

Practical embedded Edge AI with TI

Aug 19th 2021







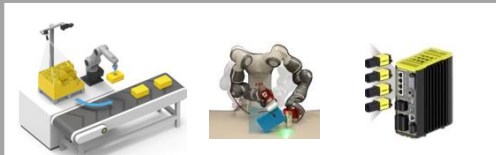

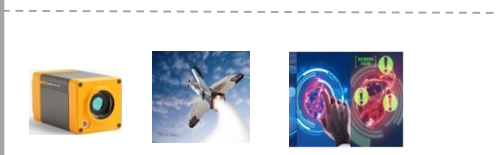
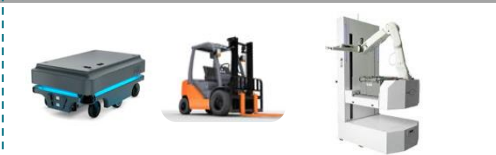
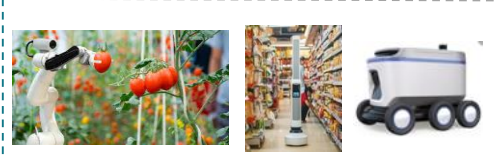



TI Information – Selective Disclosure

Webinar | Agenda

- Overview of TI processor and tools for practical Edge AI vision system
 - What you can build with TI processor for Edge AI
 - Overview of SK-TDA4VM – a new \$199 starter kit for edge AI applications, offering 8 TOPS deep learning performance
- How to get started today evaluating and developing an intelligent application with TI
 - Demonstration on TI Edge AI Cloud service
 - Walk through of edge AI resources on ti.com
- Call to actions

Vision Edge AI | revolutionizing applications from factories to home

	Low	Mid	High	
Applications	<div><p>Smart factory & warehouse</p></div> <div><p>Smart City, construction & Agriculture</p></div> <div><p>Smart home, medical, & defense</p></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>	<div></div> <div></div> <div></div>
Key Care-about	<p>Single to Multiple cameras</p> <p>Low power preferred for either battery operation or for thermally constrained environments</p> <p>Integrated functional Safety for lower cost, complexity and compact form factor</p>			

Practical embedded Intelligence with TI Edge AI

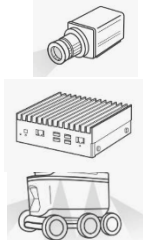
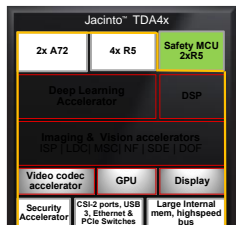
Processor for practical edge AI



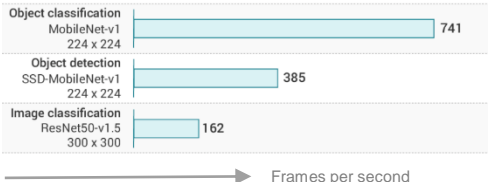
TDA4VM
8 TOPS AI

Available now

High performance vision AI system, at low-power & lower system cost



MLPerf inference benchmarks



www.ti.com/edgeai

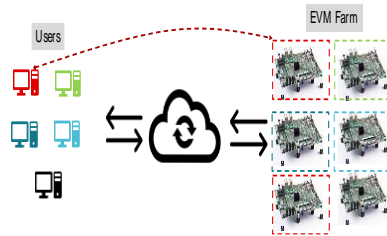
Free evaluation tool



TI Edge AI Cloud
Free-online service

Available now

In minutes evaluation with Jupyter Notebooks



Training videos

TI Model Zoo
(100+ models)



