



AI EDGE

are you
up for **UP**?



Centralized AI
≠
Real Time
Decision
an the Edge





**AI at the Edge
with
CPUs + GPUs
=
Expensive
Not Efficient
(Gflops/W)**





**AI On The Edge for
Robots, Drones,
Portable/Mobile Devices
Outdoor Devices**

=

**Efficient (Gflops/W)
Reasonable Cost
Industrial Grade Archit.**



AI Edge Use Case Video

Work Safety:

https://www.youtube.com/watch?v=-Wb_8VDGZD8&feature=youtu.be

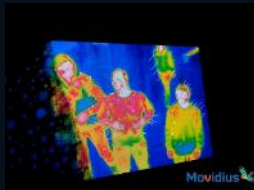
Brand Recognition:

https://www.youtube.com/watch?v=so_3ki-Sc2U



UP AI Edge

CREDIT SIZED STACKABLE ARTIFICIAL INTELLIGENCE PLATFORM
FULLY POWERED by Intel® TECHNOLOGY



UP CORE PLUS

X86

AI PLUS

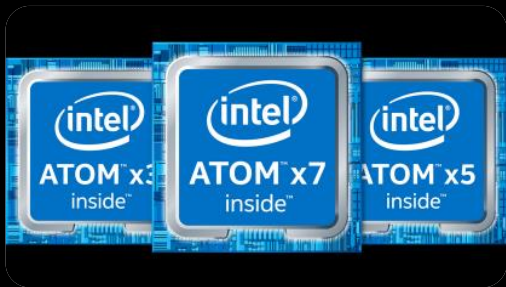
FPGA

AI CORE

VPU



UP AI Edge



Intel® Atom x5/x7 Celeron/Pentium

Low Power Consumption
Quad Core 64 bit x86
Architecture

OS agnostic

GPU integrated

Rich I/O



+ Intel® Cyclone® 10 GX

Programmable
Versatile
Architecture

Super Rich I/O

Good for CPU Offload,
Real Time High Speed Signal
Analysis



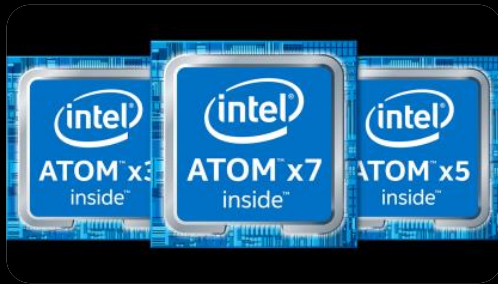
Intel® MOVIDIUS™ Myriad 2

Video Processing Unit
(Hardware Neural Network)

Optimized for Machine
Learning and Real Time
Pattern Recognition



UP AI Edge



UP CORE PLUS

Low Power Consumption 6th Generation Atom, Celeron
Pentium Quad Core 64 bit x86 Architecture

GPU integrated

Intel Sensor HUB

Support of Windows 10, Linux Ubuntu, Yocto, Debian



Credit Card Form Factor

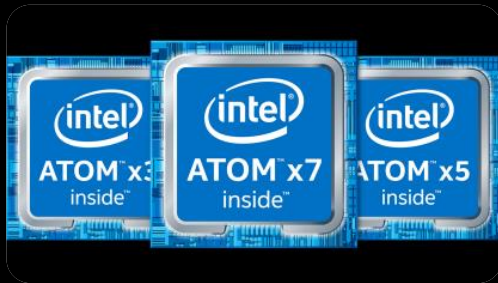
Stackable & Expandable

Low Power Consumption

Cost Effective Solution



UP AI Edge



UP CORE PLUS

Intel® Atom™ x5 / x7 / Celeron® / Pentium®
2/4/8 GB DDRL 4 Dual Channel 2.400 MHz
32/64/128 GB eMMC
DP 4K@60 Hz
eDP
CSI 2 Lane + CSI 4 Lane
USB 3.0 Type A
USB 3.0 Type B
WiFi 802.11 AC 2T2R
2 x 100 pin expansion connector
Compatible with UP Core expansion board
12V DC In



UP AI Edge



AI PLUS

Programmable Versatile Architecture
Rich high speed I/O
Hardened Floating Point Capabilities
Good for CPU Off-loading

