

SELENE: Self-monitored Dependable platform for High-Performance Safety-Critical Systems

Description

Existing HW/SW platforms for safety-critical systems suffer from limited performance and/or from lack flexibility due to building on specific proprietary components, which jeopardize their wide deployment across domains. While some research attempts have been done to overcome some of these limitations, their degree of success has been low due to missing flexibility and extensibility, which would ensure that industry cantake that path, as many industries need technologies on which they can rely during decades (e.g. avionics, space, automotive). A number of high-performance computing (HPC) commercial off-the-shelf (COTS) platforms offer the computation capabilities needed by autonomous systems in domains such as automotive, space, avionics, robotics and factory automation by means of multicores, GPUs and other accelerators. Unfortunately, the utilization of HPC platforms has been traditionally considered out of the reach of the safety critical systems industry due to the difficulties or road blocks these platforms bring to the certification process.

SELENE follows a radically new approach and proposes a Safety-critical Cognitive Computing Platform (CCP) with self-awareness, self-adapting, and autonomous capabilities. SELENE's CCP uses artificial intelligence (AI) techniques to adapt the system to the particular internal and external (environmental) conditions with the aim of maximizing the efficiency of the system being able at the same time of meeting application requirements. AI techniques are feed with information provided by the on-line monitors and external sensors and are applied in a transparent way without compromising the safety of the system. To ensure safety requirements are preserved SELENE's CCP relies on the strong isolation capabilities provided at hardware and software levels.

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Source URL (retrieved on 1 Mayo 2025 - 02:54): <https://www.bsc.es/es/research-and-development/projects/selene-self-monitored-dependable-platform-high-performance-safety>