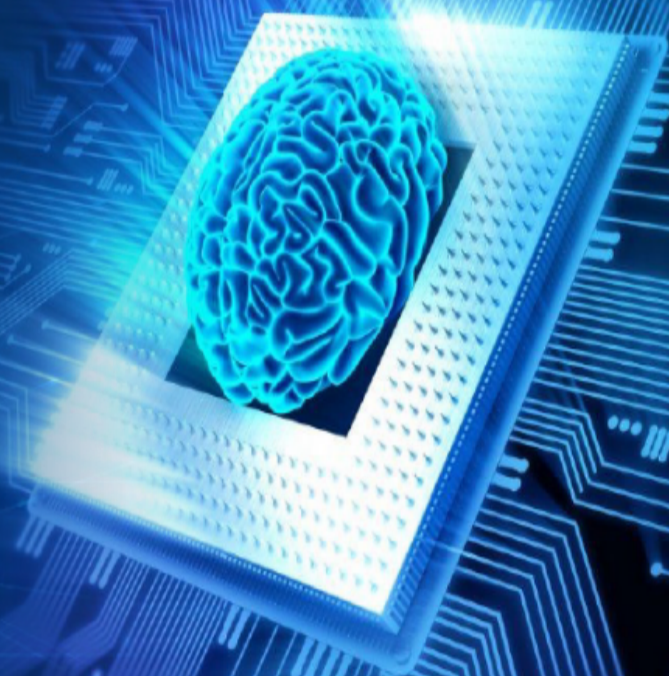
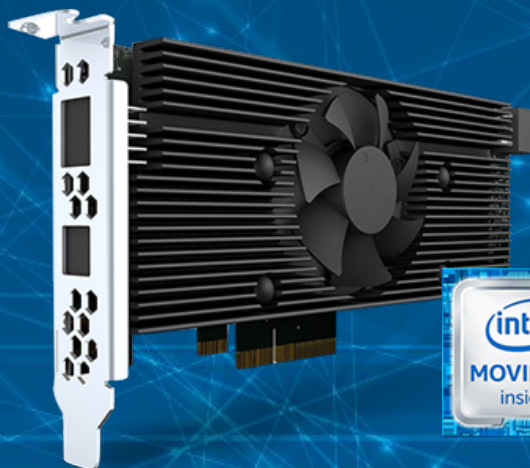


# INTEL® VISION ACCELERATOR DESIGN PRODUCTS

High Performance for AI Inference



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# WHAT IS AI?

