <https://arxiv.org/pdf/1611.05431.pdf>, <https://arxiv.org/pdf/1608.06993.pdf>, <https://arxiv.org/pdf/1605.07678.pdf>

What the Vision Market Needs Today

- Pre-Built platforms for faster time to deployment in a rapidly evolving market
- Flexibility to innovate and differentiate for increasingly complex vision use cases
- Accelerate the latest AI while optimizing for power, cost, and latency constraints at the Edge

Existing Embedded Processor and GPU Based Solutions Struggle to Meet All These Needs



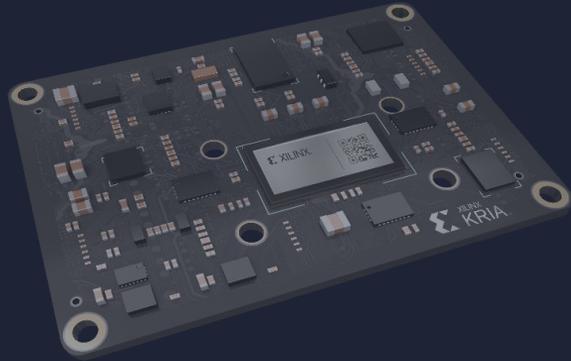
CREATE INNOVATIVE IDEAS

Introducing



**Adaptive SOMs
Accelerating Innovation at the Edge**

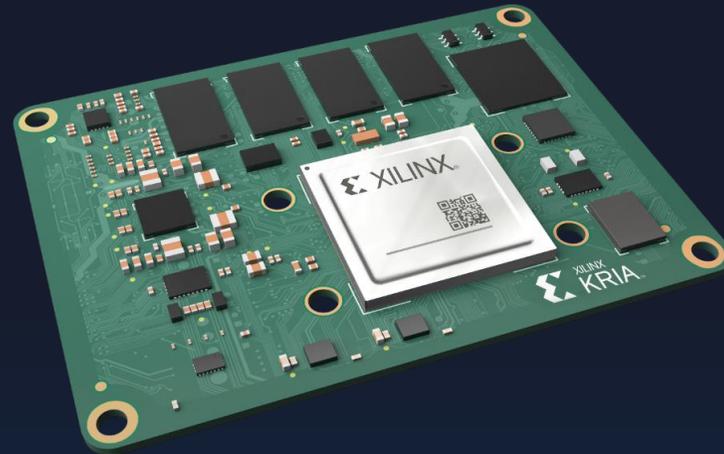
Introducing the Kria™ System-on-Module Portfolio



ROADMAP

Cost-Optimized SOM

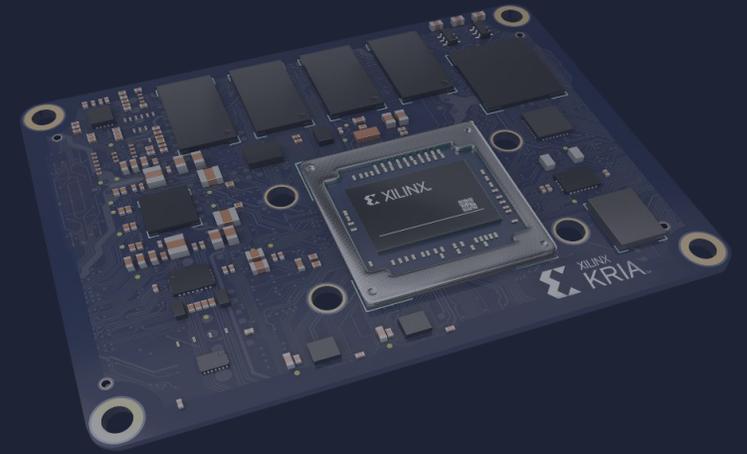
For electric drives and other size and cost-constrained applications



