



A High-Performance Multicore Mixed-Criticality Platform for Aerospace, Robotics and Automotive Systems

Challenge & Solutions

Combining several applications, with different criticality and safety requirements, demanding high performance on multicore embedded boards, while satisfying strict hard real-time constraints remains a very difficult challenge. Solving this challenge would allow manufacturers to put more functionality on a single board, thus achieving much more efficient designs in terms of weight, footprint and power and, therefore, costs. This requirement comes regularly in studies of various markets. The main drive is to reduce the number of boards, thus drastically reducing costs and overall complexity. This could have a significant impact on domains such as aerospace, robotics and automotive systems. HIPPEROS addressed this challenge by creating a mixed-criticality version of its high-performance real-time operating system (RTOS). This innovative RTOS ensures perfect time & space isolation of the applications and is also able to monitor high- and low-criticality modes of operation. Moreover, monitoring timing constraints and processor frequencies also permits low power optimization. HIPPEROS successfully demonstrated the feasibility of the concept by porting an industrial mixed criticality application and benchmarking its performance. Results show an almost perfect performance scaling with the number of available cores as well as <1 percent performance overheads due to the RTOS scheduling, including the mixed criticality features.



EuroCPS Support

HIPPEROS received the Thales EuroCPS platform during the IMICRASAR EuroCPS project. This platform is based on a Freescale PowerPC multicore board, which Thales uses for safety critical avionics applications, performance benchmarks and isolation characteristics. Thales also provided an avionics domain representative application as a demonstration use case and supported HIPPEROS throughout the project.

Digital Skills

HIPPEROS: Multicore platforms, RTOS design, embedded programming, mixed-criticality, benchmarks.

Thales Research & Technology (TRT): Mixed-criticality, avionics applications, embedded systems.

Company

The company specializes in high-performance embedded solutions for intelligent autonomy (BE) - www.hipperos.com

15 employees

Partners: Thales Research & Technology (TRT) **THALES** RESEARCH & TECHNOLOGY

Since 2014 (spin out of Université Libre de Bruxelles)

Impact/What's next

The results of the IMICRASAR EuroCPS project have been incorporated into HIPPEROS' standard technology offering and are being delivered to pilot customers with use cases in image processing, navigation, collision avoidance and medical devices. Providing better RTOS support for embedded multicore platforms in the mixed-criticality domain is a unique differentiating feature of the HIPPEROS RTOS and creates a significant business opportunity for the company. During the project, the company increased its staff by 30 percent. Turnover in 2017 totaled nearly €1M and grew at about 20 percent in 2016 and 2017. Growth is expected to continue at the same rate in the next three years, and even faster after 2020 when the HIPPEROS D0178 certified kernel will be released.



EuroCPS is an European funded project gathering several design centers in order to boost and initiate synergies between innovative companies, major CPS-platforms and CPS-competency providers.

