



ComputeCore™

Features & Benefits

- Safety critical compute framework that provides the building blocks to enable accelerated compute and autonomous systems using the Vulkan® SC API.
- Empowers applications to target the GPU for both graphics and compute simultaneously and with high performance parallel processing capability.
- Facilitates the transition to Vulkan Compute from OpenCL®/CUDA®.
- Supports a variety of compute functions such as FFT computations, matrix manipulation (including matrix multiplication, transpose and inverse), optical flow analysis, and image filtering in the spatial domain including edge detections, blurring, standard deviation filtering, and noise removal.
- Ideal for safety critical applications such as signal processing and image processing applications that require object detection, tracking optimization and analysis.
- Ideal for a wide range of machine learning and autonomous applications such as neural network interfacing, ADAS, sensor fusion, augmented vision systems, signal processing, detection and analysis, image processing, security monitoring, encryption, and more.
- Designed from the ground up for real time and safety certification. Contains no open source components and no 3rd party software.
- Available with ISO 26262 Accredited Safety Assessment Certificate and CertCore178™ (DO-178C / ED12-C Avionics) DAL A safety certification package.
- Product is offered in conjunction with engineering services to facilitate the migration of existing CPU/FPGA/OpenCL/CUDA compute functions or algorithms to safety critical Vulkan and includes the completion of required regulatory safety certification evidences.

Introduction

CoreAVI's ComputeCore is a suite of compute libraries that provides the building blocks to enable accelerated compute and autonomous systems using the Vulkan SC API. ComputeCore is offered in conjunction with CoreAVI's VkCore® SC Vulkan graphics and compute driver, allowing compute applications to benefit from the performance gains and scalable capabilities offered by Vulkan. CoreAVI provides pre-written algorithms that can be deployed immediately, facilitating an easy migration to Vulkan Compute from OpenCL or CUDA, saving integrators time and money. ComputeCore is offered with custom development services to design new customer specific compute libraries or to facilitate the migration of existing CPU/FPGA/OpenCL/CUDA functions or algorithms to safety critical Vulkan. These libraries are suitable for a wide range of machine learning and autonomous applications such as augmented vision systems, synthetic displays, signal processing, detection and analysis, image display processing optimization and security encryption. ComputeCore is available with the required safety data packages for the highest levels of safety certification.



Features

ComputeCore provides the following modules:

Fast Fourier Transform (FFT)

- Implements common FFT operations on 1D, 2D, ND data
- Supports both real and complex data, as well as forward and inverse operation
- 4 to 10 times faster for 1D operations than the popular FFTW library

Image Processing: Filtering

- Contains a collection of in-shader filters that can be applied to an image
- Allows an application to provide custom filters for image processing
- Provides the following capabilities (as well as others – please contact CoreAVI for full details):
 - Gamma Correction
 - Contrast Enhancement
 - Blur
 - Sharpen
 - Noise Removal
 - Edge Detection
 - Standard deviation filtering
 - Median filtering

Math

- Implementation of commonly used mathematical operations
- Matrix and vector manipulations

Services

ComputeCore is offered with services to help aid customers not only in the transition from their current CPU/FPGA/ OpenCL/CUDA compute functions to Vulkan SC Compute, but also in new implementations of compute capabilities. In addition to the custom development of safety critical libraries, CoreAVI provides the required safety certification evidences to achieve industry safety standards, including automotive ISO 26262 ASIL D and avionics DO-178C/ED-12C DAL A support.



Contrast

Blur Filtering



Standard Deviation Filtering

Median Filtering

Figure 1: Examples of ComputeCore Image Processing Functionality

Contact Sales@CoreAVI.com for more information on ComputeCore.