AVAILABLE NOW

Kria K26 SOM

For vision AI in smart cities and smart factories



ROADMAP

Highest AI Compute SOM

Highest real-time compute/watt for edge AI applications

Kria™ K26 SOM

For vision AI in **smart cities**
and **smart factories**

Security
Cameras



City
Cameras



Traffic
Cameras



Retail
Analytics



Machine
Vision



Vision Guided
Robotics



K26 SOM Overview

Based on the Zynq® UltraScale+™ MPSoC Architecture

COMPUTE

Arm®
Quad-Core
Subsystem

256K
System Logic
Cells

1.4 TOPS
AI Processing
Performance

4K60p
H.264/265
Video Codec



77 x 60 x 11mm

INTERFACES

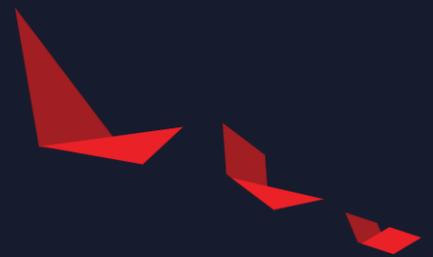
245 I/O
Dual 240-Pin
Connector

15 Cameras
Mix of MIPI,
sub-LVDS, SLVS-EC

40G Ethernet
1Gb to 40Gb
via 4x 10G

4x USB
Mix of USB
2.0 and 3.0

4GB
64-Bit DDR4
Memory



Production SOMs for Fast Deployment

Vision AI Applications

Kria™ SOMs Enable Faster Time to Deployment

Device
Based Design

RTL / HW
Design



System Design
& Integration



Deploy



Module
Based Design

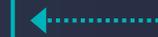
System Design
& Integration



Deploy



Up to 9 Months Faster
Time to Market



Reduce development
time by designing at
higher abstraction

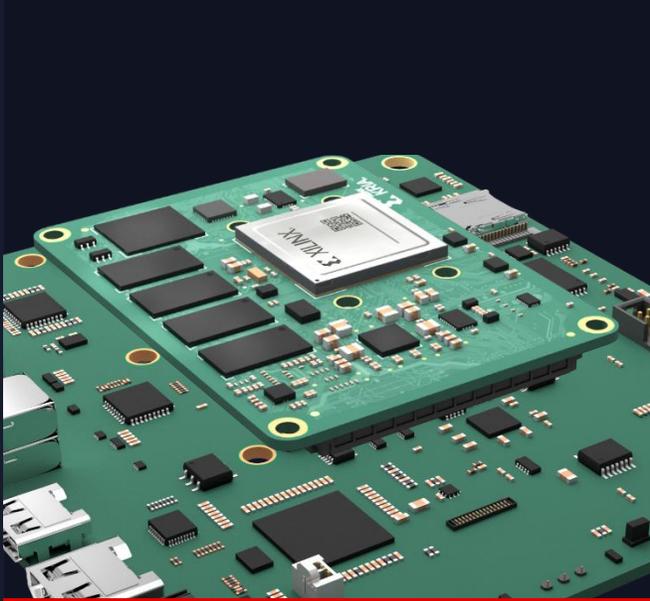
Lower total
BOM cost

Common platform
streamlines inventory

Turnkey product life
cycle management

Faster Productization for Volume Deployment

Production-Ready



Built for Rapid Deployment

- ▶ Fully production-ready SOM
- ▶ Carrier card as reference design



Built to Last

- ▶ Ruggedized, Certified
- ▶ Industrial Strength



Built for Expandability

- ▶ Versatile & Scalable
- ▶ Field Upgradeable

Kria SOMs in Smart Cities

Object Detection at High Speeds

Up to 3X throughput at low latency vs. competition*
High resolution w/low latency critical for high-speed object identification

Adaptable AI for complex object & character detection
Covers emerging styles to “homemade” vehicle plates

Edge-to-Cloud scalable for camera network
End-to-end adaptability with Kria™ SOMs and Alveo™ accelerator cards



*Xilinx Benchmarks

Kria™ SOMs in Retail Analytics

Any Sensor, Any Interface

AI compute for consumer intelligence and insights

- ▶ High performance for detection, object tracking, re-identification
- ▶ Analytics for inventory, shopper journey, touch-free checkout, emotion analysis
- ▶ Optimize for sales conversion, staff allocation, loss prevention, and more

Support for multiple cameras with any vision sensor

- ▶ Programmable I/O for diverse sensor protocol (MIPI, Sub-LVDS, SLVS-EC)
- ▶ Flexible resolution, accuracy, field of view for aisle cameras / shelf cameras
- ▶ Expandable cameras for multi-channel analytics



