Hailo-15 AI Vision Processor

Unprecedented AI performance in a camera power envelope

Overview

Hailo-15 is a series of AI vision processors for smart cameras. The Hailo-15 System-on-a-Chip (SoC) combines Hailo's patented and field proven AI inferencing capabilities with advanced computer vision engines, generating premium image quality and advanced video analytics.
The unprecedented AI capacity can be used for both AI-powered image enhancement and processing of multiple complex deep learning AI applications at full scale and at superior efficiency.

Highlights & Key Features

Unparalleled AI Analytics

- Up to 20 TOPS (Tera Operation Per Second) running on a powerful Neural Network (NN) Core enabling processing of multiple advanced DL models in parallel
- High FPS deep learning model processing for faster and highly accurate detection of more objects per frame
- Best AI performance at a standard camera power consumption & cost envelope

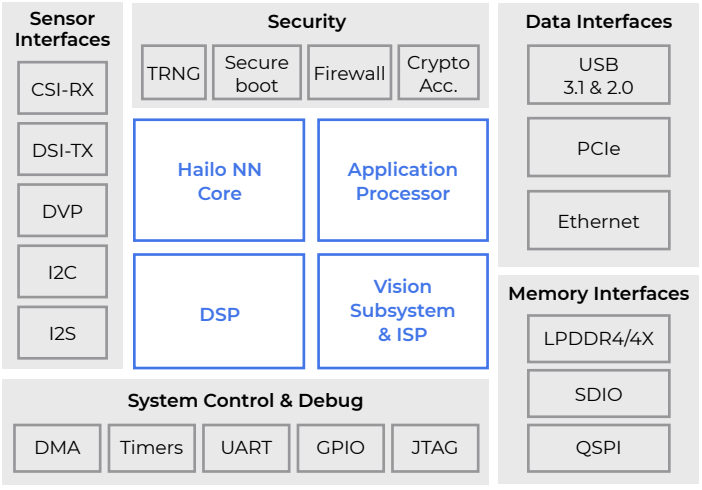
Superior Image Quality

- AI-powered vision processing for video image enhancement: noise reduction in low-light conditions, digital zoom for a higher resolution, image stabilization for fine and clear video stream, dynamic range and distortion correction.
- Premium 4K30 image quality with a cutting-edge ISP pipeline and an advanced Vision sub-system with High Dynamic Range (HDR) and Noise Reduction (NR) algorithms
- Industry leading DSP vision processing and high-quality video encoding

Flexible & Secure System

- Industry-standard frameworks with a complete Yocto-based Linux distribution
- Industrial grade SoC with a variety of interfaces for image sensors, data, and memory
- Secure boot and secure debug with hardware accelerated crypto library, TrustZone, TRNG, and Firewall

Block Diagram



General Specifications

High-performance NN core sub-system

- **Hailo-15H** 20 TOPS | **Hailo-15M** 11 TOPS | **Hailo-15L** 7 TOPS
- Hailo's patented structure defined dataflow architecture
- Full software control for continuous capability upgrades

Vision sub-system

- ISP: up to 12MP resolution, 600 Mpixel/s pixel rate
- RGGB & RCCB CFAs support
- HDR (2/3 DOL)
- Advanced noise reduction features: 2DNR, 3DNR, Chroma NR
- Video Encoding (HEVC & AVC) H.265/H.264 , multiple stream
- Electronic / digital image stabilization, lens shading & distortion correction, digital zoom, flip & rotate

Sensor Interfaces

- Video In: dual MIPI CSI, DVP 24 bit
- Video Out: MIPI DSI
- I2C (x4), I2S (x2 in, x2 out), SPI (x4)

Memory Interfaces[1]

- LPDDR4/4X 32bit @4266 MT/s
- QSPI
- SDIO 3.0/eMMc5.1 (up to HS200)

DSP vision processing sub-system

- Vector DSP, 256 MACs@ 700 MHz supports up to 350 GOPs

Physical[2]

- Packaging: FCCSP 15x15 mm
- Operating temperature -40°C to 85°C

Peripheral Interfaces[3]

- PCIe Gen 3.0 x 4 lanes (Endpoint or RC)
- 10 / 100 / 1000 Ethernet with RMII / RGMII
- USB3.1 Gen2 / USB2.0 Host

Security

- Secure boot
- Secure debug
- Hardware accelerated crypto library
- TrustZone, TRNG, Firewall

Application Processor sub-system[4]

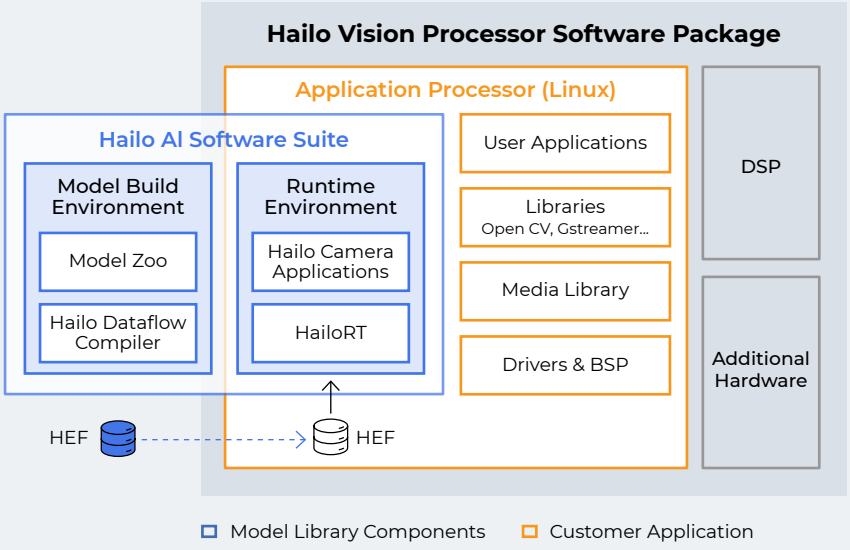
- Quad-core ARM™ A53 up to 1.3 GHz 12 kDMIPs

Hailo-15L:

1. *LPDDR4 32bit @3200 MT/s*
2. *13x13 mm*
3. *PCIe Gen 3.0 x 2 lanes*
4. *Quad-core ARM™ A53 up to 1.1 GHz 10.1 kDMIPs*

Comprehensive Software Package

The vision processor software package includes a set of drivers, libraries and tools designed to develop smart cameras based on AI computer vision. It includes all the support for camera hardware interfaces and protocols, as well as specialized image- and video-processing algorithms and vision subsystem that are optimized for the requirements of camera-based applications.



System Usage

The Hailo-15 series of AI Vision Processors offers a versatile solution for a variety of smart cameras, accommodating diverse requirements and able to be integrated into numerous AI-powered smart IP cameras.

Part Numbers

Hailo-15H Industrial: HNC2HAI11SM | Hailo-15M Industrial: HNC2MAI11SM

www.hailo.ai

Click here for more information & product inquiry