A New Adaptive Module for Vision AI at the Edge

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

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Announcing Adaptive System on Modules for Edge Applications

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- Production System-on-Modules (SOMs) 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

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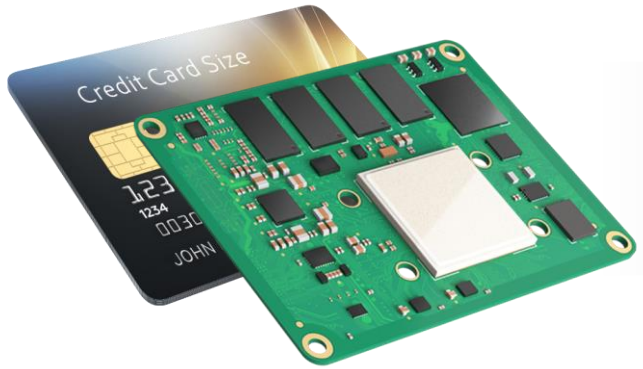
What is a SOM

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



Abstracts the Hardware

Design at the board level
instead of the chip-level

Production-Ready

Plugs directly into end-product
for production deployment

11%
SOM Market CAGR*

$2.3B
SOM TAM by 2025*

*Source: QYResearch Global System on Module (SOM) Market Report, History and Forecast 2014-2025

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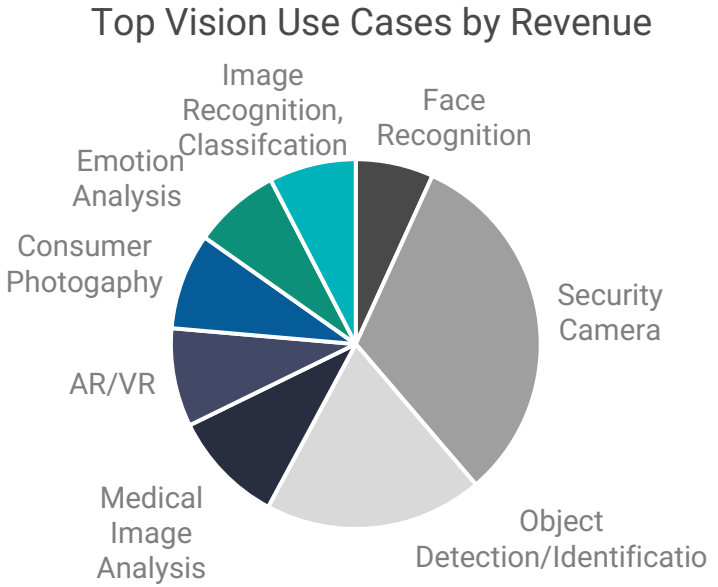
Rising Complexity in Vision AI

