

# ComputeCore™

## FEATURES AND 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, and when used with CoreAVI's VkCoreVX™ SC supports 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 CertCore™ 178 (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

### *BLAS (Basic Linear Algebra Subprograms)*

- 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.

## DEVELOPMENT INTERFACE AGREEMENT

The intent of a Development Interface Agreement (DIA) is to define the responsibilities of the customer and supplier in facilitating the development of a functional safety system. In custom developments, the DIA is a key document executed between customers and suppliers early in the process of developing both the system and the CoreAVI drivers and libraries. As the CoreAVI software is a Commercial-Off-The-Shelf (COTS) SEooC product, an ISO 26262 DIA is not required. Please refer requests for custom DIAs to CoreAVI Sales. The following sections highlight key points of the standard DIA.

### *Requirements Transfer*

ComputeCore is developed as a Safety Element out of Context (SEooC). Detailed safety requirements were not available from lead customers during development. Therefore, the safety requirements used were based on CoreAVI analysis of target safety applications and industry standard safety critical APIs. CoreAVI is willing to discuss acceptance of new customer safety requirements for future designs. Please contact CoreAVI Sales for further information.

### *Availability of Safety Documentation*

The following table lists the safety documentation for the library:

DELIVERABLE	CONTENTS	AVAILABILITY	DELIVERY
Safety Manual	Documents usage, assumptions, issues, etc. of SEooC to put the SEooC into a safety context (application)	NDA Material	TBD

### *Support*

CoreAVI provides integration, performance optimization, and design consulting services.

### *External Product Audits*

CoreAVI works with TUV Rheinland® for an external audit of functional safety suite software to ISO 26262 standards.

Contact [Sales@CoreAVI.com](mailto:Sales@CoreAVI.com) for more information on ComputeCore.