Real Time High Speed Signal Analysis

Support of Tensor Flow

Support of Quartus Design Tools, DSP
Builder, and HLS Compiler

Compatible with Basler LVDS camera



Credit Card Expansion Board

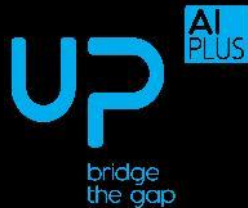
Reach I/O

Low Power Consumption

Movidius via mPCIe



UP AI Edge



AI PLUS

Intel Cyclone 10gx 105 / 150 / 220 K1e
Display Port IN connected to Cyclone
LVDS IN connected to Cyclone
USB 3.1 Device Type C connected to Cyclone
GPIO connected to Cyclone

USB 3.0 Type A connected to mainboard UP Core Plus
mPCI-Express connected to UP Core Plus
Gbit Ethernet connected to UP Core Plus



UP AI Edge



AI PLUS Target Customers

Software Developers

- Purpose : Provide easy access to FPGA
- Usage : Off load CPU via OpenCL™ and machine vision via OpenCV

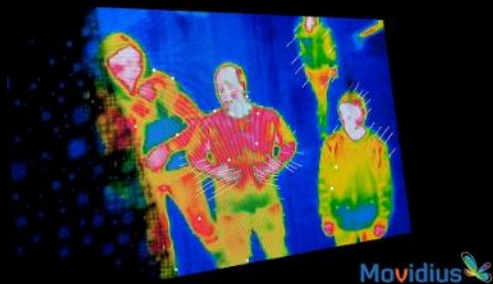


FPGA Developers

- Purpose : Provide all-in-one versatile expandable industrial cost effective platform which integrates Intel® Atom™ x5/x7/Celeron®/Pentium® + Cyclone® 10 Gx
- Usage : exploit complete FPGA for video acceleration, machine learning, algorithm acceleration



UP AI Edge



Hardware Neural Network

Optimized for Machine Learning and Real Time
Pattern Recognition

Support of Tensor Flow & Caffe software

Compatible with all x86 computers with
mPCI-Express slot

Fully compatible with Intel Neural Compute Stick software suite



AI CORE

mPCIe expansion board

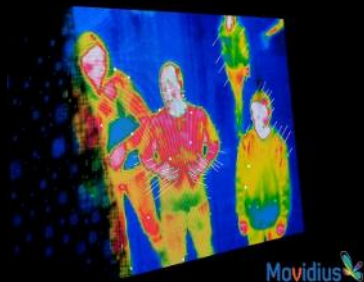
MOVIDIUS™ Myriad 2
Video Processing Unit

Optimized for Deep Learning

Ultra Low Power

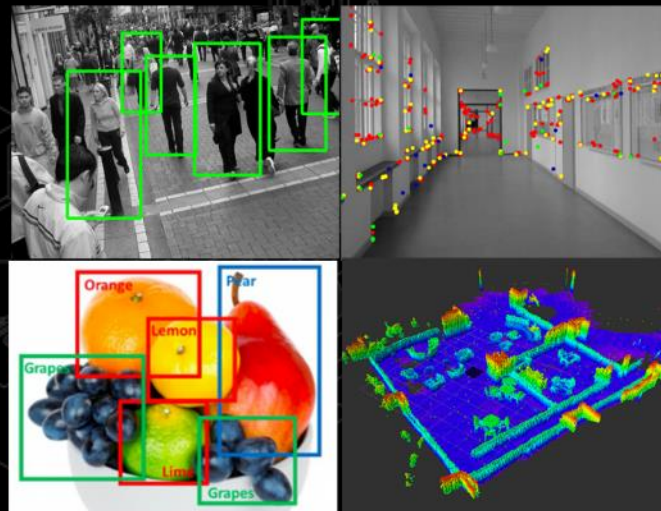


UP AI Edge

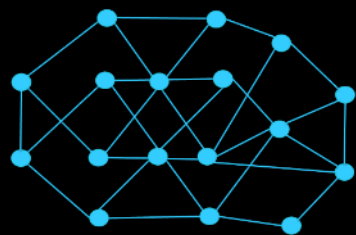


FEW EXAMPLES OF APPLICATIONS :

