nearbAI, the flexible AI accelerator

nearbAI is easics’ flexible AI engine that efficiently runs your Deep Neural Networks (DNNs): both Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs). It is semiconductor IP ready to be integrated right next to your sensor(s). It outputs structured data with the lowest possible latency and power consumption.

Today’s embedded systems rely on ever more data from sensors. The bandwidth required to send this growing amount of raw data to a central processor — be it on premise or in the cloud — has become an acute bottleneck.

The solution is to process this data already at the point of data collection. Transferring such processed data requires much less bandwidth than sending raw data. nearbAI is ideally suited to enable this efficiency gain.

With nearbAI, easics offers an optimized accelerator for the DNNs in today’s and tomorrow’s applications. nearbAI is highly parameterizable so it can match your precise requirements. It comes with an extensive development software suite. In addition, easics’ nearbAI support team is available to discuss your application needs and to customize and integrate nearbAI in your application.

nearbAI internals
The DMA Controller loads sensor data and quantized weights in buffers. Both data and weights are then shifted through the Convolution Engine. The results are sent to the Accumulator and are finalized in the Post Processor. The Sequencer manages the execution of the subsequent layers of the DNN. It generates a continuous flow of tensors through all layers of the DNN. The final output tensors are returned as results — structured data — to your application microcontroller (MCU).

nearbAI highlights
optimization through parameterization of easics’ baseline nearbAI core, taking into account your application-specific needs:

- standard or custom DNN models
- performance (inference rate), power consumption, hardware cost (silicon area), latency and silicon technology
- DNN accuracy: 6, 8, 12 or 16 bit data and weights
- custom-tailored interfaces

supported operations include:

- **Convolution Engine**
  - 2D convolution
  - depthwise convolutions
  - matrix multiplications for LSTM optimization
  - fully connected layers
  - bias
- **configurable Post Processor**
  - max pooling, average pooling
  - ReLU, ReLU6, Leaky ReLU
- CNNs: ResNet, YOLO, MobileNet, …
- RNNs: DeepSpeech, …

contact us for nearbAI benchmarks!

nearbAI deployment

- digital or mixed-signal ASIC
- Intel FPGA
- Xilinx FPGA
- FPGA System-on-Module (SoM)
nearbAI - hardware AI close to your sensors

nearbAI close to your sensor(s)

- image sensor
  - visual, near-IR, thermal IR, X-ray
  - hyperspectral
  - Time-of-Flight (ToF), 3D stereo
  - LiDAR, radar
  - ultrasound
- audio sensor
- contact us to discuss your sensor application!

nearbAI development software suite

- **Estimator**: estimates resource utilization and inference time for your selected DNN model(s) and parameters
- **Core Generator**: generates a parameterized VHDL-core, simulation and synthesis scripts, and customized tools
- **Network Compiler**: performs quantization, memory allocation, and sequencing through the microcode
- **Run-time Library**: controls the hardware and implements hardware / software interaction

why nearbAI?

- customize your nearbAI instance according to your DNN model(s), performance requirements, latency, power consumption, silicon area (number of multiplier units) and memory throughput constraints
- let the Estimator tool assist you with making trade-offs and guiding you to the hardware platform that is best suited for your nearbAI deployment
http://nearbai.easics.com
- benefit from nearbAI’s low hardware cost, thanks to its MAC efficiency of above 95%
- nearbAI supports both CNNs and RNNs on the same instance, resulting in unmatched flexibility
- perform early optimizations on a real-time FPGA prototype, for a smooth transition to ASIC
- entrust easics’ nearbAI support team with on-demand integration support of the nearbAI core in your application

let us know your AI requirements and we will propose a dedicated nearbAI engine tailored precisely to your application needs!