Artificial intelligence (AI) in the cloud is maturing. Embedded deep learning (DL) is still emerging. This product sheet is about applying AI on premises, rather than in remote data centers. Smart factories crave for self-learning engines that make fast in-line decisions, close to the sensors. Such on-prem AI-engines need to be low-latency, energy-efficient, small and cost effective. First use cases include quality control and robotics. Labeling data and training artificial neural networks is rapidly becoming the solution of choice for the industry. A team of engineers handcrafting an algorithm is becoming too slow, too expensive and not scalable. Enter easics' embedded AI solution.

Deep Learning on FPGA (ASIC)

DL based on convolutional neural networks (CNNs) outperforms classical machine vision algorithms. CNNs have been shown extremely effective at sophisticated object recognition problems. FPGA technology boosts the performance of these networks and makes it possible to embed them in the application of your choice. Easics has developed a DL framework to generate an IP core of your neural network and to map it on FPGA, CPU or ASIC hardware.
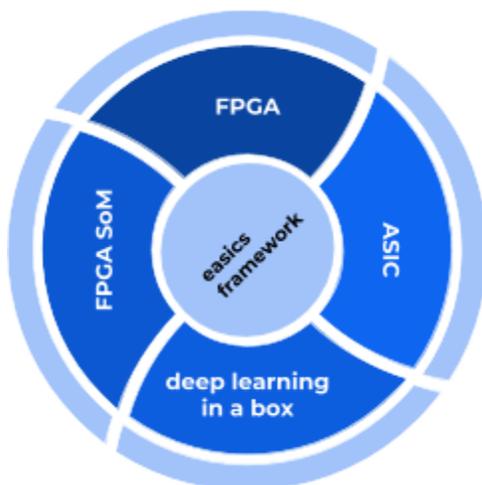
Hardware Knowledge for Your AI Application

Your DL journey starts with collecting data / images of the use case that you would like to solve with AI. Easics has the right ecosystem and partners to help you with labeling these data and training the neural network. Once trained, easics will provide a fast and flexible service to map the neural network on the hardware platform of your choice - FPGA, CPU and even ASIC. The IP core running on the hardware platform serves as an inference engine for real-time object detection, classification and tracking in your application.
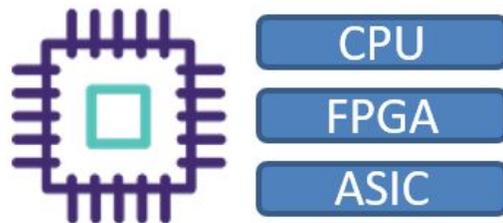
Integration Service for Your Application

Easics' inference engine fits in any FPGA by scaling it to your unique requirements and swiftly optimizing:

Latency	Power	Cost	Size

TCP/IP over ethernet is the standard interface. Easics will integrate any standard or custom interface of your choice in the FPGA. The engine tightly interfaces with your chosen sensor(s) - e.g., visual spectrum, thermal infrared, Time-of-Flight, LIDAR.

You choose the type of neural net (e.g., Yolo, Mask-R CNN, ResNet, or custom) and input image size. Based on your choice and your application, easics analyzes the feasibility of the solution and determines the optimal hardware platform. Easics' DL framework helps you to the optimized hardware implementation of deep neural nets (inference) in your AI application.

| Example core specifics	
Currently supported devices	- Xilinx Zynq - Intel Arria 10 - others on demand
External Memory	4GB DDR4
Current CNNs	Resnet 51, Resnet 101, Yolo v3 (106 convolutional layers)
Input image size	256 x 256
Frame rate (can be optimized)	100 ms (ResNet 101, Yolo v3)
Multipliers in parallel	2880
Power (can be optimized)	20 Watt

Deep Learning in a Box

Deep learning in a box relies on easics' generated deep learning core. It runs on FPGA and is complemented with state of the art memories and ethernet connectivity. It is deployed as a stand-alone box that can be connected via an ethernet cable to the machine needing the inference engine.

Hardware Knowledge for Your AI Application

Applications of Embedded AI

Easics focuses on embedded applications that benefit from object recognition, localization and tracking in images or live video. They include industrial machines, quality control, factory automation, robotics, autonomous vehicles, smart cameras, and crowd or traffic monitoring.
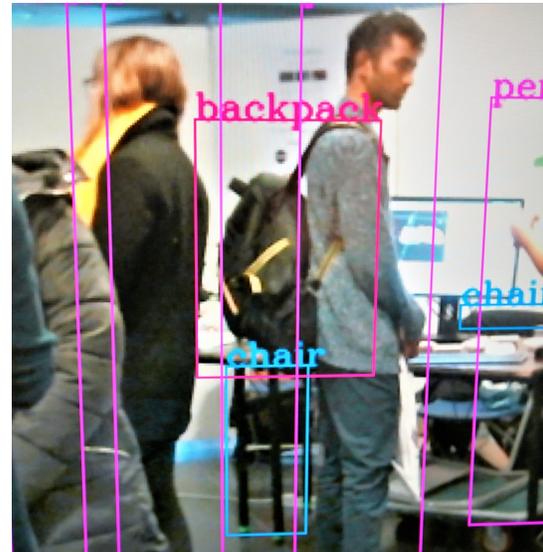
For an ever increasing number of applications, labeling data and training an appropriate CNN is significantly faster and cheaper than having an engineering team program the application using classical (non AI-based) machine vision techniques.

Embed AI in Your Application

Applying Deep Learning in a Box to your application is fast, friendly and flexible.

Fast	Friendly	Flexible

Contact easics to discuss your application and we will verify the feasibility of applying Deep Learning in your application using easics' DL framework.