AI

## MACHINE LEARNING

Regression  
Decision trees

Classification  
Extrapolation

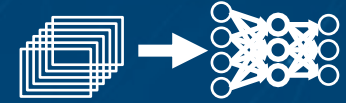
Clustering

## DEEP LEARNING

Image Processing  
Speech Recognition

Natural Language Processing

Computer Vision



**SUPERVISED LEARNING**



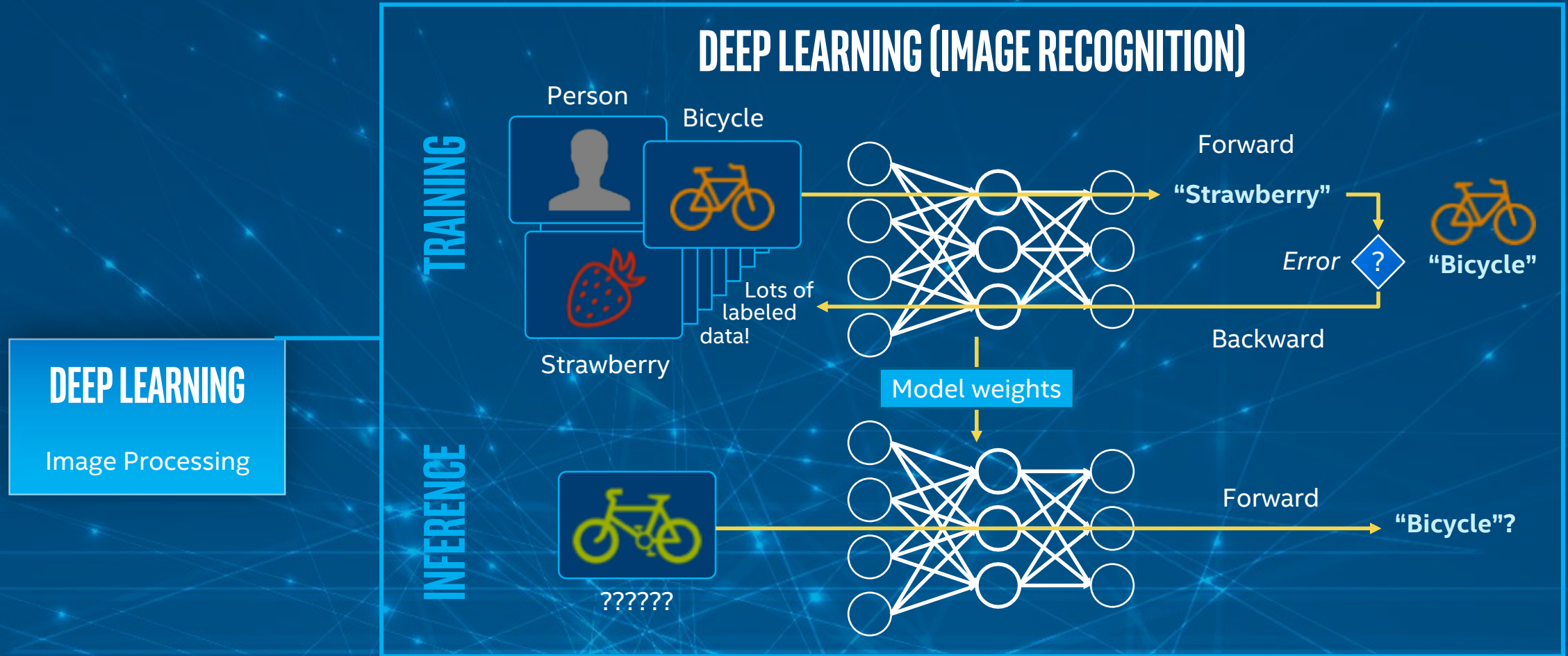
**UNSUPERVISED LEARNING**



**REINFORCEMENT LEARNING**

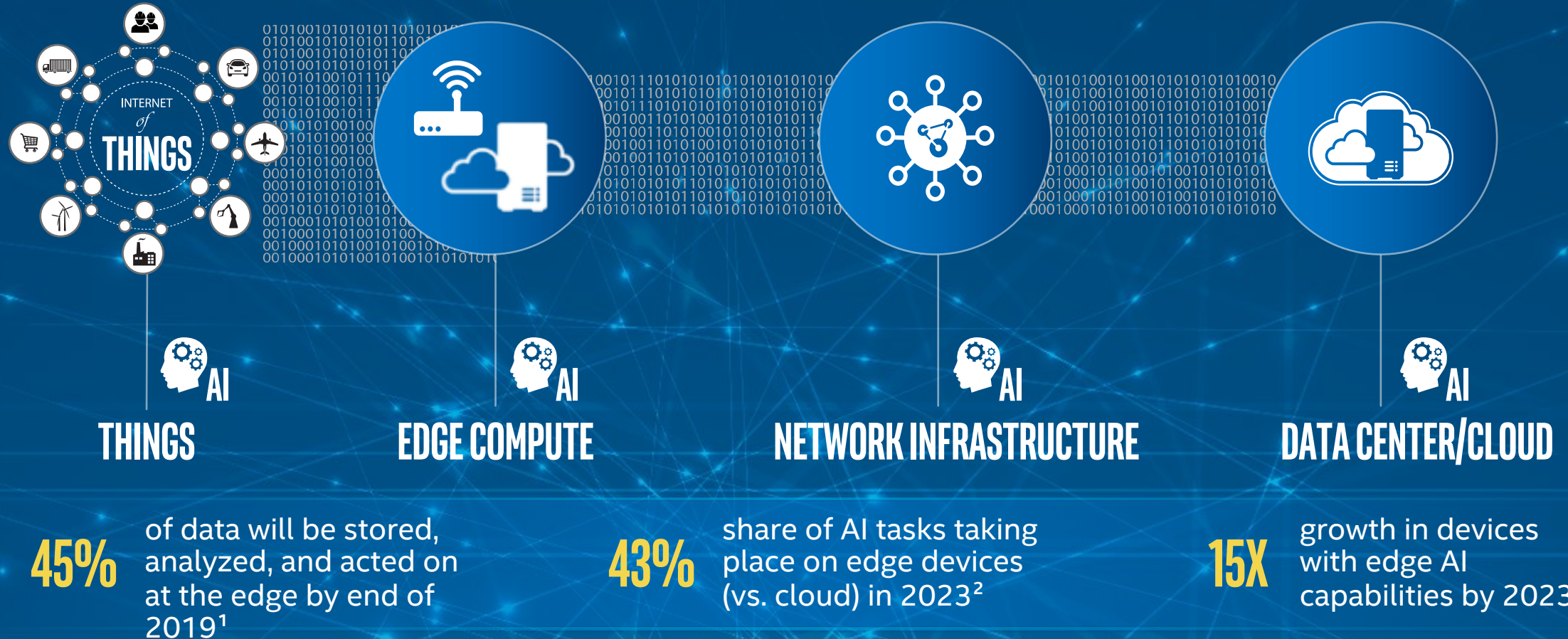


# WHAT DOES AI DO?



# FROM EDGE TO CLOUD, AI HAS CREATED **A HUGE OPPORTUNITY FOR DEVELOPERS**

## **KEY DRIVERS TO THE EDGE:** BANDWIDTH, STORAGE, LATENCY, SECURITY





# COMPUTER VISION AND ARTIFICIAL INTELLIGENCE ARE TRANSFORMING IOT DEVICES AT THE NETWORK EDGE



## SMART CITIES

Public Safety & Surveillance  
Traffic, Parking and LPR  
Emergency Response



## FINANCIAL SERVICES

People Counting  
Customer (i.e., Gender, Wait Time)  
ATM Facial Recognition



## INDUSTRIAL

Machine Vision  
Asset Inspection (i.e., Pipeline)  
Augmented Reality



## CASINO GAMING

Public Safety & Surveillance  
Facial Recognition



## TRANSPORTATION

Autonomous Vehicles  
Public Safety (i.e., Bus/Rail)  
Traffic & People Counting



## HOME, RETAIL & SURVEILLANCE

Security & Surveillance  
Responsive Retail Advertising  
Digital Home Assistant



## ROBOTICS

Manufacturing Automation  
Industrial (i.e., Pipeline Welding)



## DRONES

Emergency Response  