<https://dev.ti.com/edgeai>

Low-cost starter kit



SK-TDA4VM
\$199

Available in Sept 2021

Fast development cycle



Industry standard APIs



Edge AI Academy

Edge AI & Robotics
eco-system



Coming in Sept '21

What you can build with TDA4VM Processor

Make factories, cities and home - smart and safe

Smart cameras and AI Boxes



Hello AI: Classification



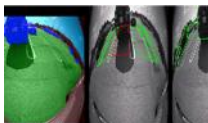
Hello AI: Object detection



Hello AI: Semantic segmentation



Hello AI: Single-input, multi-inference



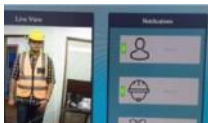
Hello AI: Multi-input, multi-inference



AWS: People counter IoT



D3: Intelligent data acquisition box

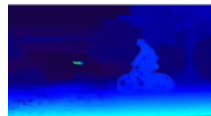


Ignitarium: People protection



RidgeRun: Multi-channel AI server for smart cities

Robotics



ROS Stereo depth estimation & point cloud



semantic segmentation under ROS



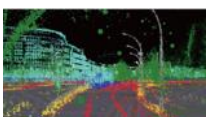
3D obstacle detection under ROS



Visual localization under ROS



Ignitarium: Autonomous indoor navigation under ROS



Kudan: TI accelerated visual SLAM

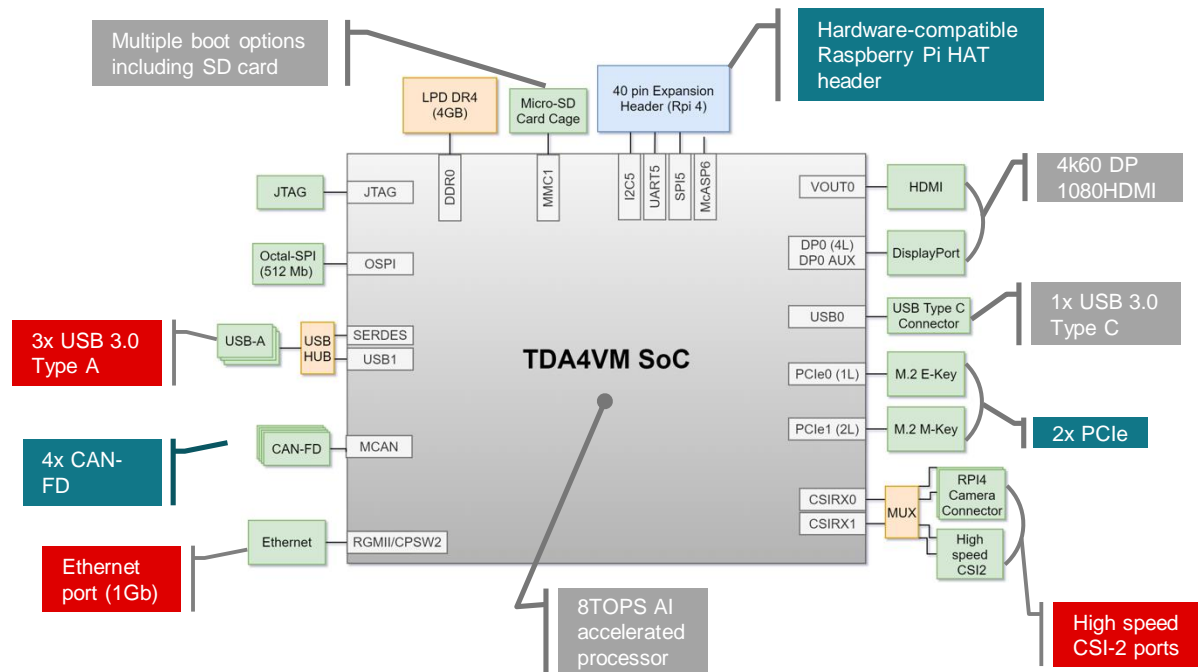
Benefits

- Fast development cycle with
 - industry standard APIs
 - Community eco-system
 - Third-party eco-system

Review the demos (home to factories) on the ti.com : [Edge AI Demos](https://www.ti.com/edge-ai-demos)

