

Low-Level Optimization of a VVC Video Encoder



ULTRA VIDEO GROUP is looking for several motivated BSc/MSc/PhD students to kick-start the career as a part of the leading academic video group in Finland (<http://ultravideo.fi/>). We are a research group in the unit of [Computing Sciences](#) at [Tampere University](#) and we have over 20-year experience in conducting pioneering research on media processing systems in a close collaboration with industry. Our main research interest lies in tailored video coding, processing, and streaming solutions on various platforms ranging from low-power embedded devices to highly distributed cloud environments. Our primary research focus is on:

- VVC and HEVC video encoding and streaming
- Vision-based environment perception for human/machine consumption
- Photorealistic modelling of future driving and transportation
- Video codec acceleration on embedded platforms with high-level synthesis
- Content-aware video coding, annotation, and tagging
- Volumetric video coding for extended reality (XR)

Job description

The project aims at optimizing a real-time Versatile Video Compression (VVC) encoder using autovectorization.

VVC is the latest video coding standard ratified in 2020. It is able to double the coding efficiency for the same subjective visual quality compare with the previous standard (HEVC), but its inherent computational complexity calls for optimized implementation.

The job consists in developing a method to generate Single Instruction, Multiple Data (SIMD) optimized functions. However, the idea is not to develop these optimizations manually from scratch but to use existing techniques of autovectorization. Autovectorization techniques tries, with little changes to the original code, to generate SIMD optimized code. First, it would be interesting to compare the existing methods to already optimized function. We will be able to evaluate the benefit of such methods. Then, a complete workflow could be proposed.

With this project, you will discover how to optimize data-intensive applications linked to multiple domains such as video processing and computer vision.



Qualifications

Essential skills:

- C/C++

Desirable skills:

- Software optimization/Complexity Reduction
- Single Instruction, Multiple Data (SIMD)
- Knowledge in video compression

How to apply

Each position will be tailored to the applicant's skills, background, and level of studies, incl. the starting date and working time. To apply, please complete the following form

<https://forms.office.com/r/9CZ2k7AC3S>

with your resume and transcript of records. The closing date for applications is **November 14th, 2022** (at 23.59 EET / UTC+2). Interviews will be started on a rolling basis.

Contact

For more information, or any question regarding the application, please contact (in English, Finnish, or French):

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