# COLIBRY NPU

## Make AI with zero energy

ASYGN Colibry Neural Processing Unit is an ultra-low power microcontroller powering performance and saving energy for image, sound or any sensor AI based proce sing. It saves power thanks to an efficient Neural Nework Processing Accelerator (NNPA) which is fully reconfigurable to serve many AI applications.

**Optimized for sensor data processing**

Hardware image accelerators, FFT


**Ultra-low power Microcontroller**

32-bit RISC-V Core
Up to 300 MHz
From 100uW to 10mW

**Neural Network Processing Accelerator**

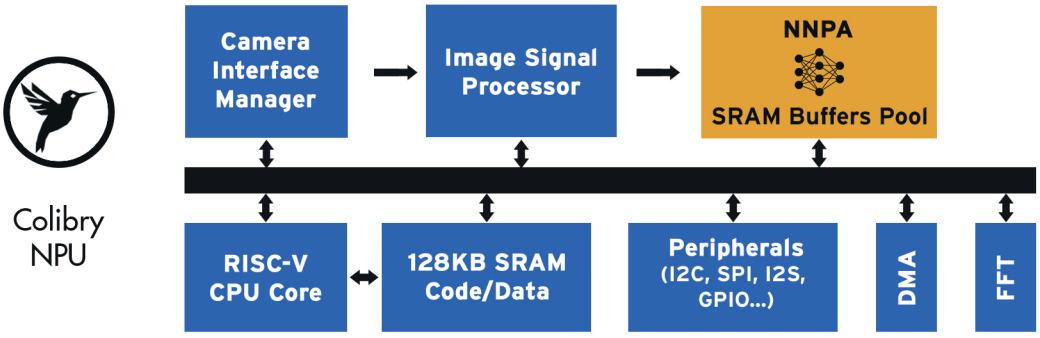
On-Chip AI accelerator
Reconfigurable CNN layers
Up to 9.6 GOPS

**TinyML application ready**

640KB SRAM
for both data and weights
Always-on AI

## Architecture

The microcontroller features a 32-bit RISC-V core with standard peripherals, a Neural Network Processing Accelerator and an FFT accelerator for sound and sensor data pre processing.




### 1. Configuration

Loading one or multiple pretrained Deep Neural Network models into the embedded memory just once.

### 2. Data

Continuously loading data either through the DMA or from dedicated sensor data stream.

### 3. Execution

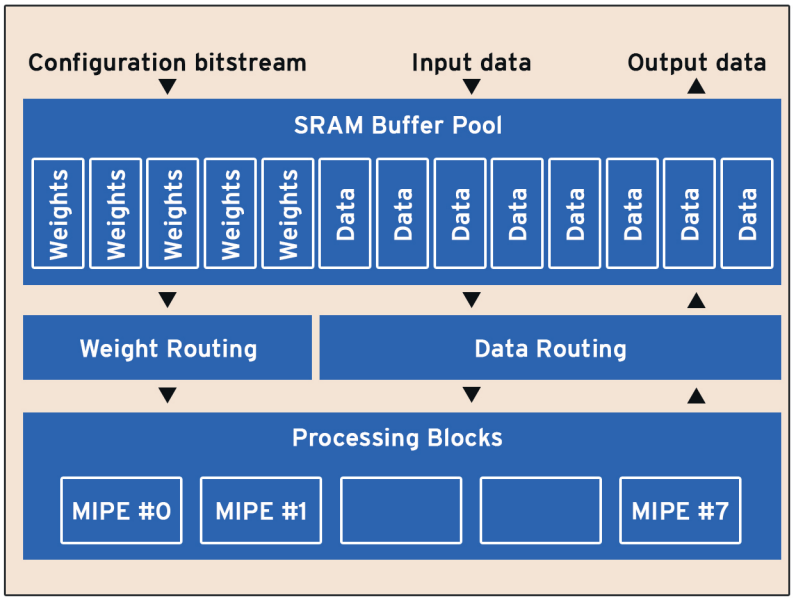
Autonomously executing at the adapted clock frequency to deliver results as fast as possible. Accessing the results stored in the memory with the RISC-V core.

# Neural Network Processing Accelerator

The NNPA architecture is based on memories for storing model weights and data, two programmable routing elements, and a processing block close to the memory.

The 8 macro processing elements offer up to 6.4GOPS (or 9.6-GOPS at 300MHz) at maximum speed.

Depending on the targeted application and operating clock frequency, continuous inference tasks consume power ranging from approximately 100µW to 10mW.




## Specifications

| | |
|---|---|
| MCU | 32bits RISC-V Core, 128KB Data and Code SRAM |
| NNPA | 1D, 2D regular/depthwise convolutions, fully-connected, pooling layers and ReLu activations<br>4/8bits weights format |
| Speed | Programmable CPU and NNPA clock frequencies up to 300MHz |
| Memory | 640KB SRAM to Neural Processing split into a pool of buffers for network weights and data storage balancing<br>Direct Memory Access (DMA) controller for efficient peripheral/memory transfers |
| Performance boosters | Lightweight ISP for input image scaling, cropping or color space conversion<br>FFT accelerator for efficient frequency-domain pre-processing |
| Peripherals | Parallel camera, sound, inertial sensor<br>I2C, SPI and GPIOs |

## Applications

The Lightweight processing provided by the Colibry NPU enables embedded AI for numerous powered-constrained applications and can also serve as always-on smart wake-up system.

SMART CITY

USER INTERFACE

VIDEO DETECTION

MAINTENANCE

SOUND CLASSIFICATION