Vision Market is Diverse and Fragmented

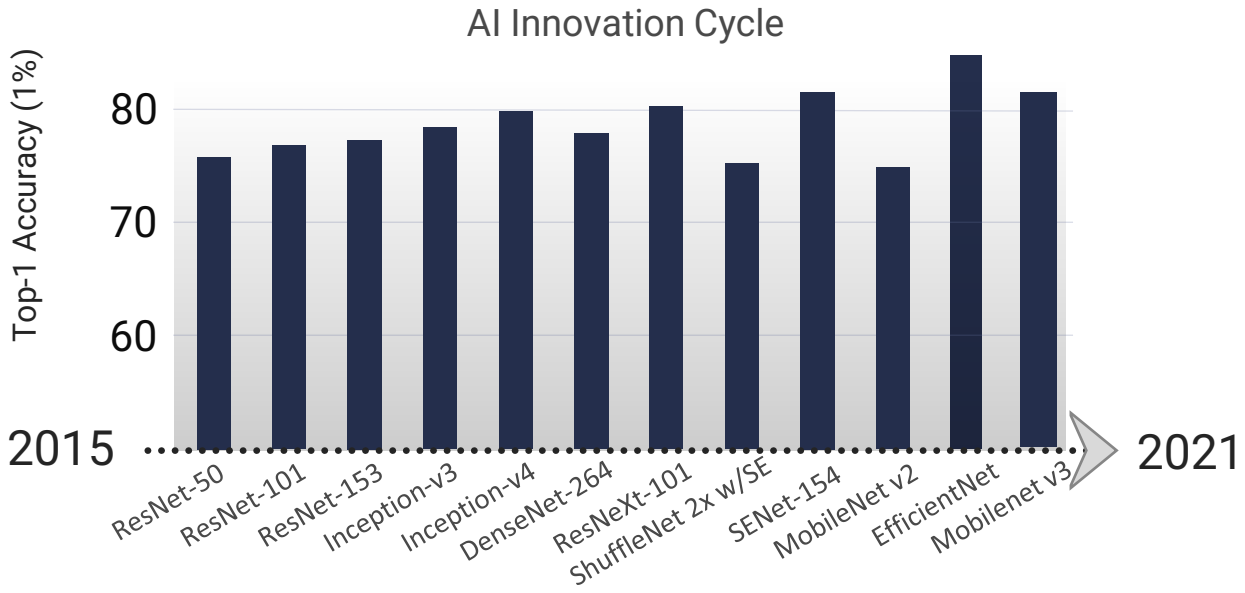
- Over 70 Vision use cases, no one solution
- Evolving AI, sensor fusion, and vision pipeline



Source: Market Report: Computer Vision Technologies and Markets

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



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

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Introducing

Adaptive SOMs
Accelerating Innovation at the Edge

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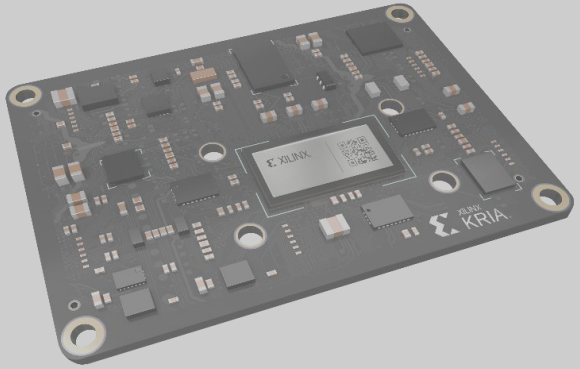
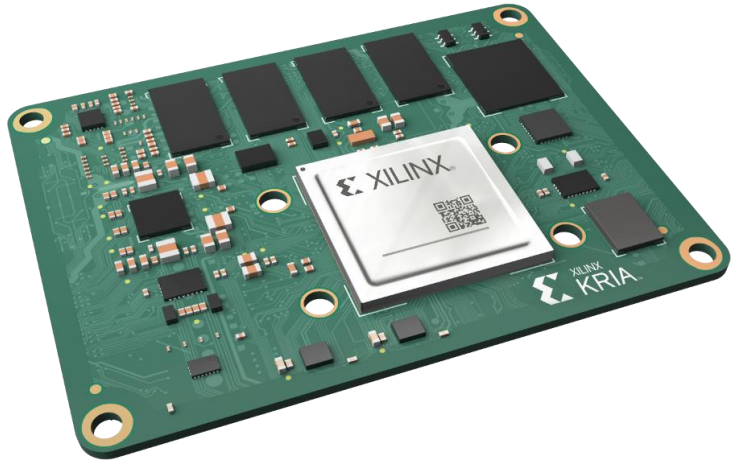
Introducing the Kria™ System-on-Module Portfolio



