

Artificial Intelligence on the Edge

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This article introduces UP AI Edge, a platform which is fully powered by Intel technology and integrates: Intel Apollo Lake-I CPU, Intel Cyclone 10 gx FPGA, and Intel Movidius Myriad 2 VPU (Video Processing Unit), and represents a completely new paradigm for AI in the industrial embedded market.



Top side of the UP Core Plus mainboard

■ Deep Learning, Machine Learning and Artificial Intelligence (AI) have recently reached the hype of expectation in the consumer market. While pure AI still seems to be far away, sophisticated Machine Learning solutions have reached the plateau of productivity and are part of our everyday life. Some of these technologies are now entering the industrial and the Internet of Things market, spreading intelligence in our connected world. Hereby, the biggest constraints of the field deployment of AI on the Edge used to be as follows. 1) Cost of the solution: no optimized hardware was available and the most common solution was to use a high-performance CPU + GPU. 2) Power consumption of the solution: a CPU + GPU approach delivers high performance at high thermal dissipation power. 3) Robustness of the solution: the technologies used were designed for big data centers, where temperature range, vibration and other industrial requirements were not needed.

Recent progress in Machine Learning technology, as well as new silicon chips, permits to expand AI from cloud computing to edge computing. AAEON Technology Europe and its line UP Bridge The Gap are now releasing an unique platform, which can overcome all the previous limitations: UP AI Edge. This platform is fully powered by Intel technology and it integrates: Intel Apollo Lake-I CPU,

Intel Cyclone 10 gx FPGA, and Intel Movidius Myriad 2 VPU (Video Processing Unit). UP AI Edge delivers unmatched performance and it represents a completely new paradigm for AI in the industrial embedded market.

The mainboard is UP Core Plus, a credit-card-sized board (55 mm x 90 mm) powered by Intel Apollo Lake-I family. Intel Apollo Lake-I platform is a 64-bit QuadCore architecture with extremely high performance in only 9.5W of TDP (x5 – 3940). The board supports up to 8GB Dual Channel DDR4 2.400 MHz, DP up to 4K, eDP, 2 USB 2.0, 1 USB 3.0, 1 USB 3.0 OTG, WiFi 802.11 AC 2T2R, 2 x CSI and it has two 100-pin high speed connectors to expand it.

The companion board UP AI Plus is powered by Intel Cyclone 10gx (105KLe-220KLe), has 1 GB DDRIII, and is DPin connected to the Cyclone for Video Acquisition, and USB Type-C and GPIO connected to the Cyclone for data acquisition. LVDS in connected to the Cyclone for Camera acquisition, GBit Ethernet, USB 3.0 and mini-PCIe connected to the mainboard via the 100-pin connector. Thanks to a collaboration with Basler, the worldwide leader of industrial Machine Vision camera solutions, UP AI Plus is compatible with selected Basler cameras, which can be seamlessly connected via LVDS. UP AI Plus can be used to process streams of high speed raw

data – e.g. from cameras – or to run video acceleration, real time video data analysis, video acquisition and many other functions. Different applications can run just by loading the specific IP inside the FPGA.

Because of the mini-PCIe, the companion board UP AI Plus can host UP AI Core, a mini-PCIe module powered by Movidius Myriad 2. Myriad 2 is the most advanced low power technology for running a neural network on the edge and for processing video images. It has been adopted by DJI for their professional drones, as well as from Amazon and Google for different other products. UP AI Core is fully compatible with the Intel Neural Compute Stick libraries and tools. UP AI Edge will also be available as an industrial rugged AI gateway for deployment in harsh environments.

For software support, UP AI Edge will be supported by the UP Community and from the Intel Network Compute Stick for all the software questions related to UP AI Core (Myriad 2). UP AI Edge will be in mass production in June 2018, but people can start pre-ordering it to support the project from April onwards on Kickstarter, as well as from May 2018 on UP Shop and with all resellers and partners of UP and AAEON. The price will start at \$399 US for the complete platform. ■