

# SiMa.ai: IGNITE THE EDGE ML MARKET WITH NEW SOFTWARE-DRIVEN “MLSoC”

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SiMa.ai is a machine learning startup founded November 2018 with the mission to transform and ignite the embedded Machine Learning (ML) edge market by overcoming the deficiencies of current solutions. Now, with \$150 million in funding behind it, SiMa.ai has created what it says is the first software-centric “MLSoC” (Machine Learning System on Chip) platform capable of running edge vision models at 10 times better power efficiency over its competitors. Instead of going it alone, the company partnered with providers of leading-edge silicon IP including Synopsys and Arm, to complement their own ML IP to accelerate the entire workflow while also speeding time-to-market.

## A SOFTWARE-CENTRIC PURPOSE-BUILT SOLUTION FOR ML ON THE EDGE

The company announced it is launching and shipping the MLSoC Platform to customers. This is the first step to achieving its ambitious goal of reshaping the embedded edge market—which the company values at an estimated \$1 trillion annual SAM. By combining their own technology with state-of-the-art hardware from partners, SiMa.ai claims it can outmatch competitors which tend to trade off easy-to-use software and power efficiency for a high-performance architecture.

Although others have also productized specific software and hardware designs, SiMa.ai has taken this approach to the extreme. Developers want user-friendly power-efficient hardware that they can use while still leveraging and preserving legacy applications. That’s what SiMa.ai’s MLSoC Platform is about: a software-centric (flexible and easy to use), purpose-built (not adapted to but designed for the embedded edge) platform capable of addressing edge intelligence requirements.

This approach enables the company to target a diverse range of markets including smart vision, robotics, healthcare, drones, government and autonomous vehicles. With the MLSoC Platform, SiMa.ai can address the requirements of embedded edge devices which all share a characteristic feature: they have limitations in size, weight, and power (SWaP profiles). Edge solutions that have adapted from other markets have traditionally had a hard time adapting to these strict constraints.

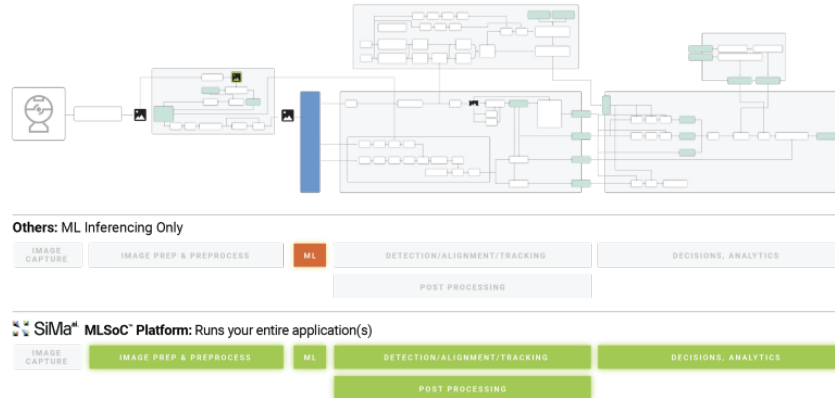
## COMPUTER VISION WITH 10-TIMES THE POWER EFFICIENCY

SiMa.ai claims its MLSoC solution can handle any framework, any model, and any computer vision application with the Apache TVM-based Front-End compiler and the optimized SiMa.ai Back-End. The company states the MLSoC Platform provides 10x better power efficiency (FPS/W) over alternatives across any framework (PyTorch, ONNX, TensorFlow, TFLite, etc.) on over 120 tested neural networks. The hardware and software co-design allows for computation scheduling and data movement that isn’t possible with data-center hardware designs that are simply adapted for embedded edge tasks.

SiMa.ai claims its software can get any computer vision model ready to execute on the MLSoC Platform in minutes instead of months. SiMa.ai’s software stack automatically schedules and partitions the code optimally across the MLSoC subsystems, such as the Synopsys-supplied EV74 Vision Processor, without manual intervention—a push-button experience.

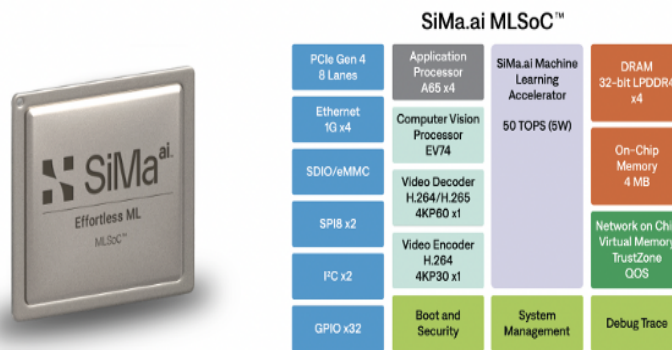
# SiMa.ai 's SECRET SAUCE: A HOLISTIC VISION IMPLEMENTED INTO AN SoC FOR ML

There's a reason why SiMa.ai has been able to pull off a highly competitive solution to disrupt the embedded edge market. The company's vision is reflected in MLSoC's holistic optimization. It's designed not just to accelerate the ML inference elements but to run the entire pipeline, including the pre-processing and post-processing stages of the application, often overlooked. This has facilitated SiMa.ai to generously meet and exceed clients' requirements.



SiMa.ai 's holistic approach is also reflected in the MLSoC P platform's architecture. It comprises an ML accelerator (MLA), a tile-based element that achieves 50 TOPS at 5W, and takes care of the ML computations. It's accompanied by a computer vision unit that consists of four-core Synopsys ARC EV74 processors. A couple of other key functions are handled by an application processing unit (4x Arm Cortex-A65) and a combo video encoder-decoder. Different stages of the ML application are solved by different elements within SiMa.ai 's MLSoC Platform.

## Machine Learning SoC Device



First **software-centric** purpose-built MLSoC platform with **push-button** performance

The software development kit (SDK) provides tools to automatically quantize the models and optimize performance while minimizing latency through a push-button experience, saving customers time and money.

## CONCLUSIONS

SiMa.ai 's is essentially a software company that builds its own silicon. It has created a software-centric, purpose-built, flexible, power efficient, scalable, easy-to-use MLSoC Platform that could overcome the limitations of increasingly outdated silicon-first solutions. The company delivers 1/10th the response time at 1/10th the power compared to competitors. SiMa.ai is built on strong foundations and its first-gen product looks to be clearly differentiated in a crowded market.

## IMPORTANT INFORMATION ABOUT THIS PAPER

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