ROADMAP

Cost-Optimized SOM

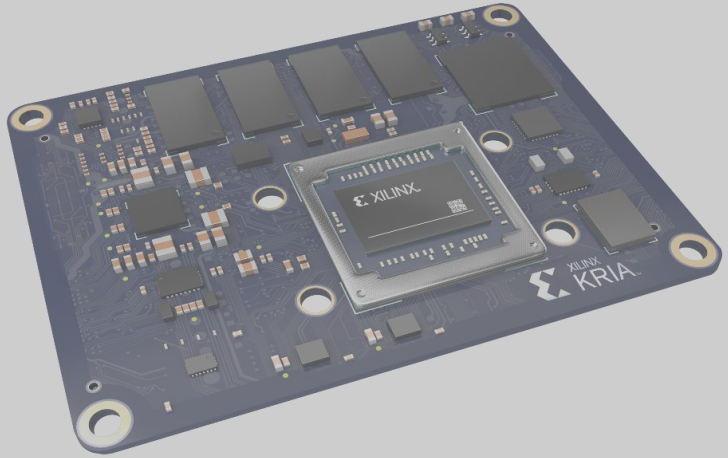
For electric drives and other
size and cost-constrained applications



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

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Kria K26 SOM

For vision AI in smart cities and smart factories

Security Cameras

City Cameras

Traffic Cameras

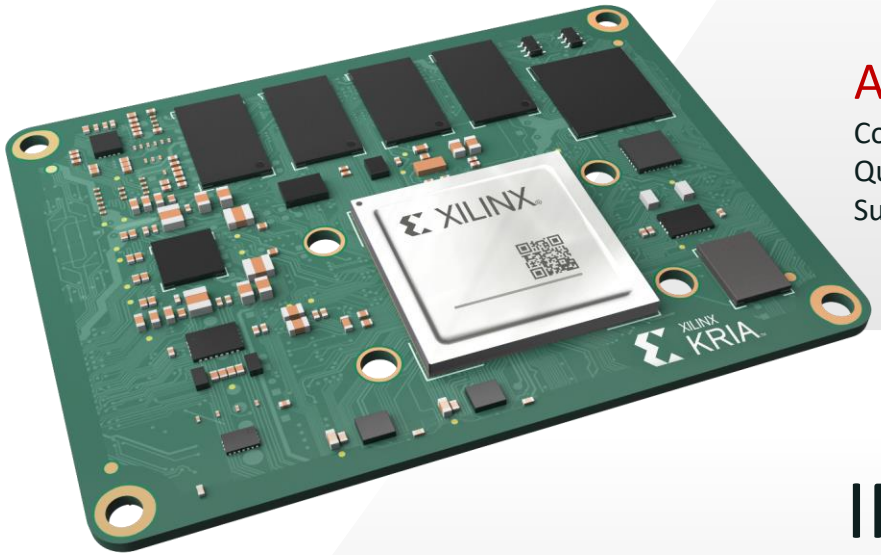
Retail Analytics

Machine Vision

Vision Guided Robotics

K26 SOM Overview

Based on the Zynq® UltraScale+™ MPSoC Architecture



COMPUTE

Arm®
Cortex™-A53
Quad-Core
Subsystem

256K
System Logic
Cells

1.4TOPS
AI Processing
Performance

4K60p
H.264/265
Video Codec

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

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Kria SOMs in Smart Cities

Object Detection at High Speeds

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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

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Kria™ SOMs in Retail Analytics

Any Sensor, Any Interface

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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

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Kria™ SOMs in Smart Factories

Ruggedization, Cybersecurity, Industrial Life Cycle

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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