Inventory Analysis



Diverse Sensors



Flexible Form Factors

Kria™ SOMs in Smart Factories

Ruggedization, Cybersecurity, Industrial Life Cycle

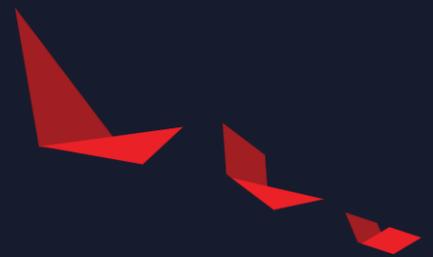
Ruggedized for reliability in harsh environments
Built for indoor/outdoor, high and low temp, and shock resistance

Compliant with required cybersecurity; IEC 62443
Adaptable to security threats across product lifetime

Designed for industrial life cycle requirements
Industry's longest operating life and warranty

INDUSTRY CERTIFICATIONS

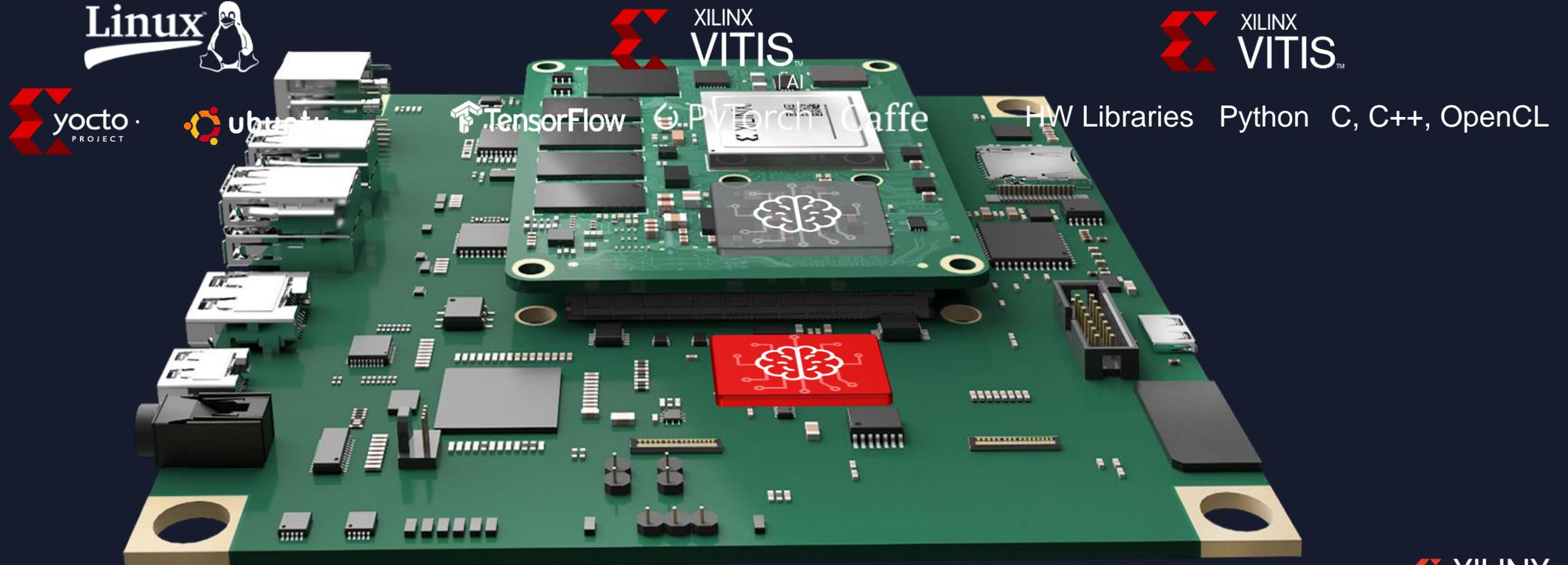




Enabling Millions of Developers in Their Familiar Environment

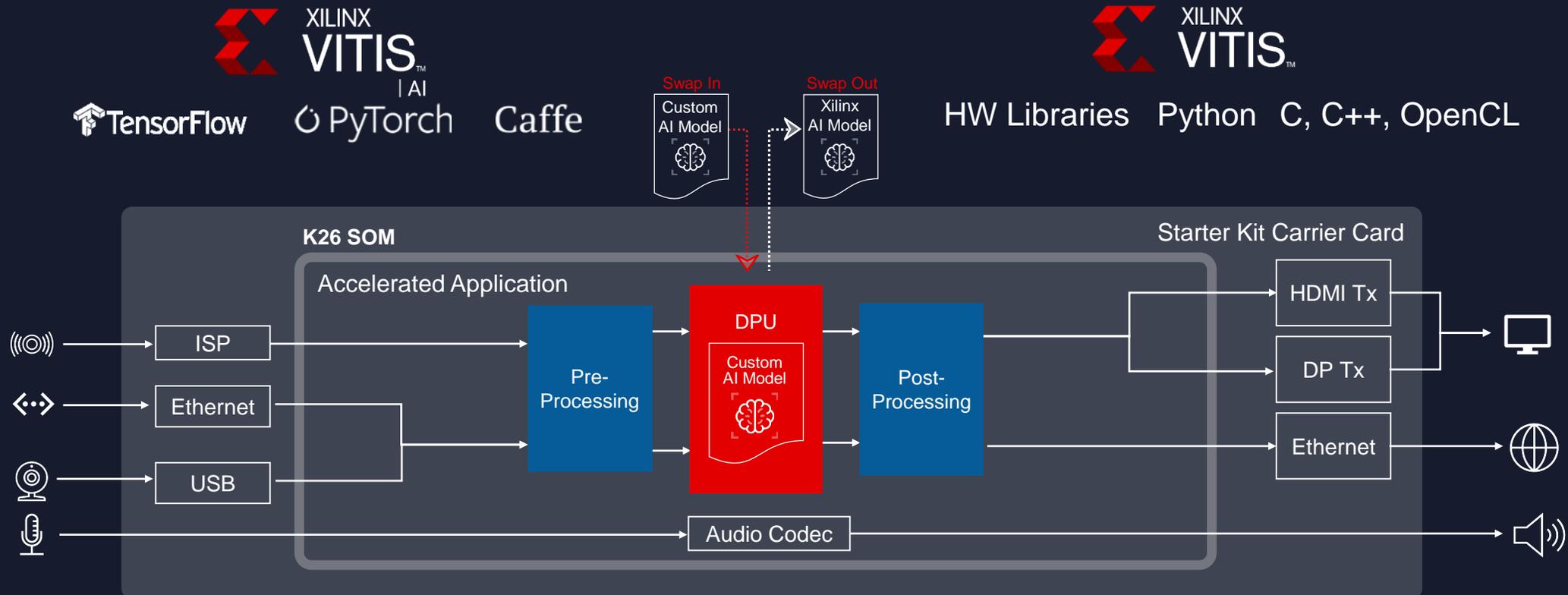
A Pre-Built Hardware and Software Platform for Embedded Design Simplicity

- ▶ Pre-built hardware system, embedded environment with helpful utilities
- ▶ Developer “drops in” their differentiation using their preferred design environment



Starting from a Higher Level of Abstraction with Accelerated Applications

- ▶ Vitis™ AI development environment to swap AI models running on Deep Learning Processing Unit (DPU)
- ▶ Vitis core development kit to customize vision pipeline via HW-accelerated libraries, C, C++, OpenCL, Python



A Wide Selection of Vision Accelerated Applications

Vision Accelerated Applications
“do the work for you”