Asset Inspection (i.e., Windmill)



# INTEL® AI TECHNOLOGY IN ACTION



## Machine Learning and Mammography

Detecting invasive ductal carcinoma with convolutional neural networks showing how existing deep learning technologies can be utilized to train artificial intelligence (AI) to be able to detect invasive ductal carcinoma (IDC)<sup>1</sup> (breast cancer) in unlabeled histology images.



## AI Assists with Skin Cancer Screening

Doctor Hazel, a skin cancer screening service powered by AI that operates in real time, relies on an extensive library of images to distinguish between skin cancer and benign lesions, making it easier for people to seek professional medical advice.



## AI Helps Detect Bacteria in Water

Offline analysis is accomplished with a digital microscope connected to a laptop running Ubuntu\* and the Intel® Movidius™ Neural Compute Stick. After analysis, contamination sites are marked on a map in real time



## Shark Detection to Save Lives

Intel® Movidius™ Neural Compute Stick was used with Australia's Little Ripper Lifesaver UAV to monitor the New South Wales coastline for sharks.



## Nudity Detection to Fight Child Pornography

The NaaS (Nudity-detection as a service) the result of a project by Haschek Solutions. It uses a cluster of three Raspberry Pis and two Intel Movidius Neural Compute Sticks to analyze photographs to identify pornographic images.



