CoreAVI: Enabling Certified, Safety Critical High Performance Graphics

Case Study

Arm Functional Safety Partner
Software & Tools

Application Areas

✛ Automotive

✛ Aerospace

✛ Industrial

✛ Robotics

✛ Transportation

Links

✛ VkCore® Functional Safety Suite for Arm Mali-G78AE GPU

✛ Arm's Next-Gen Mali-G78AE GPU

✛ Vulkan SC Graphics and Compute

✛ GPUs/SoCs for Safety Critical

CoreAVI architects safety critical graphics and compute solutions supporting safe autonomy, machine vision, AI and visualization applications in the automotive, unmanned vehicle and industrial IoT segments, as well as commercial and military avionics systems. We are people innovating a safe and secure autonomous world.

Goal

The visualization of safety related information within the vehicle has never been so important as traditional IVI systems merge with instrument clusters, HUDs and mirror replacement displays. Our goal is to show how the automotive industry can assure functionally safe reliable displays through proven system design and certification techniques meeting the most stringent ISO 26262 safety standards ensuring an enhanced, safe visual information experience for the driver.

Challenge

As traditional IVI systems merge with the instrument cluster and new applications such as HUDs and mirror replacement displays become widely deployed, the underlying systems are becoming more complex. These systems are displaying an ever-increasing array of information to the driver that must be acted upon to keep the occupants and other road users safe such as speed, ADAS function status and more. The challenge for the developer is how to ensure that this critical information has been rendered on the display currently and has not been corrupted or delayed thus passing on misleading information. The vehicle is also undergoing significant topology changes to address this increase in complexity. ECUs are getting consolidated into domain controllers that must support multiple functions that often have differing safety requirements, known as mixed criticality. This complexity is also reflected in the supply chain with tier ones and OEMs having to integrate an increasing number of hardware and software components. This issue is compounded when functional safety is a requirement.

Solution

CoreAVI has collaborated with Arm to develop safety certified graphics and compute drivers for Arm's latest Mali-G78AE safety capable GPU, as well as software libraries that make up the platform for automotive cockpit display systems. This close collaboration reduces risk, development effort and time-to-market throughout the supply chain, by offering confidence through pre-validated and combined hardware/software solutions accompanied by robust safety collateral, addressing the requirements of today's highly innovative system designs.

Benefits

✦ Safety, including the enablement of mixed criticality displays and applications.

✦ Enhanced features and display capabilities enable rich, high performance graphics across multiple safety-related use cases.

✦ Support for broadest range of industry standard safety critical APIs.

✦ Native GPU driver offering high performance for safety critical workloads.

✦ Simplifies system integration with libraries for fault diagnostics and management.

How does the Product/Solution/Service relate to Arm Technology?

✦ The CoreAVI Functional Safety Suite has been ported to the Mali-G78AE and comprises of the Vulkan SC driver, OpenGL SC1 & SC2 libraries and the TrueCore safety monitor. This combined solution enables the developer build high performance, mixed criticality automotive visualization systems with a path to safety certification.

✦ All software elements within the CoreAVI Functional Safety Suite have been developed and assessed according to ISO26262 ASIL D. The associated safety collateral enables the developer to design and certify the system quickly and with confidence.

✦ CoreAVI offers additional services for porting SC driver stack to any real-time operating systems and customization of SW stack.

CoreAVI and Arm enjoy a close partnership aimed at furthering the development of future automotive & autonomous systems. They collaborated in 2020 with the launch of the high performance Arm Mali-G78AE, with CoreAVI supporting Arm's first GPU designed for safety crticial applications with their Vulkan-based VkCore Functaional Safety Suite. CoreAVI's software suite takes advantage of the performance, safety, flexibility, and scalability of the Mali-G78AE GPU, offering customers the best available technology for modern safety critical software systems.