Prototype and develop using \$199 starter kit

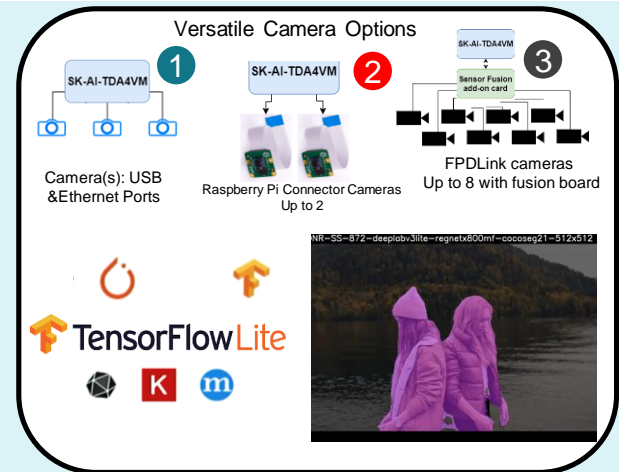
Edge AI Starter Kit | Jacinto™ TDA4VM processor



Fast out-of-box Edge AI demo:

1. Insert programmed SD card*
2. Plug-in all peripherals
3. Run demo in under an hour!

* Follow instructions in [Edge AI Devkit](#) to program SD card



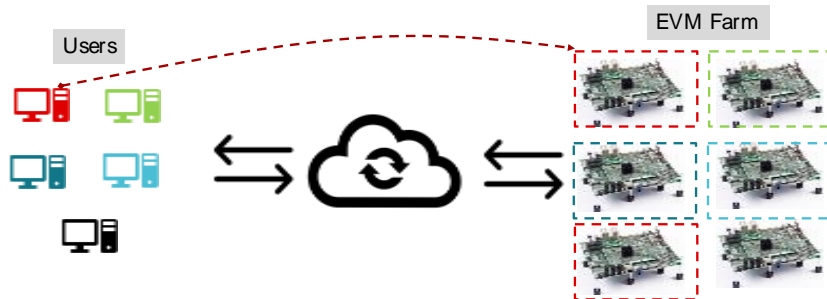
Part number: SK-AI-TDA4VM | **Price:** \$199 | **Order:** Available Sep '21

Camera options 2 and 3 do not work simultaneously

How to get started today

TI Edge AI Cloud for faster evaluation | Now available!

Free on-line service, enable deep learning evaluation in minutes



- < 1 min to explore & compare performance : Model Selection tool
- < 5 min to experience SW & evaluate HW : TI Model Zoo examples
- < 30 min to evaluate custom models : Custom model examples
- 1 hr+ to benchmark performance : TI Model Zoo examples

No EVM buy

Evaluate TI SoC DL capabilities in remote EVM farm using web browser, Jupyter Notebook

In-minutes evaluation

Collect latency, FPS, accuracy, DDR BW and Power benchmarks in minutes

Service walk-through

ti.com/edgeai | Now available!

Practical embedded intelligence

Enabling optimized edge AI inference performance, system power and cost

Our embedded processors, software and tools for edge AI let you effectively balance deep learning performance with system power and cost. We offer a practical embedded inference solution for next-generation vehicles, smart cameras, edge AI boxes, and autonomous machines and robots. In addition to general compute and deep learning cores, our processors for edge AI integrate imaging, vision, multimedia cores and security enablers and optional microcontrollers for applications that require SIL-3 and ASIL-D functional safety certifications.

Explore

Discover processors for edge AI.

High-speed, low-latency embedded AI

High throughput per TOPS

Low-power consumption

[View products](#)

Evaluate

Start your free deep learning evaluation.

Access to evaluation boards through the cloud

Deep learning benchmarks in minutes

Pre-trained models and AI tools

[Evaluate at no-cost](#)

Develop

Develop software faster than ever.

Industry-standard APIs

Low-cost starter kits

24/7 online engineering support

[View starter kits](#)

One central page with all the information

Add intelligence to your design with our edge AI technology

From smart cameras and edge AI boxes to autonomous machines and robots, your opportunities to design with embedded intelligence are endless. Be inspired to build something great with our solutions for edge AI by exploring a collection of [embedded AI projects](#) from Texas Instruments and developers from our [third-party ecosystem](#).