RoHS COMPLIANT · FC · CE · ICT · SABS APPROVED · KC

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

Linux

yocto PROJECT

ubuntu

XILINX VITIS AI

TensorFlow PyTorch Caffe

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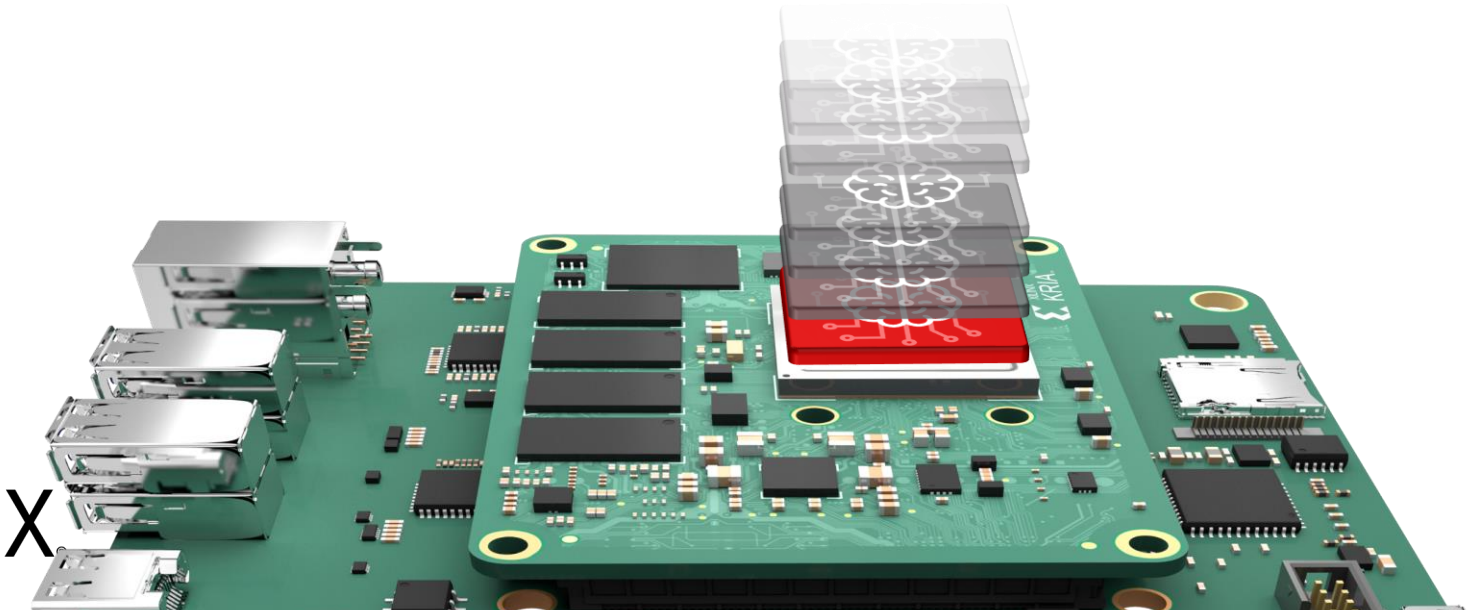
HW Libraries Python C, C++, OpenCL



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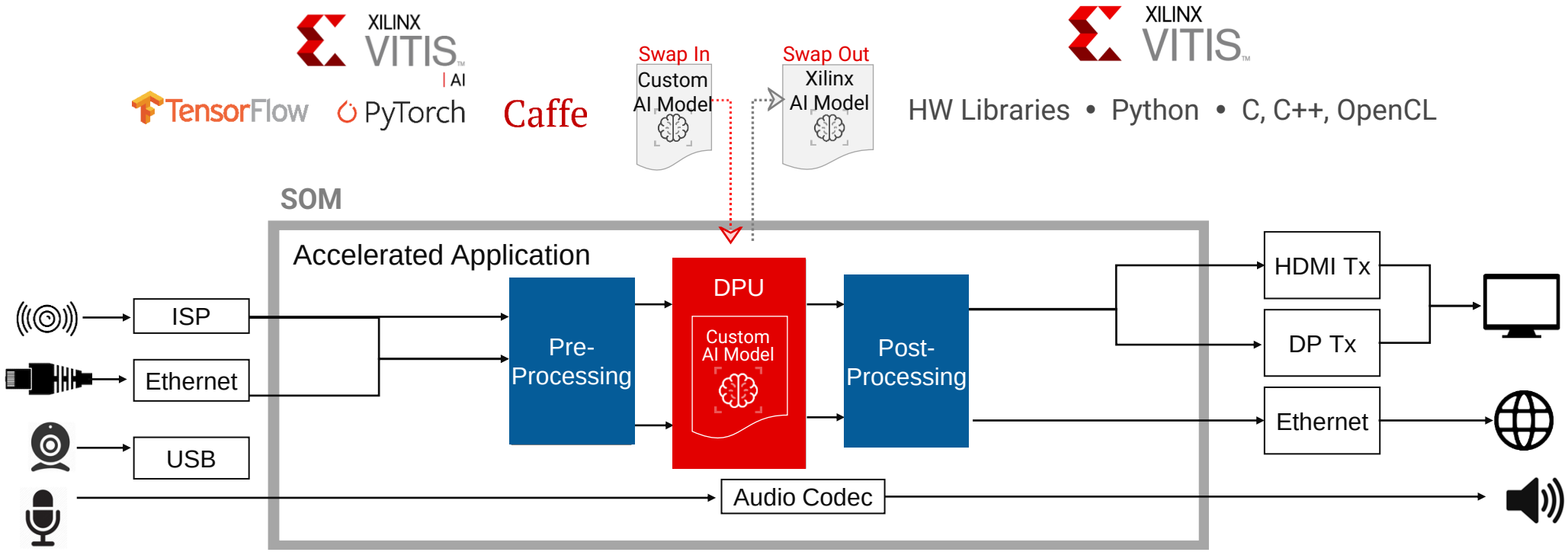
Starting From a Higher Level of Abstraction with Accelerated Applications

