

OVERVIEW OF ANTRICA SOLUTIONS WITH AI CAPABILITY

INTRODUCTION

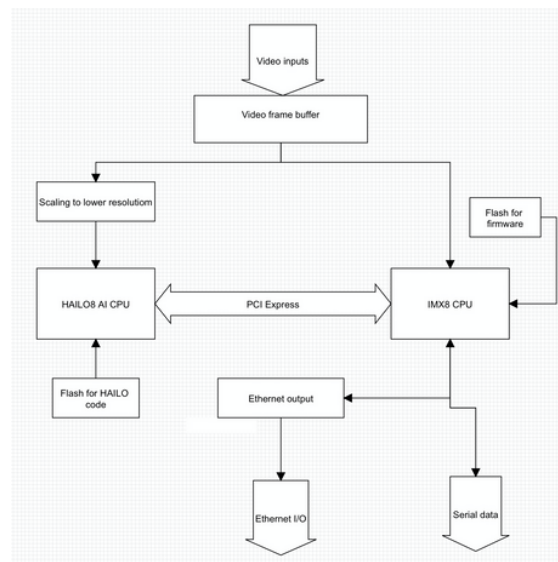
Antrica sells a range of devices (ANT-1776xxx) based on the IMX8 processor which is used to capture multiple video sources and compress these using H264/265 and stream over an IP network. These devices are used in unmanned and manned applications where a variety of cameras (night vision, Zoom block . HD and analogue, quad analogue , HD-SDI, USB , HDMI , Cameralink etc) are used and streamed over an Ethernet IP link.

Variations of the the ANT-1776 and future generations come with an option to add the Hailo 8 AI edge AI processor (see Halo 8 description below or visit www.hailo.ai)

This processor is the lowest power and size solution available considering the 26 tera operations per second capability)

ANT-1776 AI VERSIONS: ARCHITECTURE

The architecture of how the Hailo 8 and IMX8 processor interact in the ANT-1776 xxx is shown in the following block diagram.



Video is taken in by the ANT-1776xxx and converted to digital, or manipulated if already digital, and put into a frame buffer.

This video data within the frame buffer is raw and near real time data which is simultaneously accessed by the Hailo8 and IMX8 CPUs simultaneously .

The IMX8 takes this data and converts into H264 and 265 stream whilst the Hailo8 uses this data for whatever AI functions the Hailo8 has been programmed to do. The Hailo 8 then provides data to the IMX 8 as both graphics overlay coordinates (such as would be used for object classification or tracking) plus raw data which can be used as an output to control an autopilot or to send data to the ground or control a camera gimbal etc etc . This data is output via one of the serial ports on the IMX8 CPU.

Note: The data and graphics overlay will be customer by customer specific with firmware modified to accommodate a customers specific requirements and type of data .

Today the Antrica AI versions of the ANT-1776xxx ship with open source AI code called YOLO 5. Please see the description of YOLO5 below. This code is part of the standard ANT-1776 firmware but is only enabled if a HAILO8 processor is fitted.

OVERVIEW OF ANTRICA SOLUTIONS WITH AI CAPABILITY



HOW TO DEVELOP WITH THE HAIL08 VERSIONS OF THE ANT-1776

There are a few ways to do this:

- A.** Use the YOLO5 code provided with object detection classification functions. This will need custom firmware to output data via a serial port depending on what the customer needs. Graphics overlay is available as standard. The Firmware for the ANT-1776 already includes YOLO5 code but is only enabled if the HAIL08 CPU is fitted. (More detailed description below)
- B.** Provide Antrica with a detailed description of the AI functionality and we will engage with our chosen partner [axon-vision.com](https://www.axon-vision.com) who will develop bespoke code for the Halo 8 to achieve the customer requirement. Maris Tech will take this code and integrate it with the ANT-1776 firmware. Devices that ship will contain all the functions and outputs specified by there customer.
- C.** Develop your own AI code for the HAIL08 and then using ANT-1776xxx API commands upload this to the HAIL08 flash via the IMX8 Ethernet interface. Code development is achieved using the HAIL08 development kit supplied by HAILO themselves.

HOW TO DEVELOP BOTH AI CODE AND HOST A LINUX APPLICATION ON THE IMX*8 PROCESSOR.

Example A (above): Using the standard ANT-1776 with AI capability and YOLO5 pre loaded.

In this example the customer may use the existing YOLO5 code pre loaded and write a linux application which will output AI data (coordinates , tracking, object classification and so on) via the IMX8 I/O . This data could be output via the existing serial UART connection using an alternative PORT. Or the customer could define one of the unused UART connections on the IMX8 or use ethernet .