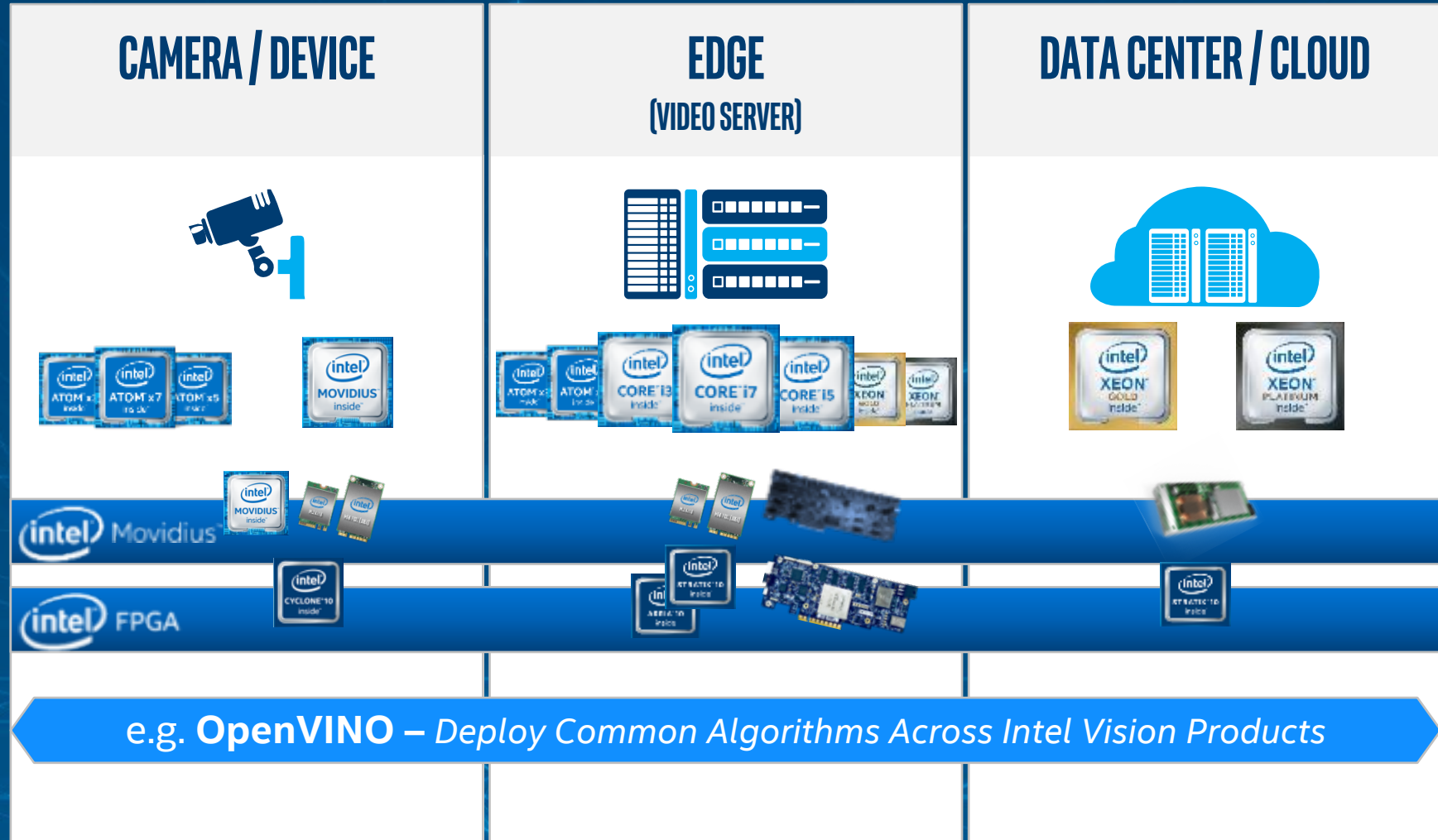
## CORAIL: Coral Reef Restoration and Research

Prototype a fully functional modular AI-powered underwater camera unit that continuously counts the number of visible fauna, and, as possible, assign a taxonomy to help protect endangered coral reefs.