- Object Recognition
- People recognition



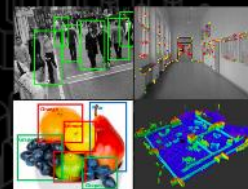
UP AI Edge



Create your
model with
Caffe or
TensorFlow



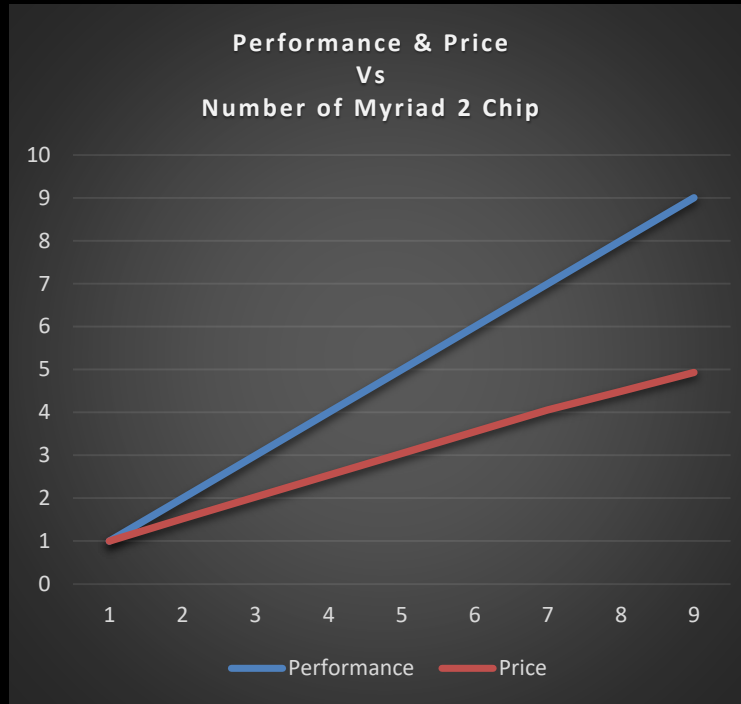
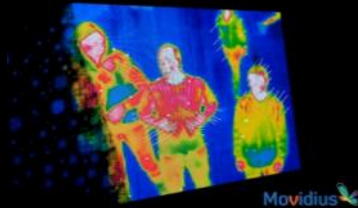
Train Your
Model
in the Cloud



Deploy it in the
Field on AI Core



UP AI Edge



Example :

Custom Solution with 5
Myriad 2 onboard

Performance = 5 x AI Core
= 5 x Myriad 2

Price = 3 x Price of AI Core

$N \times \text{Myriad 2} = N \times \text{Performance} < N \times \text{AI Core price}$



UP AI Edge

From development kit to field deployment



Development
Kit



AI Edge
Indoor
Gateway



AI Edge
Outdoor
Gateway



UP AI Edge

EXAMPLES OF TARGET APPLICATIONS



**Predictive Maintenance
Machine Vision**



**Commercial
Robot**



**Video Surveillance /
Traffic Control**



**Industrial
Augmented Reality**



**Intelligent
Retail**



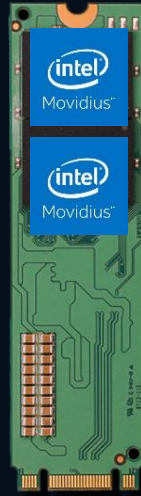
**Professional Air
Drone**



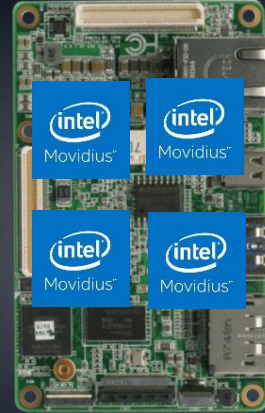
UP AI Vision Roadmap



UP AI Core
-mini PCI-e
-1x Myriad 2



UP AI Core-M
-M.2
-2x Myriad 2



Vision Plus
-board to board connector
- Compatible for UP Core Plus (Apollo Lake)
-4x Myriad 2

