

# Neural Networks On Embedded Systems

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## Summary

The main purpose of this presentation is to elaborate on the interaction and incorporation of Neural Networks on Embedded systems, benefits from the cooperation of these two fields, describe suitable applications and focus on hardware implementations. This presentation is a review on previous research attempts to incorporate Neural Networks in Embedded Systems.

The first part is an introduction to the benefits gained by incorporating neural networks in embedded systems as well as illustrating some successful applications such as automobile, digital cameras, Intelligent Flight Control System and fraud detection.

The second part deals with the hardware implementation of Neural Networks. A co-processor that accelerates neural algorithms in hardware and in particular Axeon's Vindax VX1064 Artificial Neural Network co-processor which addresses the most computationally demanding of automotive problems will be presented. Also Axeon's first implementation of the VX1064 in an Altera Stratix-II FPGA will be discussed. The implementation of an ASIC containing 64 processing elements called Neural Network Stream Processing Core (NnSP) for Embedded Systems will be outlined. Furthermore, an embedded neural network for fire classification using an array of gas sensors will be examined. Finally, the implementation of Neural Networks on FPGAs will be addressed.