AI has the power to make a difference and change lives. What will you make?  
**Get Started Today ► [intel.com/ncs](https://intel.com/ncs)**

# INTEL® VISION PRODUCT PORTFOLIO

Host Processors  
+  
Discrete Accelerators  
on  
Unified SW Toolkits





# INTEL® DEEP LEARNING DEPLOYMENT TOOLKIT

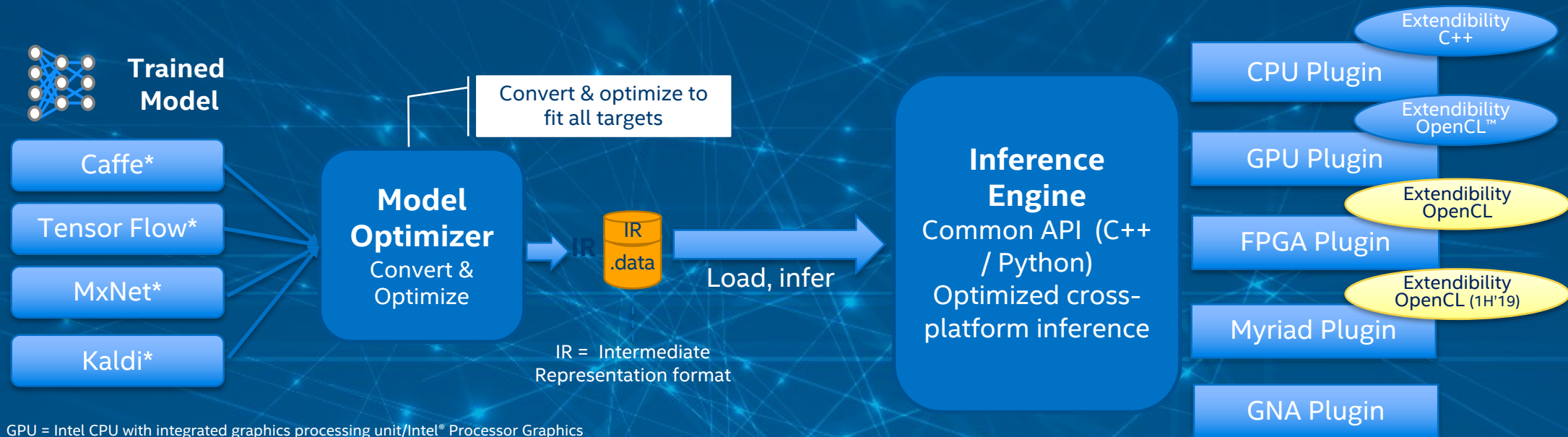
## TAKE FULL ADVANTAGE OF THE POWER OF INTEL® ARCHITECTURE

### Model Optimizer

- **What it is:** Preparation step -> imports trained models
- **Why important:** Optimizes for performance/space with conservative topology transformations; biggest boost is from conversion to data types matching hardware.

### Inference Engine

- **What it is:** High-level inference API
- **Why important:** Interface is implemented as dynamically loaded plugins for each hardware type. Delivers best performance for each type without requiring users to implement and maintain multiple code pathways.



# QUICKLY DEPLOY WITH PRE-BUILT PROJECTS

## OPEN-SOURCED REFERENCE IMPLEMENTATIONS



Retail

### Store Aisle Monitor

Capture video, generate a heat map, record the number of people present, and then integrate the results. The program can also create an output video and save snapshots.

### Shopper Mood Monitor

Detect the mood of shoppers when looking at a retail or kiosk display.

### Parking Lot Tracker

Receive or post information on available parking spaces by tracking how many vehicles enter and exit a parking lot.

### Shopper Gaze Monitor

Build a solution to analyze customer expressions and reactions to product advertising collateral that is positioned on retail shelves.

### Store Traffic Monitor

Monitor three different streams of video that count people inside and outside of a facility. This application also counts product inventory.

### People Counter System

Create a smart video application using the Intel Distribution of OpenVINO toolkit. The toolkit uses models and inference to run single-class object detection.



