GAPUINO GAP8 Developer Kit - 1st fully programmable multi-core RISC-V Processor for IoT Application

SKU 110991164

GAP8

GAP8 is a System-on-a-Chip that enables massive deployment of low-cost intelligent devices that capture, analyse, classify and act on fusion of rich data sources such as images, sounds or vibrations. GAP8 integrates everything necessary to acquire from sensor, pre-process, analyse and act on rich data sources integrated into a single device. This allows GAP8 to have an energy efficiency that is compatible with operation for years on batteries and a system cost that enables massive deployment of embedded, intelligent devices.

GAP8 Features

- Optimized for the execution of signal processing and machine learning algorithms on intelligent edge devices
- Autonomous operation using a battery or energy harvesting
- Fully programmable in C/C++
- 200 MOPS at 1mW
- Minimum 2µA standby current
- Integrated design results in low system cost
- >8 GOPS at a few tens of mW

The main functional blocks of GAP8:
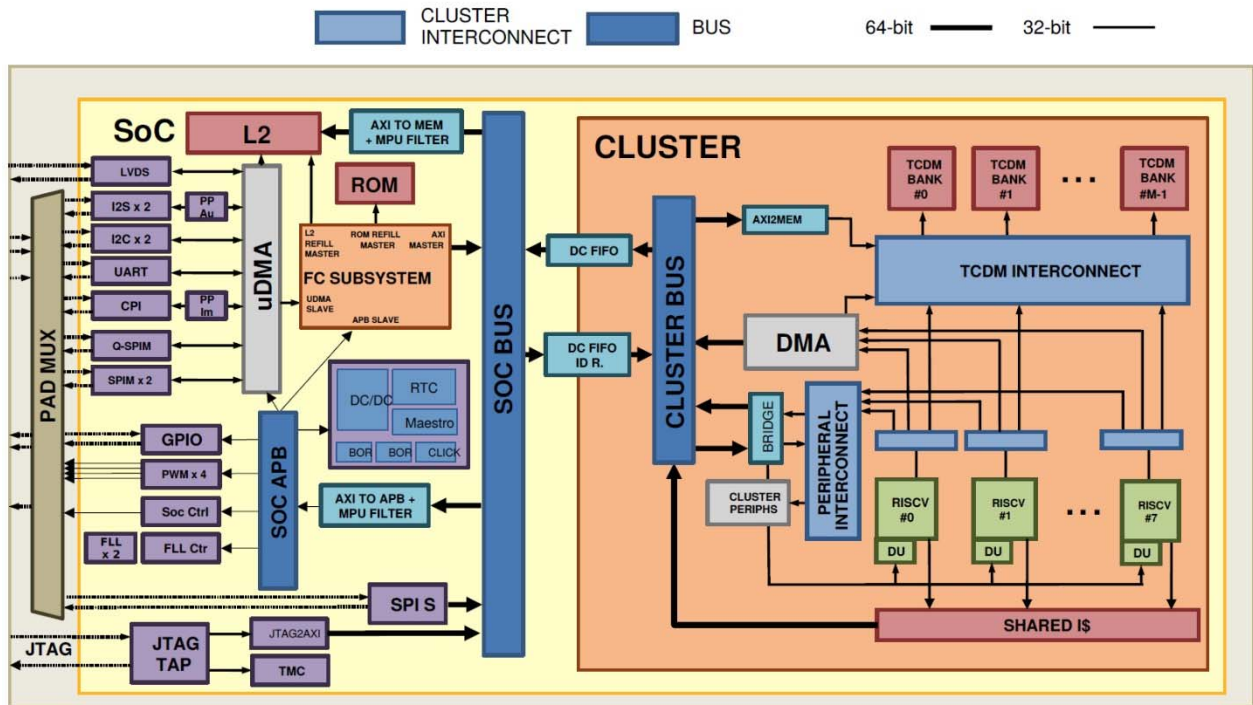
Open Source Architecture

GAP8 is based on many years of research into ultra-low-power parallel processors carried out in the Parallel Ultra Low Power (PULP) project by ETH Zurich and the University of Bologna. This heritage results in an extremely rich, integrated architecture in an IoT Application Processor that delivers low power operation in real customer use cases.

What technology is behind GAP8?

- All cores implement extended RISC-V ISA
- 1 core acts as a controller for communications, control and task dispatch
- 8 cores are grouped into a parallel compute cluster with a low contention shared memory architecture
- Hardware event synchronization ensures efficient parallelization
- Hardware Convolution Engine (HWCE) further optimizes Convolution Neural Networks
- Dynamic & Voltage Frequency Supply control of controller and cluster domains

GAPUINO GAP8 development board

GAPUINO is an Arduino Uno form factor board (master) that includes a GAP8 and all the peripheral interfaces necessary to prototype GAP8 applications, compatible with most Arduino shields.It leads out all necessary I/Os and includes a USB to serial and JTAG bridge that allows you to program the on board flash and debug your GAP8 applications.

Whether you are a company developing algorithms for image, sound or vibration analysis, a company developing sensors that need to process rich information or a programmer that wants to learn more about extremely efficient edge computing using an advanced, low-power compute cluster GAPUINO and the GAP8 HDK and SDK is designed for you.

GAPUINO Features:
- Arduino Uno compatible master
- Camera connector for external camera (e.g. Himax HM01B0)
- Quad SPI flash 256Mbits
- HyperBus combo DRAM/Flash 512Mbits Flash + 64Mbits DRAM
- USB to GAP8 JTAG + UART
- Reset button
- Configurable I/O voltage (3.3V/5V)
- Input Power – DC Connector or USB
What can you do with GAPUINO and the GAP8 SDK?

GAPUINO Sensor Board
The GAPUINO sensor board adds a range of ancillary sensors to GAPUINO.

GAPUINO Sensor Board Features
- Arduino Uno & Raspberry Pi Shield
- 4 x MP34DT01 Microphone
- VL53 Time of flight
- IR sensor
- Pressure sensor
- Light sensor
- Temperature and humidity sensor
- 6 axis accelerometer / gyroscope

Low Power QVGA Image Sensor
- Includes board and adaptor for GAPUINO
- QVGA resolution
- Black and white sensor

GAP8 Applications
GAP8's extended instruction set and hierarchical, highly integrated architecture allow it to deliver power and cost efficiency in wide range of AI and signal processing tasks used in processing rich data. Processing and interpreting rich data such as images, sounds or vibrations on an edge device eliminates the need to transport large quantities of data to the cloud making sensors compatible with low power wide area networks (LPWANs).
GAP8 can deliver more power efficiency over a wider range of compute tasks than any other ultra-low power processor available today. This allows device manufacturers to integrate artificial intelligence and advanced classification into autonomous wireless edge devices in

many different application areas.

-What problems can GAP8 solve?

Computer Vision: GAP8 runs complex computer vision algorithms such Convolutional Neural Networks (CNNs) for Object Detection and Recognition and Counting. For example, it can classify a QVGA image every three minutes for 10 years on a small 3.6 Ah battery.

Audio Signal Processing: GAP8 can allows a complete audio processing stack to be implemented using a single processor: microphone-array beam forming, noise reduction, echo cancellation and keyword or sentence recognition.

Machine Health Monitoring: Predictive maintenance needs multi-sensor analysis: vibration, lubrication, electric motor monitoring, infrared tomography, and alignment & balancing. GAP8, with its autonomous sensor data fusion embedded capabilities, can reduce sensor deployment and operational costs by uploading the right maintenance information at the right time for years on a battery.