Production-ready applications available
now from both Xilinx and partners

App Store model encourages partners
to deliver high quality applications



First Embedded App Store for Edge Applications

1: Supports face detection and other models in Xilinx Model Zoo

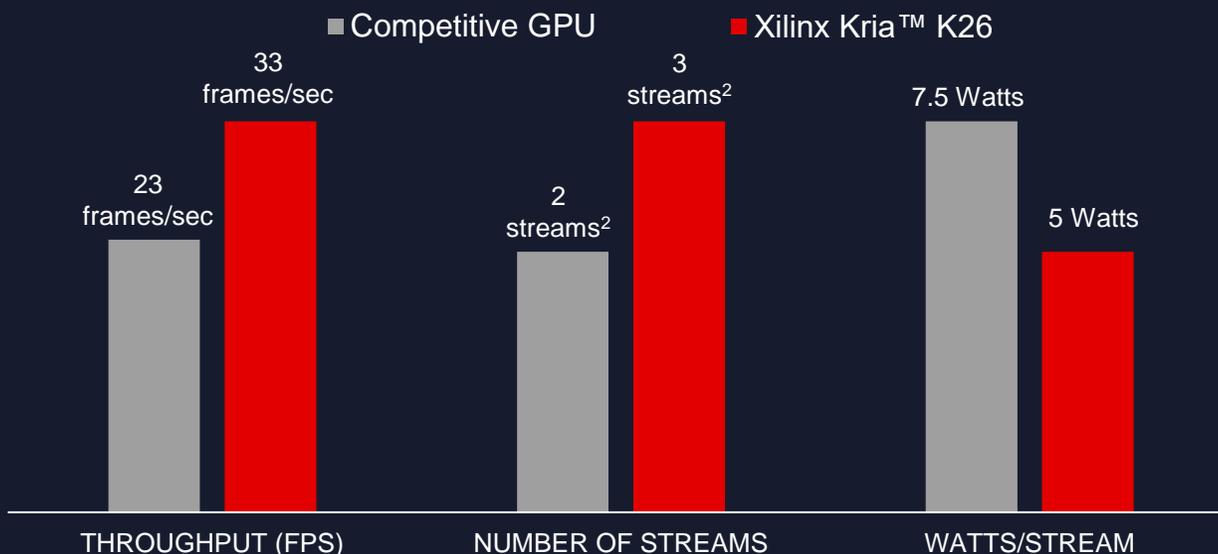
2: Coming Soon

Real-World Application Benchmark (Video Pipeline with AI)

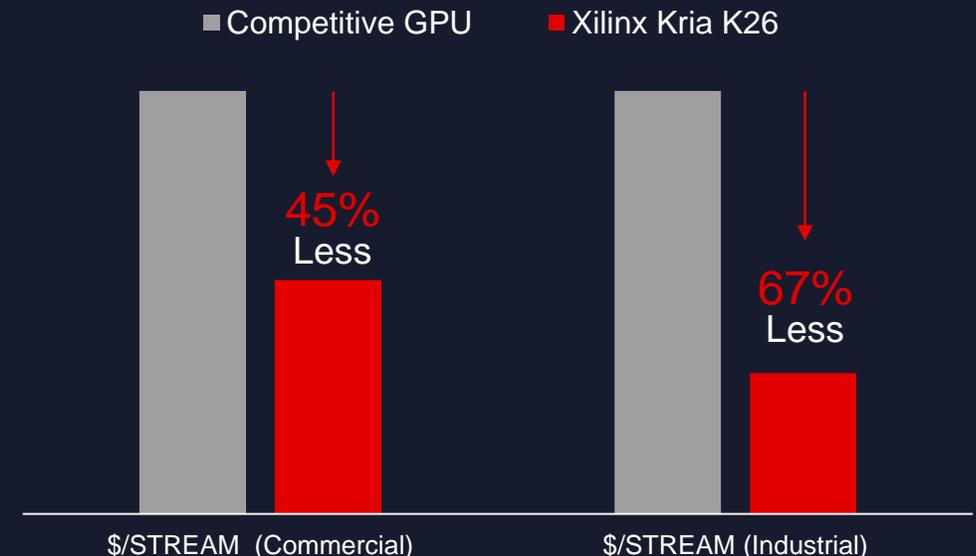
The Power of Adaptable Hardware Now Accessible to Any Developer



1.5X Performance at 33% Less Power¹

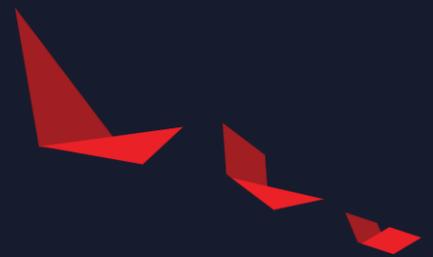


At Half the Cost per Video Stream¹



1: Xilinx Internal benchmarks, more benchmark details in "Kria™ K26 SOM : The Ideal Platform for Vision AI at Edge" Xilinx White Paper (https://www.xilinx.com/support/documentation/white_papers/wp529-SOM-benchmarks.pdf)

2: Assuming 10fps for ML



Out-of-the-Box Ready

A Development Kit for the Masses

Introducing the Kria™ KV260 Vision AI Starter Kit

VISION READY

- Multi-Camera Support: Up to 8 interfaces
- 3 MIPI sensor interfaces, USB cameras
- Built-in ISP component
- HDMI, DisplayPort outputs