Industrial

### Object Size Detection

Use a video source such as a camera to capture images and validate an object's size.

### Object Flaw Detector

Detect various anomalies of an object that is moving on a conveyor belt within a manufacturing facility, and then run analysis on what is detected.

### Machine Operator Monitor

Send notifications when an employee appears to be distracted when operating machinery.

### Motor Defect Detector

Predict performance issues with manufacturing equipment motors. Perform local or cloud analytics of the issues found, and then display the data on a user interface to determine when failures might arise.

### Safety Gear Detector

For people working in hazardous conditions, wearing appropriate safety gear is critical. This solution observes workers as they pass in front of a camera, identifies them using facial recognition, and determines if they have adequate safety protection.

### Restricted Zone Notifier

Secure work areas and send alerts if someone enters the restricted space.



Smart Cities

### Industrial Anomaly Detection

Intruder Detector  
Build an application that alerts you when someone enters a restricted area.

### Facial Recognition Access Control

Develop a facial detection and recognition solution to grant access to designated areas.



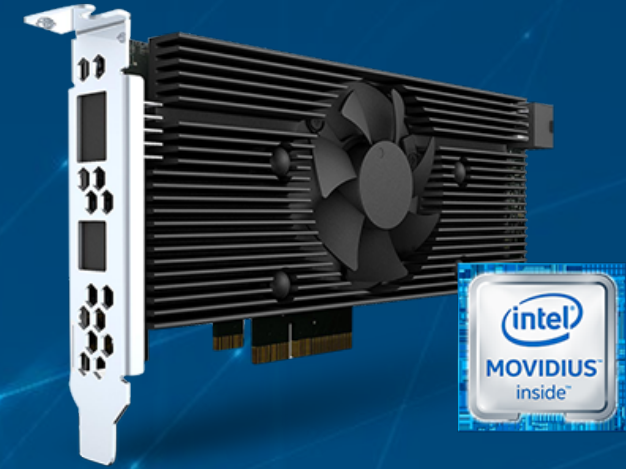
# INTEL® MOVIDIUS™ PRODUCT PORTFOLIO

	X1 Movidius	X2 Movidius	X8 Movidius
VPU	1 MA2485	2 MA2485	8 MA2485
Dimensions	M.2 2230 22mm x 30mm	M-PCIe* 30mm x 50mm	½ height PCIe* 69mm x 168mm
Minimum System Spec	Intel Atom® x7 E3950, 8GB DDR4, 64GB, USB 3.0, M.2 2230	Intel Atom® x7 E3950, 8GB DDR4, 64GB, USB 3.0, M-PCIe	Intel® Core™ i5 6500TE 8GB RAM, 500GB, USB3.0, 2 PCIe x4 x8 x16
Models	<ul style="list-style-type: none"> <li>- <u>AAEON* UP* AI Core X</u></li> <li>- <u>Advantech* VEGA-320</u></li> </ul>	<ul style="list-style-type: none"> <li>- <u>AAEON* UP* AI Core XM 2280</u></li> <li>- <u>ADLINK* EDL-mPCIe-MA2485</u></li> <li>- <u>Advantech* VEGA-330</u></li> <li>- <u>JWIPC* AI Accelerator Card</u></li> <li>- <u>Uzel* UI-AL2</u></li> </ul>	<ul style="list-style-type: none"> <li>- <u>IEI* Mustang-V100-MX8-R10</u></li> <li>- <u>NEXCOM* AIBooster-X8</u></li> <li>- <u>Uzel* UI-AR8</u></li> </ul>

# INTEL VISION ACCELERATOR DESIGN PRODUCTS KIT

POWERED BY IEI\*

- Specialized Processors designed for high-performance machine vision at low power
- 8 VPU's x 16 SHAVE cores (Streaming Hybrid Architecture Vector Engine)
- Supports multiple network topologies (GoogLeNet, ResNet, etc.)
- Two Memory Banks (DDR4, 8GB in total)
- Preinstalled Intel® Distribution of OpenVINO™ toolkit
- Get started quickly with samples