Web page walk-through

ti.com/edgeai | Now available

Microcontrollers (MCUs) & processors

Product tree

- Microcontrollers (MCUs) (884)
 - Arm-based microcontrollers (132)
 - C2000 real-time microcontrollers (180)
 - MSP430 microcontrollers (572)
- Processors (285)
 - Arm-based processors (107)
 - Digital signal processors (DSPs) (178)

Practical embedded intelligence

Enabling optimized artificial intelligence (AI) performance, system power and cost

TI Edge AI processors, software and tools let you effectively balance deep learning performance with system power and cost. We offer a practical embedded inference solution for next-generation vehicles, smart cameras, edge AI boxes, and autonomous machines and robots.

Explore

Discover TI Edge AI processors

High-speed, low-latency embedded AI

High throughput per tera-operations per second

Low power consumption

[View products](#)

Evaluate

Start your no-cost evaluation today

Develop

Develop software faster than ever

Don't sacrifice power or cost for high-speed AI

TI Edge AI processors have a **unique heterogeneous architecture** that enables high-speed AI and helps you reduce system power and cost. Our practical approach to embedded intelligence lets you optimize AI performance for every watt and dollar spent.



Acceleration

Our highly efficient C7x and Matrix accelerator delivers **industry-leading learning inference**.

Computer vision acceleration

Computationally-intensive vision and multimedia tasks are offloaded to specialized hardware accelerators, yet remain configurable, through industry-standard application programming interfaces (APIs).

Accelerate your AI tasks with industry-standard APIs

Automatically unlock the full potential of TI Edge AI processors and accelerate your deep learning, vision, multimedia and other AI tasks with the TI Edge AI software development environment.

Application layer

Multi-camera AI processing

Sensor fusion

Secure cloud connection

Python and C++ programming

Industry standard APIs and frameworks

TensorFlow Lite

ONNX Runtime

TVM

GStreamer

Docker

ROS

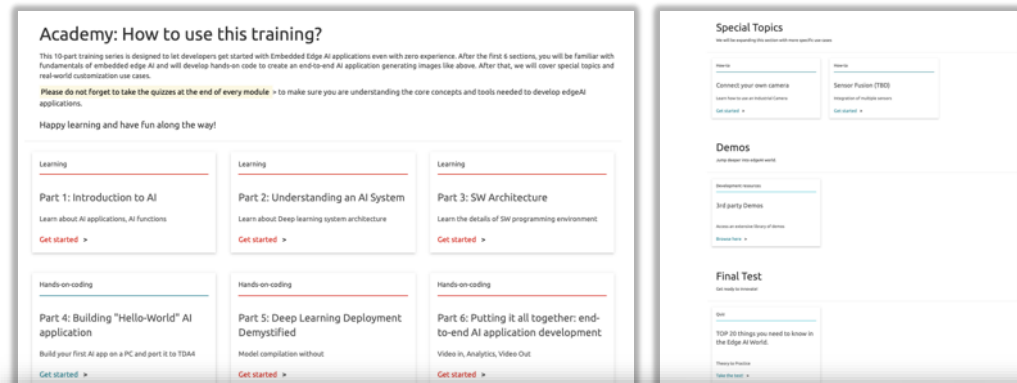
OpenGL ES

Academy | Train developers to get into AI, Faster and Easier



Objective

- ❑ A self-paced classroom-like training for new AI developers



Content

- ❑ Parts 1-3: AI fundamentals, AI system and SW
 - Emphasize how the TDA4 platform is making it efficient and easier
- ❑ Parts 4-6: code examples
 - Model use, deployment and end-to-end camera to analytics examples
- ❑ Parts 7-10: Real-world use cases
 - Specific EE examples, demos, final test

Web page walk-through

Call to action

☐ Reimagine “what’s possible” for your application with embedded edge AI

- Review www.ti.com/edgeai for more information

☐ Develop on the cloud tool

- <https://dev.ti.com/edgeai/>
- Performance benchmarking
- Evaluate different deep learning models

☐ Develop with low-cost starter kit

- Check <https://www.ti.com/product/TDA4VM> on Sept 8, 2021

☐ Contact TI for support (e2e.ti.com)

Questions and Discussion

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