- Use Vitis AI to swap in custom AI model running on Xilinx Deep Learning Processing Unit (DPU)
- Optionally Use Vitis to customize vision pipeline via 400+ pre-accelerated libraries, C, C++, OpenCL, Python



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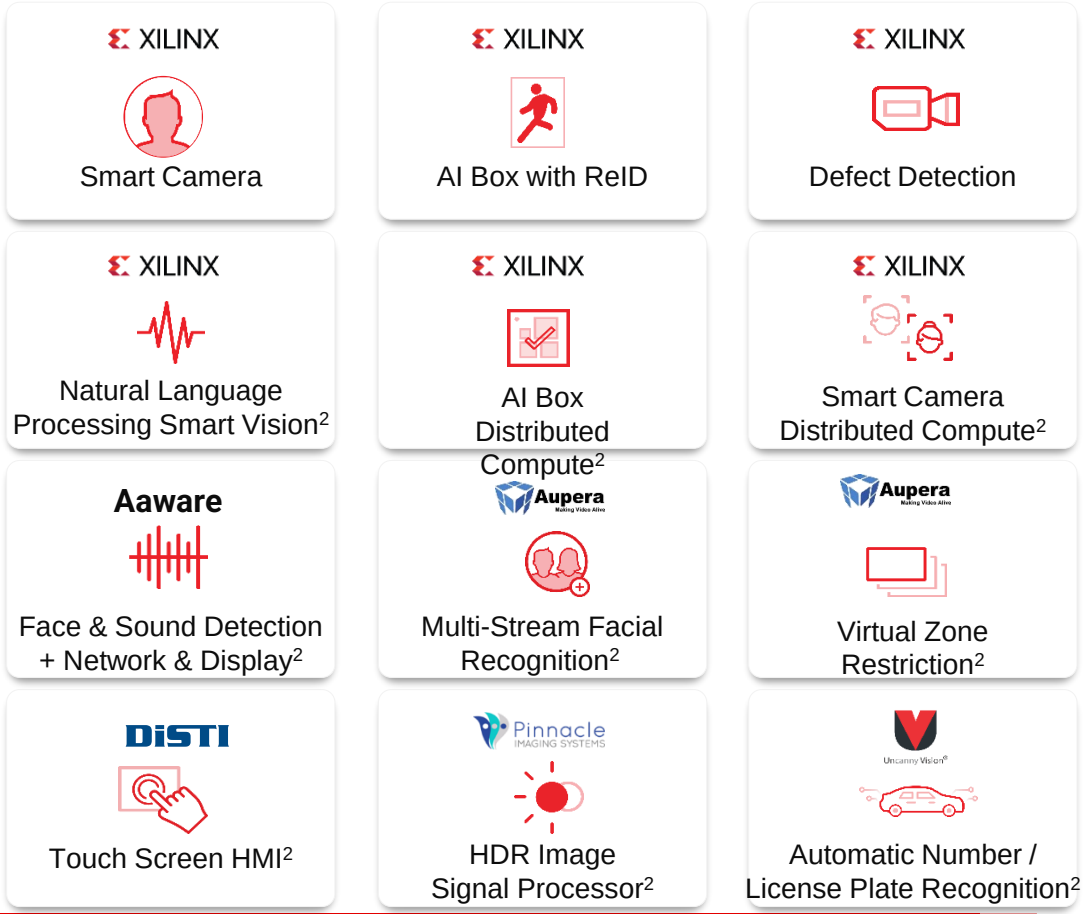
A Wide Selection of Vision Accelerated Applications

