

In conversation with...

Eric Baissus, CEO, Kalray

What is massively parallel manycore processing and what technology benefits does it provide for processing AI?

A core is a computing unit in a processor. Processing AI in a very efficient way requires a multitude of cores running in parallel. So, theoretically, the more cores one has, the better the processor is for AI processing.

However, this is only one part of the problem. Another key challenge is how to provide data to each core. Kalray is a pioneer in manycore technologies. We have developed and patented a unique architecture called MPPA® (MPPA® stands for Massive Parallel Processor Array) that allows us to connect an unlimited number of cores on a die while guaranteeing an optimum access to data, internally and externally, for each core. This is the reason why our MPPA® processors are so efficient in terms of performance and power consumption for AI processing and why they can also bring unique scalability to our customers. If our customers need more performance, they can simply connect several of our processors together.

How is your solution different from standard AI processors?

To make it simple, we believe there are 3 main AI markets today.

On one side, the massive AI computing acceleration market,

targeting cloud acceleration. The initial focus has been training but inference will also be of importance in the future. For this segment, processor price is not such an issue. It is about peak performance. Power is a few 100W's. Key players are NVIDIA, INTEL, Hyperscalers.

One the extreme opposite is the Smart Device market covering mobile phones, IoT devices ... The AI function is usually provided via a AI H/W IP included in a SoC for a few additional cents and for a sub W power consumption.

The last AI market is the Edge Computing. It goes from servers running AI-accelerated applications (such as video surveillance) to AI-based intelligent drive assist and autonomous driving systems for cars (from L2+ to L5), drones, new 5G infrastructure, health care appliances ... the requirement for such processors is a few TOPS to 100 TOPS with a power envelope of a few W to 10s of W. Such systems are running one or several AI inference Neural Networks integrated within a more complex system. For example, pre and post processing functions running in parallel. They need to be programmable using open standards and existing software. Additionally, these systems need to connect to the "real world" using high speed real time interface such as Ethernet, SSDs, Can, Camera ...

These 3 markets are all extremely different. Kalray is a pioneer in this

Edge Computing Market with our MPPA® Intelligent Processors. Our technology and solutions have been designed to meet such requirements. Our MPPA® processors along with our open software SDK and platform can be either as an on-device AI/Compute accelerator, allowing customers to seamlessly integrate AI capabilities into their system, or as the main processor of a complex highly integrated intelligent system.

What are some of the factors that chip companies must consider when building hardware for autonomous vehicles?

An autonomous car, even a L2+ car, is a very good example of an Edge Computing system.

Hardware for autonomous cars has to face two main challenges. The first one is "function aggregation": an autonomous car requires a processor to run a variety of critical functions, including several AI algorithms, but also additional vision processing, path planning, LIDAR processing, analytics, etc., all in parallel and without interference on the same chip. This is very tricky for a hardware implementation. In addition, an autonomous car must guarantee a certain level of safety and security and ease the support of the certification process. The MPPA® has been designed to provide unique answers to these challenges.

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How does Kalray see the emergence of the over 50+ start ups worldwide that are working on AI processors?

It shows that the market is very hot and that the potential is huge. Of course, it will be a very competitive market. The key challenge is to position on a specific usage and be the best solution for such usage. There are many start-ups proposing to build new chips. Kalray has over 10-year experience in Manycore processors. Our 3rd generation processor, Coolidge, is the result of a mature technology. For those reasons, we believe we have a leading solution for AI Edge Computing and a unique maturity in this market compared to all the new contenders.

In which Euro-centric industrial theaters is there most opportunity for ML acceleration?

ML is impacting a majority of existing applications in the world today. From

cloud computing to telecom, from cars to aircraft, from consumer retail to new plants. We definitely see a strong demand in AI Edge Computing in Europe from car to aerospace.

In addition, Kalray is involved in 2 major European projects, the European Processor Initiative and the Ocean 12 project, well funded projects that brings together more than 20 partners from 7 different countries.

What are the key barriers to scale for new silicon & systems for processing AI?

Technology is a first barrier. Our industry is very competitive, capital intensive and demanding in term of excellence of execution. Any new silicon maker has to successfully manage a wide number of challenges from first design prototype to high reliability high volume production. Experience and successful design

evidence is a strong plus.

At the system level, one of the key challenges will be how well the silicon supports the software environment used by the AI developers. At Kalray, our processors can run standard C/C++ code, open standard API or OS. That means less work for us and for our customers. In addition, we have massively invested in designing AI code generation tools that allow AI developers to use their usual framework such as TensorFlow and automatically build the most optimised implementation on our H/W. This is an investment that a lot of companies tend to underestimate and that we have delivered on.



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Eric Baissus
CEO



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