FLEXIBLE CONNECTIVITY

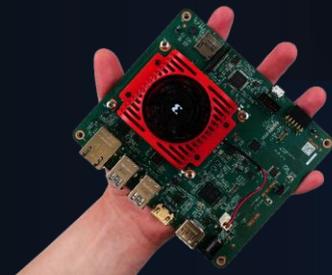
- 1Gb Ethernet
- USB 3.0 / 2.0

EXPANDABLE

- Extend to any sensor or interface
- Access Pmod ecosystem

ACCESSIBLE

- Low cost, enabling design exploration
- Available from Xilinx and distributors

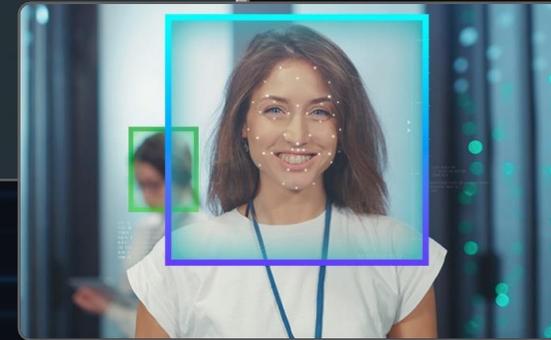


\$199

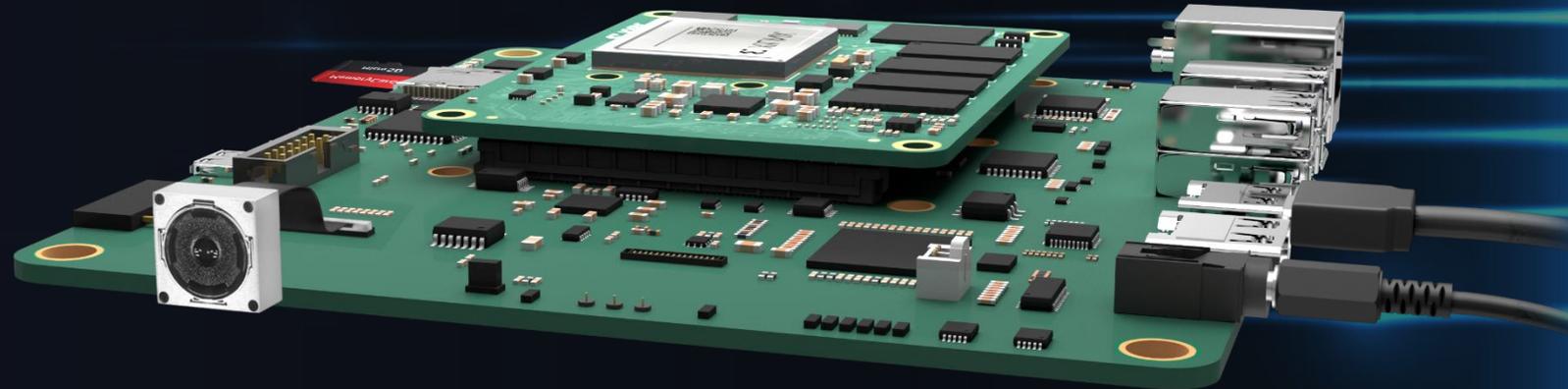
Up and Running in Less than an Hour

1. Connect camera, cables, and monitor
2. Insert the programmed microSD card
3. Power-on the board
4. Load accelerated application of your choice
5. Run accelerated application

```
Terminal  
[boolean ~]$ pageres google.com  
✓ Generated 1 screenshot from 1 url and 1 size  
[boolean ~]$
```



GETTING STARTED WEB PAGE



Up and Running in Less than 1 Hour, No FPGA Experience Needed

Accessible to Everyone

From Corporations to Makers

End-to-End Solution for SW Developers
For design houses without access to HW expertise

Cost Effective, Fast Time to Deployment
Competitive vision solution for small to mid-sized providers

Accessible to Design Communities
Low-cost kit, open standards, App Store, free resources