The process is that Antrica will supply a terminal cable for the ANT-1776 AI version plus all the necessary information to allow a customer to host their own LINUX code on the IMX8. This code would read the data provided by the HAIL08 via PCiX and output all, or a subset of this data, via either a serial I/O on the IMX8 or embed the data in the IP stream .

This will allow a customer to buy and use an off the shelf ANT-1776 with AI and write a linux app to read HAIL08 data and output this for gimble control, Autopilot control or additional graphics overlay and so on.

Example C (above): Using a standard ANT-1776 with HAIL08 but developing both custom AI code and a LINUX hosted app . (We described above the hosted Linux app this will be the same process).

Custom AI code will be developed either via a contractor or developed by the customer and uploaded as a complete program to the HAIL08 flash memory.

This will overwrite the YOLO5 code pre loaded by using APIs we supply. These APIs allow the IMX8 to take the new HAIL08 code and upload it via the PCiX bus to the HAIL08 flash. On the next boot the HAIL08 will use the new AI code.

NOTE: Both these sets of customer code (Linux and Hailo8) may be overwritten with a firmware upgrade . It may be possible for Antrica to incorporate the customers code (Linux and HAIL08) with our ANT-1776 IMX8 firmware to avoid this.

OVERVIEW OF ANTRICA SOLUTIONS WITH AI CAPABILITY

HAILO 8 EDGE AI PROCESSOR (www.hailo.ai)

The Hailo-8™ edge AI processor, featuring up to 26 tera-operations per second (TOPS), significantly outperforms all other edge processors. Its area and power efficiency are far superior to other leading solutions by a considerable order of magnitude – at a size smaller than a penny even including the required memory. With an architecture that takes advantage of the core properties of neural networks, our neural chip allows edge devices to run deep learning applications at full scale more efficiently, effectively, and sustainably than other AI chips and solutions, while significantly lowering costs.



YOLOv5

YOLO ALGORITHM

YOLO (You Only Look Once) is an open sourced popular real-time object detection algorithm in computer vision. YOLO has gone through several versions, and YOLOv5 was one of the latest versions at that time. YOLOv5 introduced various improvements over its predecessors and had several important functions, which can be summarised as follows:

Real-time Object Detection: YOLOv5 is designed for real-time or near-real-time object detection in images and videos. It can process images quickly, making it suitable for applications like autonomous driving, surveillance, and more.

High Accuracy: YOLOv5 aimed to improve detection accuracy while maintaining speed. It utilised various techniques like feature pyramid networks and anchor box clustering to achieve better accuracy compared to earlier versions.

Single-stage Detection: YOLO is known for its single-stage detection process, meaning it predicts bounding boxes and class probabilities directly from the input image in a single pass, as opposed to multi-stage methods like R-CNN.

Multiple Object Detection: YOLOv5 can detect multiple objects within an image or video frame simultaneously. It can handle scenarios where there are multiple objects of different classes present in a scene.

Support for Various Architectures: YOLOv5 offers different model sizes and configurations, including small, medium, large, and extra-large variants, allowing users to choose a model that fits their specific requirements in terms of accuracy and speed.

Customisation: YOLOv5 can be fine-tuned on custom datasets, making it suitable for a wide range of applications. You can train it to recognise specific objects or classes relevant to your use case.

Efficiency: YOLOv5 is designed to be efficient, making it suitable for resource-constrained environments. Its efficiency comes from architecture improvements and model optimisations.

Open Source: YOLOv5, like its predecessors, is typically open source, allowing developers to access the code and modify it for their specific needs. This encourages collaboration and innovation within the computer vision community.

Compatibility: YOLOv5 is often available in popular deep learning frameworks like PyTorch and TensorFlow, making it easier for researchers and developers to work with.

Deployment: YOLOv5 models can be deployed on various platforms, including edge devices, GPUs, and cloud infrastructure, depending on the specific use case and hardware availability.

OVERVIEW OF ANTRICA SOLUTIONS WITH AI CAPABILITY



AXON-VISION : ABOUT

Axon Vision empowers the Next-Gen Defence & HLS Systems with Artificial Intelligence.

The modern battlefield contains small targets, that are concealed in an urban area. Current sensors are flooding the human operators with information, turning the human factor into a major bottleneck. The future is smart, low-power, mobile sensors.

AxonVision empowers sensors with AI capabilities, creating the next-gen smart sensors, and adding autonomous capabilities to existing platforms.

Axon Vision's products are deployed in strategic facilities, military locations, and critical municipal infrastructures.

Axon Vision focuses in applications of remote sensing, object detection & recognition, smart radars, and precise reconnaissance for intelligence agencies. Axon Vision's AI insights are a key differentiator for its clients today.