SMART AGRICULTURE

Embedded AI in Agriculture

Vision technology is commonly used inside agricultural machines and for quality inspection processes. The recent deep learning algorithms are on the rise to replace classical vision algorithms in agricultural applications. This way enterprises can create vision applications based on tagged pictures. Long development cycles with multiple engineers are not needed anymore. The labeled data is used to train deep learning models for specific use cases. These trained deep learning models are used for classification, segmentation and detection of objects. Today we see applications in classification of flowers, quality inspection of crops and sorting of food.

Embedded deep learning

As more and more data will be gathered by sensors there is a clear need for data treatment at the point of data collection. Cloud based solutions have bandwidth problems to upload the data. This is not an option if you require real-time classification with low latency. To cope with this challenge you can embed an AI engine into your system that handles real-time data streams. There are multiple embedded solutions on the market like CPUs, GPUs, TPUs and FPGAs all with their benefits depending on the use case and application. SoMs (System on Modules) are boards combining these processors with memory and are a typical embedded design technique that makes it possible to develop a rather simple carrier board and plug in a complex SoM. In our case the SoM will be used as an AI engine or accelerator close to the sensor.

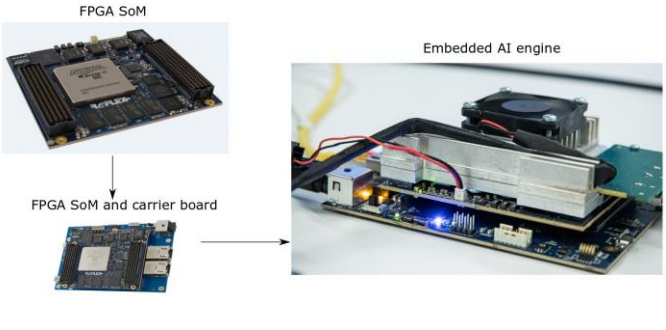
FPGA SoM as AI engine

FPGA SoMs are the industrial AI engine of choice because of the following benefits:

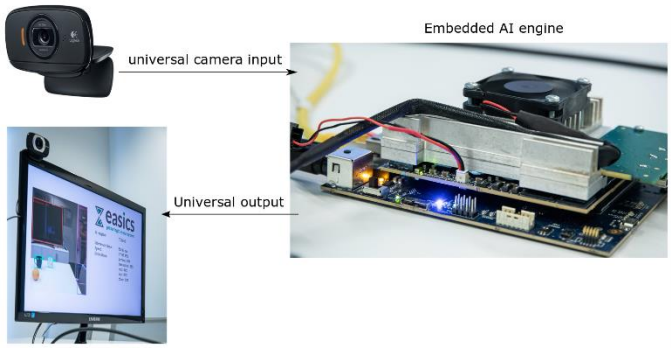
- FPGAs have a proven product lifecycle of 15 years and the possibility to port designs to new devices.
- It is a scalable topology not locked into a single hardened implementation. This offers the possibility to deploy all current and future neural network architectures.

- It is Power efficient.
- The exact topology you need, is implemented on flexible and customizable hardware.
- It is dynamically reconfigurable based on the desired behavior.
- You now have an architecture for streaming data.
- It has fixed and predictable low latency for real time decisions.
- Plenty of I/O options to interface with sensors and to integrate into machines or systems.

The System on module approach offers one form factor of 5,2 x 7,6 cm for different FPGAs that can be mounted on the same carrier board. High and low performing FPGAs are available on the same formfactor making this scalable to performance and cost. This way low end and high end applications can benefit from the same hardware.



The easics AI engine integrates easily via an ethernet interface in an existing or new vision /sensor system.



Real time orchid detection

Easics labeled a dataset of orchids to train a neural network to detect branches, open and closed flowers.

The trained neural net was deployed on an embedded AI engine. The result is a real time orchid classifier and detector. The application can detect the amount of open and closed flowers on every orchid in real time.

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