Designed and Priced for Broad Adoption

A Growing Ecosystem to Accelerate Development

It Takes a Village



ACCELERATED APPLICATIONS
Growing Ecosystem,
Available on App Store



Aaware
Acoustically Aware™

DiSTI



XILINX®



DESIGN SERVICES
Range of Expertise in
Vision, AI, Embedded
Computing, Industrial IoT



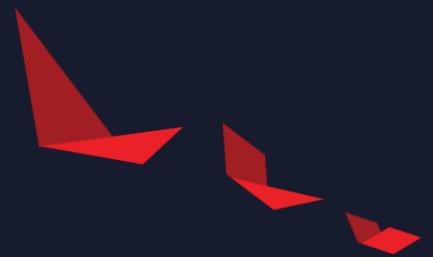
SOM PARTNERS
Scale Your System
Up and Down
Beyond Kria™

ALINX®



MYIR

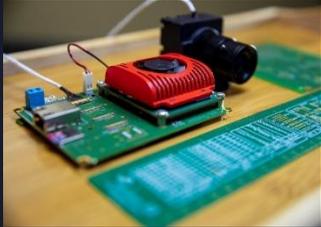




Customer Successes & Availability

Kutleng Tracking Cameras

Wildlife Safety in South African National Parks



“With almost every vision function, Xilinx has answered with available Accelerated Applications.”



“We are now able to fast track the launch of several new products within 2 months thanks to the Kria™ SOM.”



SICK AG

Accelerating Product Development

“Digital design has become increasingly complex and time consuming. Xilinx Kria™ SOMs speed up product development at an attractive price.”

SICK

Sensor Intelligence.

Optimized Solutions Limited

AI-Based Vision for Multi-Object Detection, Recognition, Identification



“By using Xilinx SoM which supports configurable AI with the best-in-class performance, we will be able to achieve our multi-sensor, high-speed imaging system”

“Kria™ SOMs . . .helps in reducing time to market with all the features supported in a single module - configurability of HW and SW, processing power, and interface to the external world.”



Available Now

Kria™ KV260 Vision AI Starter Kit

For Evaluation and Development Use



\$199

Kria K26

Production Module
Fully Qualified and Certified



C-Grade

For Commercial Environments
Operating Temp 0°C to 85°C
2 Year Warranty

\$250

I-Grade

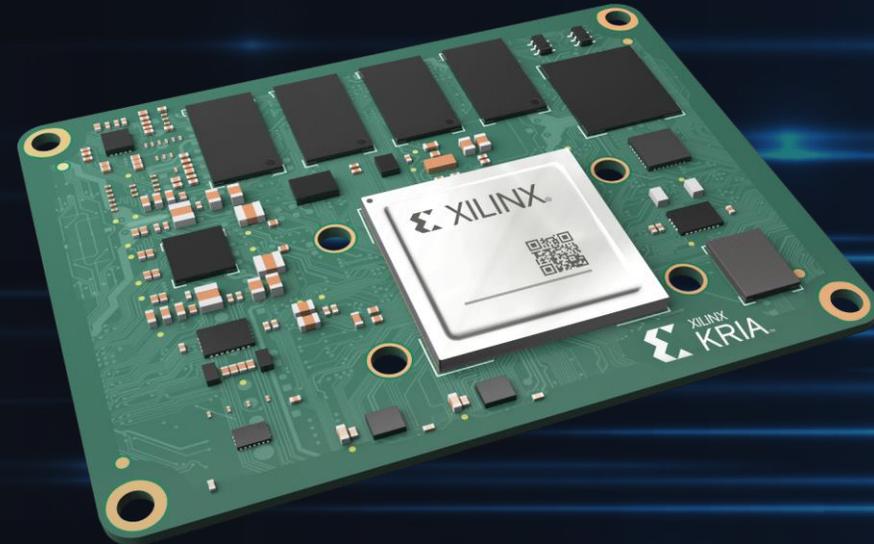
For Rugged Environments
Operating Temp -40°C to 100°C
3 Year Warranty

\$350



XILINX KRIA™

- ▶ Production System-on-Modules for Fast Deployment in Smart Vision Applications
- ▶ Enabling Millions of SW Developers in Their Familiar Design Environment
- ▶ Out-of-the-Box Ready, Low-Cost Development Kit to Get Started



Production Modules, Starter Kit,
and Accelerated Applications

AVAILABLE NOW



Thank You