Vision Accelerated Applications
"do the work for you"

Production-ready applications now available from both Xilinx and partners

Partners can monetize and help grow the Appstore



First Embedded App Store for Edge Applications

1: Supports face detection and other models in Xilinx Model Zoo | 2: App Coming Soon

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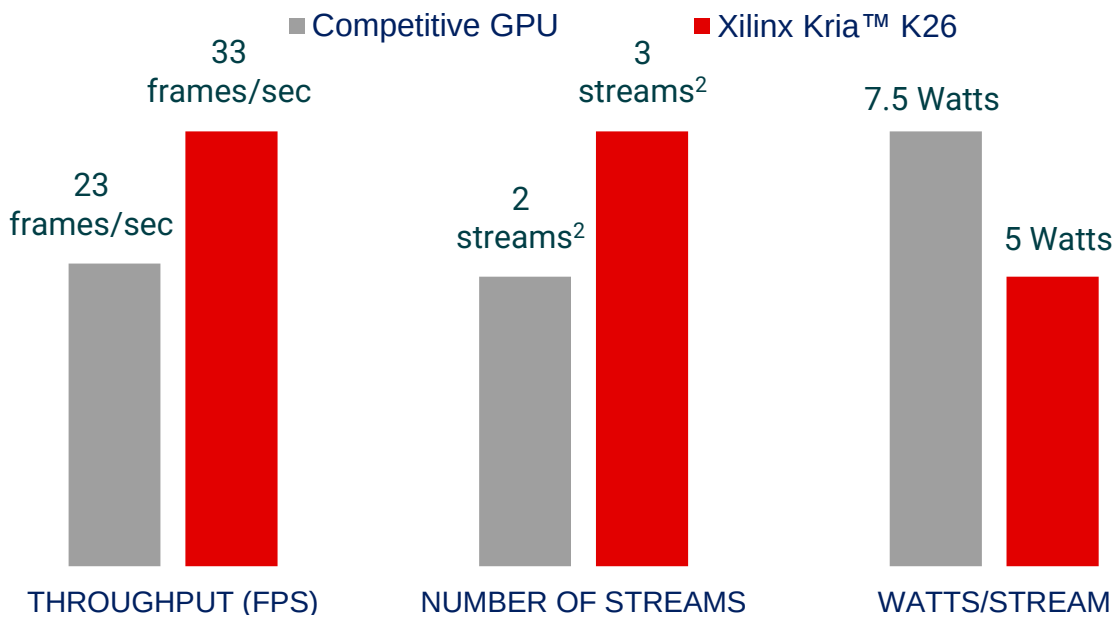
Real-World Application Benchmark (Video Pipeline W/AI)

