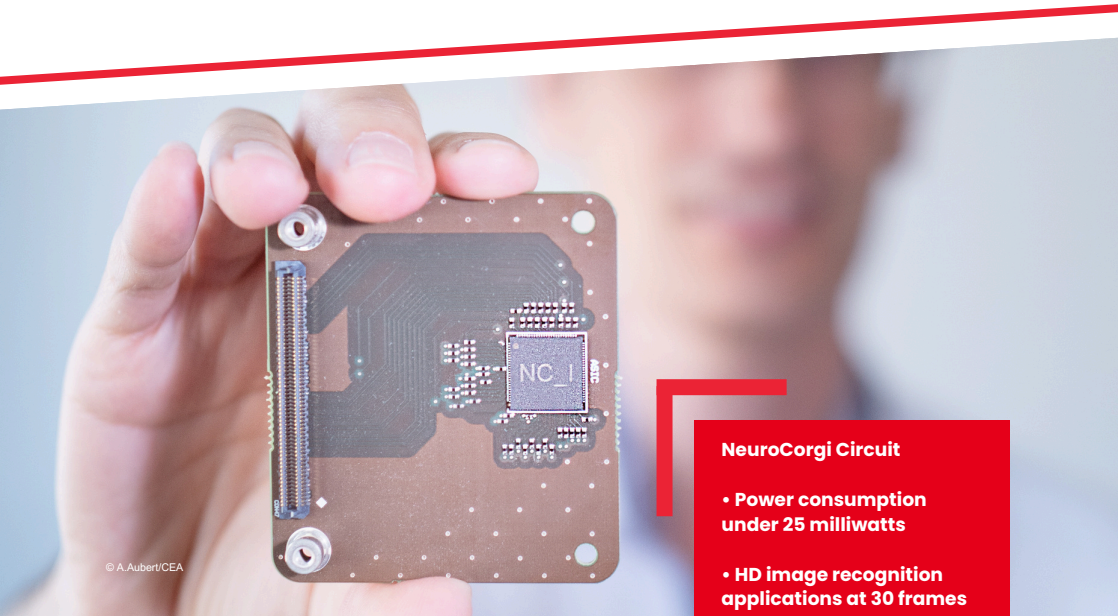# Ultra-low power and low-latency AI inference circuit
Power consumption reduced by 1000x

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NeuroCorgi Circuit

• **Power consumption under 25 milliwatts**

• **HD image recognition applications at 30 frames per second**

• **Less than 10 milliseconds latency**

What is NeuroCorgi ?

NeuroCorgi is an application specific circuit (ASIC) dedicated to AI inference. It is based on a disruptive approach consisting in:

• Streaming architecture computing layer-by-layer with a dedicated processor for each layer, achieving low latency.

• Fixing a large part of the neural network topology and its parameters inside the chip in order to avoid external memory operations, thus, eliminating the most energy consuming data movements.

• Allowing targeting multiple applications with a single circuit configuration thanks to transfer learning technique.

What are the associated tools ?

NeuroCorgi comes with a set of tools to generate a specific circuit configuration for MobileNet-like models from a new training database to ASIC design in one month time frame:

• Eclipse Aidge framework for Model Optimization.

• CorgiBuilder which is a module linked to Aidge allowing the generation of RTL, C++ and SDK models.

These tools may be adapted on demand for new custom circuit generation based on other neural network models.

Innovation & Assets

NeuroCorgi is a dedicated hardware Feature Extractor Accelerator (FEA), which may be combined with another (custom or off-the-shelf) component for application adaptation.
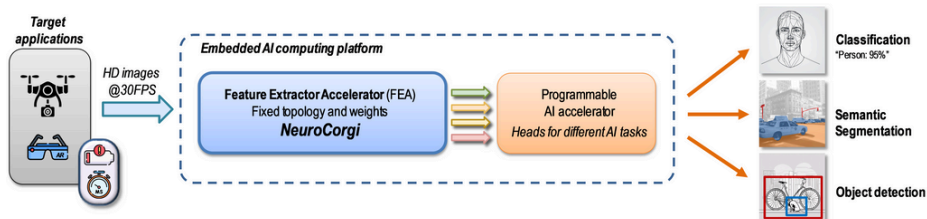
This disruptive approach integrates:
- Hardware optimization through fixed network topology and weights
- Highly tuned low bit quantization
- One FEA for different tasks: Classification, Semantic Segmentation, Object Detection

NeuroCorgi circuit photo trained on ImageNet
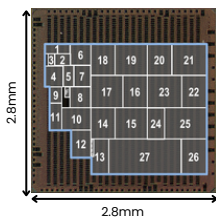
- Image Format: Up to 1280x720
- Frame Rate: 30 FPS on HD images
- Topology: MobileNet v1 (27 layers)
- Technology: GF 22 FDX
- FEA Area: 4.45 mm²
- Power Consumption:
  On HD@30FPS: 23.2mW
  On 224x224@30FPS: 1.5mW

Applications

Built in 22nm FDX, NeuroCorgi has been tested on diverse applications: object detection, classification, segmentation, for both images and audio data. It has been experimented on different types of use cases: intrusion detection, sound classification in submarine drones, radio spectrum analysis, multispectral cameras… NeuroCorgi is relevant for any markets where low power AI inference at the edge is key: Defense, Security, Mobility…

Our offer

- Dedicated ASIC design know-how
- Tools to assist the development of custom, highly efficient and low cost hardware accelerator
- Expertise in Embedded AI for optimal software hardware codesign