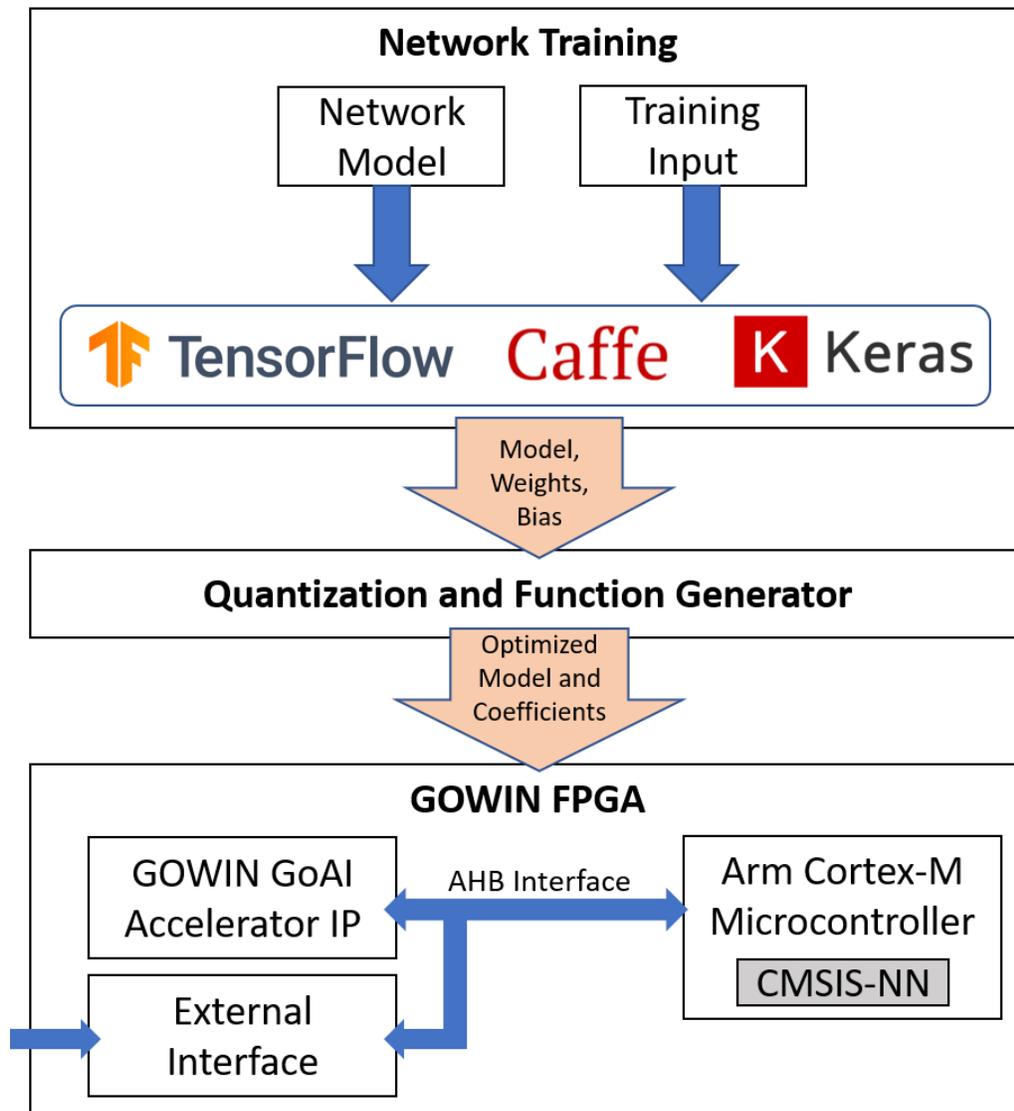
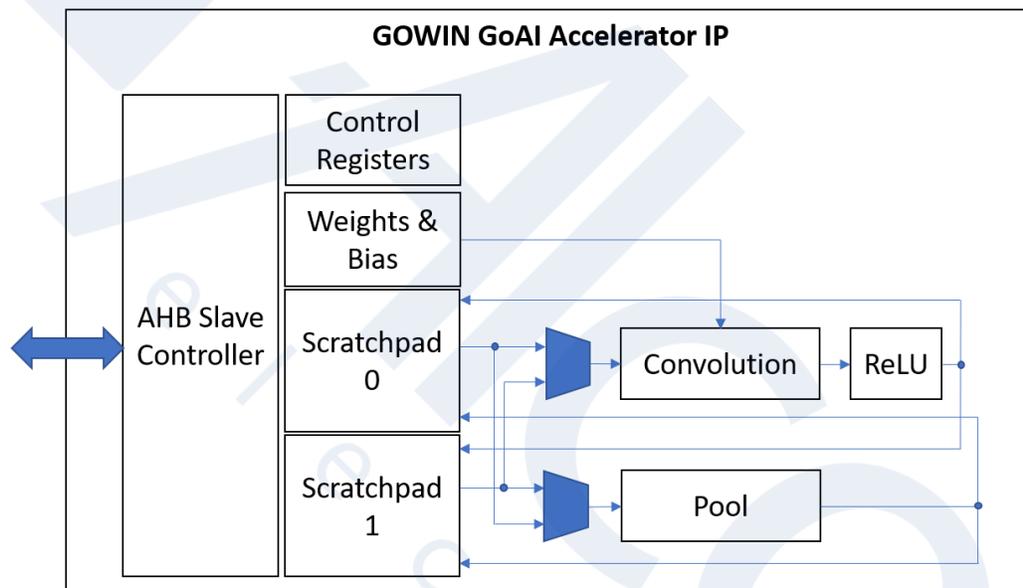


GoAI

GOWIN GoAI provides a complete artificial intelligence solution for performing inference with convolutional neural networks in edge and IoT systems. The solution includes an AI accelerator capable of increasing performance by 78x when compared to a standalone microcontroller and includes the tools necessary to go from a trained model in common development tools such as Caffe or Tensorflow to a GOWIN FPGA. Additionally, the accelerator can be connected to a processor via AHB interface providing control and debug of the AI system as well as easier interfacing to cameras, microphones and other peripherals.



The GOWIN GoAI solution leverages CMSIS-NN for quantization and model conversion. Once converted CMSIS-NN convolution, ReLU and pooling functions can be accelerated using the GOWIN GoAI Accelerator IP. The GoAI accelerator works by first loading input data, weights and configuration parameters into one of two scratchpad memories. It then enables the accelerator to compute the first layer output. After that data is passed back and forth between each of the scratch pad memories performing parallel and pipelined computations of each layer of the network. After the final layer is computed data can be passed back to the processor to analyze inference results.



A reference design has been developed to demonstrate the performance and capabilities of the GoAI IP and software solution package. The reference design includes a CNN (convolutional neural network) model for the CIFAR10 dataset with inference outputs for each of the 10 image types. The model is created and trained in Caffe, then quantized and optimized for hardware using a set of Python scripts. The optimized model is then deployed on the provided FPGA using a design including a camera interface for the Omnivision OV2640 camera, an Arm Cortex-M processor for configuration and control and the GoAI accelerator for layer computation. When the camera is pointed towards any of the 10 different objects it's identified. The detection results are provided via serial port output as well as a corresponding LED indicator.