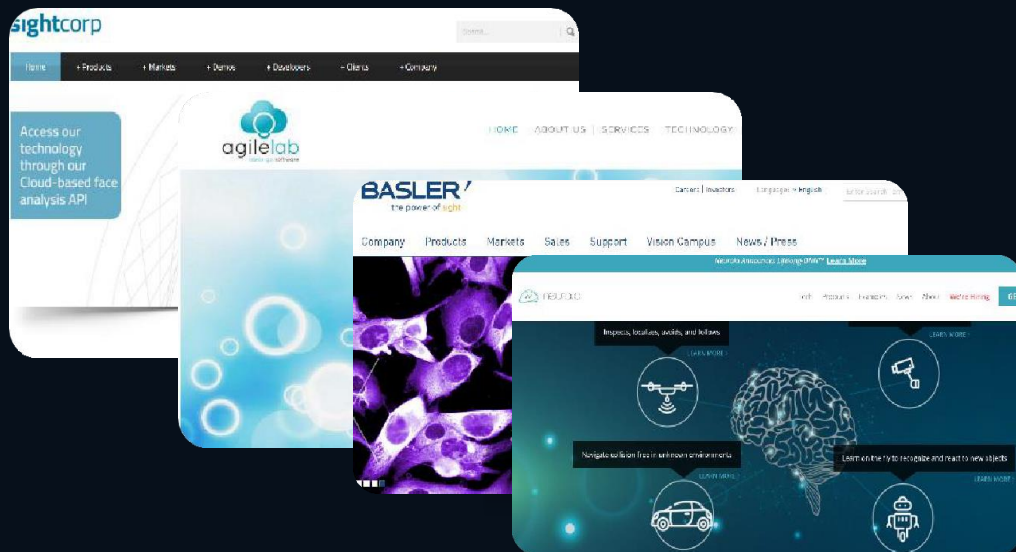


UP AI Core-X
-mini PCI-e
-1x Myriad X



UP AI Edge

Join our A.I. Ecosystem



UP AI Vision Development Kits



UP Squared AI Vision Development Kit

Implement and deploy computer vision solutions and support deeplearning inference across the CPU, GPU, and VPU.

Authorized OpenVINO™ Platform



UP AI Vision Development Kits



UP Squared AI Vision Development Kit

- ✓ UP Squared board (Atom™ X7-E3950, 4GB RAM / 64GB eMMC)
- ✓ AI Core with Intel® Movidius™ Myriad™ 2 Vision processing Unit (VPU)
- ✓ USB Camera with maximum resolution of 1920 x 1080p at 30 fps
- ✓ Power supply 5V @ 6A
- ✓ Fanless chassis

The image shows the Intel Developer Zone IOT Home page. The header includes the Intel Software logo, 'Developer Zone', a search bar, and links for support, login, and language. The main section is titled 'DEVELOPMENT AND DEPLOYMENT RESOURCES' with a search bar below it. Under 'Recent Updates', there are three featured items: 'Smart Video Tools & Reference Implementations' with a video thumbnail, 'Kits to Accelerate Computer Vision Deployments' with a photo of a kit, and 'Intel Global IoT DevFest III' with a photo of a person at a computer.

The image shows the UP Squared AI Vision Development Kit components and a description. The components include the UP Squared board, a fanless chassis, a USB camera, and a power supply. The text describes the kit as an entry-level kit ideal for conceptualization and early development, supporting a broad range of hardware acceleration options, the Intel® Movidius™ Myriad™ 2 Vision Processing Unit (VPU) in a Mini-PCIe form factor, and enabling developers to explore deep learning inference across the Intel Atom® x7 processor, integrated GPU, and VPU. It also includes a semi-industrial camera and enclosure to validate designs in the field. Below the image, it states that both kits come fully configured with the OpenVINO™ toolkit, a new SDK designed to help developers build high-performance computer vision applications and integrate deep learning inference. For flexibility, developers can go to production and optimize performance using Intel® System Studio tool suite, or prototype with the cloud-based Arduino® Create IDE. This software is included on a pre-installed custom Ubuntu® Desktop OS configured to allow for computer vision development out of the box.

Intel Movidius Myriad VPU vs Nvidia GPU

Intel Movidius

- Suitable for small PC even ARM PC
- Low cost
- Low power consumption
- Require only mPCIe slot or M.2 slot
- Does not require Internet connection as it is on the Edge
- Myriad 2 = 100Gflops
- Myriad X = 1Tflops

Nvidia GPU

- Suitable for server and high end PC
- High cost
- High power consumption
- Require PCIe slot
- Require Internet connection if it is on server
- Jetson TX1 = 1Tflops
- Jetson TX2 = 2Tflops



The Idea



=

The Most Popular platform
for prototypes



+



The Most Scalable Technology

+



Industrial Grade Electronic
Manufacturing Process and Components

UP Series

UP Board Series

UP Boards



UP



UP Squared



UP core

UP HATs



UP Kits



UP System



UP AI Edge

Main Boards



UP Core Plus

AI Accelerator



AI Core

FPGA




AI Plus


Expansion





Net Plus


UP Squared Grove IoT Development Kit


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UP SQUARED* GROVE* IOT DEVELOPMENT KIT


Reduce development time for your intensive computing applications with a kit that includes integrated software and end-to-end tools.


