

## ———— Master Project ————

# Instruction Set Extensions for High-throughput HEVC CABAC Decoding on General Purpose Processors

## Description

Context-based Adaptive Binary Arithmetic Coding (CABAC, [1]) is the main decoding throughput bottleneck for high quality videos in current video compression standards, such as HEVC/H.265 [2]. One of the main reasons is that CABAC decoding, unlike other video coding kernels, cannot exploit the vector extensions' capabilities of modern general purpose processors.

Application-specific Instruction Set Processors (ASIPs) extend the instruction set of a general purpose processor by adding customized instructions for a specific task. As a result, the task can be processed more efficiently. The goal of this master project is the development of such an instruction set extension to speed up HEVC CABAC decoding.

The student's work includes the analysis of the application (CABAC decoding), as well as the design, implementation and evaluation of a corresponding instruction set extension.

**Keywords:** Video Coding, HEVC/H.265, CABAC, ISA Extensions

## Required Skills

- knowledge in computer architecture
- good programming skills in C/C++
- good hardware development skills using VHDL or Verilog

## Desired Skills

- knowledge in video coding

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## References

1. V. Sze and M. Budagavi, "High Throughput CABAC Entropy Coding in HEVC", IEEE Transactions on Circuits and Systems for Video Technology, Volume 22, Issue 12, pp. 1778-1791, December 2012
2. G. J. Sullivan, J. Ohm, W.-J. Han and T. Wiegand, "Overview of the High Efficiency Video Coding (HEVC) Standard", IEEE Transactions on Circuits and Systems for Video Technology, Volume 22, Issue 12, pp. 1649-1668, December 2012