TANK-870-Q170

\* Contact IEI Integration Corp. for pricing

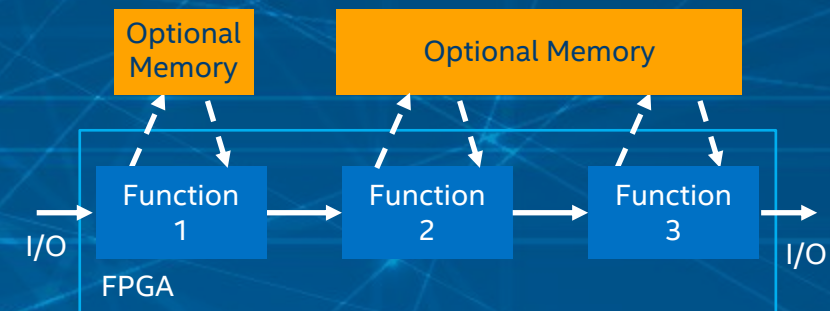
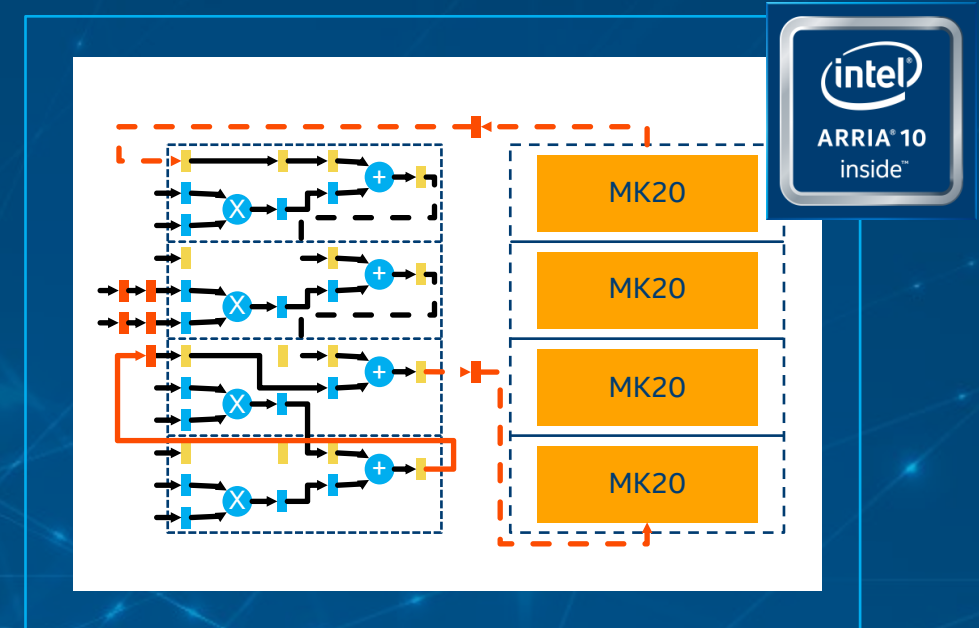


# INTEL® VISION ACCELERATOR - FPGA

## IEI \* PCIE FPGA CARD



- Arria10 1150GX PCIe add-in card with OpenVINO support and bitstream update tool.
- Provides various precision options to support different performance target using the same hardware.
- Bitstream updates on a quarterly cadence for performance enhancements over time.



# VISION ACCELERATION KIT + FPGA

## POWERED BY IEI\*

- Flexible, customizable processors designed to adapt to various display, video, and image processing workloads.
- Arria 10 GX 1150KLE FPGA
- Designed for high performance, low latency applications
- Supports multiple network topologies (GoogLeNet, ResNet, etc.)
- OpenCL BSP for accelerator customization
- Two Memory Banks (DDR4, 8GB in total)
- Passive or Active cooling
- ½ L, ½ H PCIe (Gen 3x8)



TANK-870-Q170

\* Contact IEI Integration Corp. for pricing



# DEEP LEARNING ENGINE DECISION TREE

## Standard CPU?

## Higher-performance CPU or GPU?

## VPU or FPGA Accelerator?

