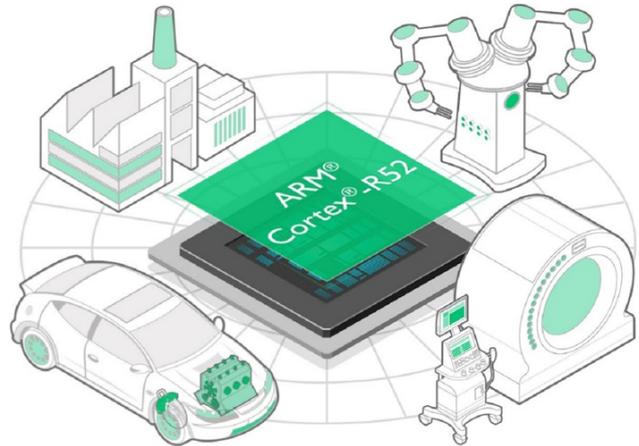


MICRO-CONTROLLER

Functional safety applications

The Cortex-R52 by ARM was designed to address functional safety in systems that need to comply with ISO 26262 (ASIL D) and IEC 61508 (SIL 3). ST Microelectronics is the first chip vendor, which licensed the processor.

The Cortex-R52 offers hardware-enforced separation of software tasks to ensure that safety-critical code is fully isolated. This allows the hardware to be managed by a software hypervisor policing the execution and resourcing of tasks. By enabling the precise and robust separation of software, the Cortex-R52 decreases the amount of code that must be safety-certified, so speeding up development as software integration, maintenance and validation is easier. The processor also deals with increased software complexity while delivering the determinism and fast context switching that real-time systems demand. The safety processor implements hardware to simplify the integration of increasingly complex real-time software environments while providing the robust separation of software necessary to protect safety-critical code. It introduces an extra privilege level, which provides support for a hypervisor. This is all achieved without impacting the determinism needed for real time systems and while providing higher levels of performance from single and multicore configurations.



The Cortex-R52 is suitable for autonomous vehicles, medical devices, and industrial as well as service robots (Photo: ARM)

"The Cortex-R52 is the first processor built on the ARMv8-R architecture and it was designed from the ground up to address functional safety," said James McNiven from ARM (United Kingdom). "We are helping partners to meet particular market opportunities, especially in fully autonomous vehicles and robotics systems where specific functionality is required for safety-critical tasks. By documenting the strict development process, fault modeling and supporting software isolation, ARM is enabling a faster route to market for partners addressing these applications."

The British company, which was recently acquired by Softbank (Japan) for about 31 billion US-\$, presented also the first customer for the new processor: ST Microelectronics. It is expected that French-Italian chipmaker will provide models featuring CAN connectivity – of course, supporting the CAN FD protocol. "The Cortex-R52 supports our Smart Driving vision by enabling a new range of high-performance, power-efficient SoCs for any in-vehicle application demanding real-time operation and the highest levels of functional safety, including powertrain, chassis and ADAS," said Fabio Marchiò from ST Microelectronics. "The Cortex-R52's ability to compartmentalize software provides our users with the best solution for safety without loss of determinism. Its virtualization support simplifies the consolidation of applications and functions into a single processor, delivering a shorter integration time." First micro-controllers based on Cortex-R52 are expected on the market by 2018.

As an ECU manufacturer, Denso (Japan) supports the launch of the safety processor: "We welcome the development of new processor technology to drive the evolution of embedded real-time control, which is critical to advancing capabilities for autonomous systems," said Hideki Sugimoto. The availability of ARM's Fast Models and Cycle Models enables software partners to develop solutions for the processor. They further speed the path to market as software developers will get access to the Cortex-R52 early in the design process. The Cortex-R52 offers a 35-percent performance uplift compared to the Cortex-R5, which is already deployed in a range of safety applications. It has achieved a score of 1,36 Automark/MHz on the EEMBC AutoBench using the Green Hills Compiler 2017.

"Green Hills Software is expanding its support for ARM processors with optimizing compiler solutions for the Cortex-R52," said Dan Mender. "Through close collaboration with ARM, we deliver the industry's highest performing safety certified compiler for the Cortex-R52, enabling customers to develop safety-critical products at the highest certified levels of automotive (ASIL D) and industrial safety (SIL 3)."

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