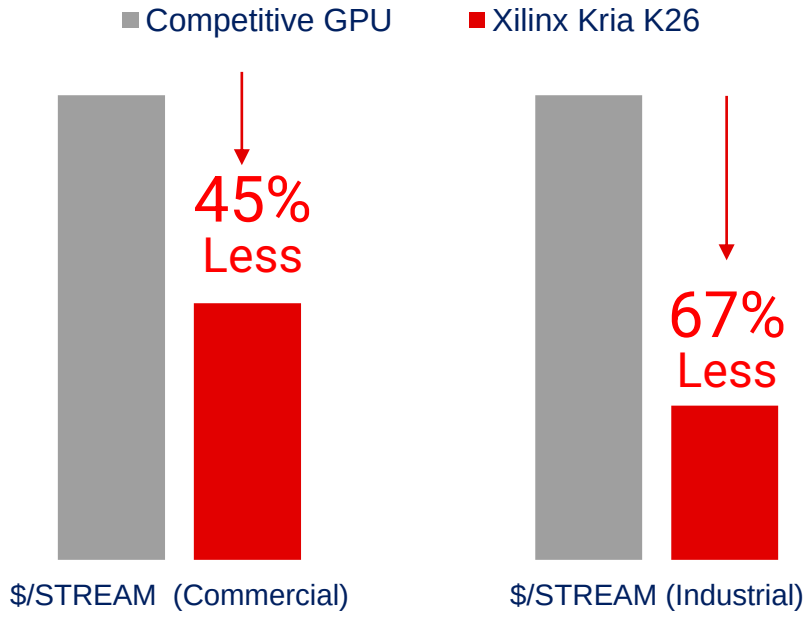
The Power of Adaptable Hardware Now Accessible to Any Developer

1080p @30fps Video Decode ▶ Image Pre-Processing ▶ ML (Detection) ▶ OCR *Character Recognition* ▶

1.5X Performance at 33% Less Power[1]



At Half the Cost per Video Stream[1]



1: Xilinx internal benchmarks for K26 vs. published data for GPUs, 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

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Introducing the Kria™ KV260 Vision AI Starter Kit

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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

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Kutleng Tracking Cameras

Wildlife Safety in South African National Parks

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

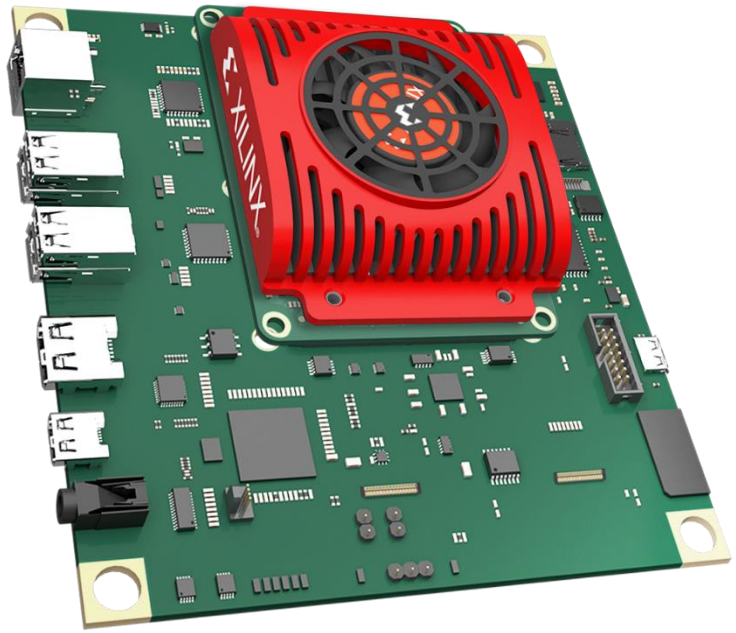
"We are now able to fast track the launch of several new products within 2 months thanks to the Kria™ SOM."

Kutleng
ENGINEERING TECHNOLOGIES

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

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- Production System-on-Modules for Fast Deployment in Smart Vision Applications
- Enabling Millions of SW Developers in Their Preferred Design Environment
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Production Modules, Starter Kits
and Accelerated Applications
AVAILABLE NOW
https://www.xilinx.com/kria

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Thank You

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