[Get Started](#)[Buy](#)



 Documentation

 Tutorials

 Sensor Library

 Forum

UP Squared Grove IoT Development Kit



www.up-board.org

List of Content:

UP Squared Intel Celeron N3350, 2GB DDR4, 32GB eMMC
Power Supply
Grove Adapter
Grove Sensors (LCD RGB Backlight, - Rotary Angle Sensor, Light Sensor v1.2, Button, Temperature & Humidity Sensor)
16GB USB drive
USB3.0 OTG cable

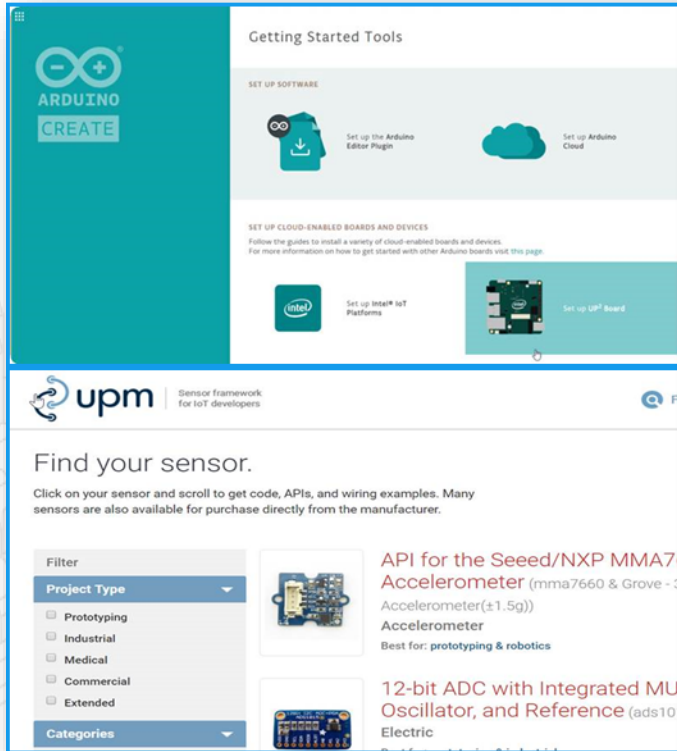
Pre-loaded **ubuntu[®]** OS and supported by
Arduino Create

Product page:

<https://software.intel.com/en-us/iot/hardware/up-squared-grove-dev-kit>



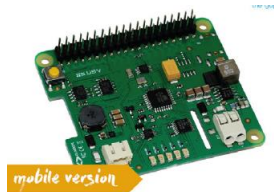
Arduino Create & UPM



Arduino Create pre-configured:
An integrated online platform that
enables developers to write code,
access content, configure boards,
and share projects.

Sensor framework ready:
+400 sensors' libraries integrated
software framework (open source)

Expand it



Mobile power HAT

- 40-pin
- Power by battery pack



Anybus Common Ethernet Slave

- mPCIe
- Automation protocol



Power over Ethernet

- 40-pin
- Power over LAN



eDP adapter

- Convert LVDS to eDP



Audio HAT

- 40-PIN
- Line-out, MIC, buzzer



Fanless metal chassis & DIN RAIL kit

Industrial Grade IoT Gateway Family

UP single boards that are industrially built for pros



UP-GWS01



UP Square



UP Core



UPS-GWS01



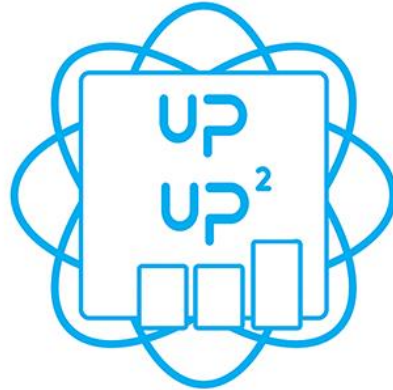
UPC-GWS01



Industrial Eco-System



CANONICAL



www.up-board.org



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