Resource-efficient implementation of mixed-criticality systems

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**Context and motivation**

Due to cost and other considerations, there is an increasing trend in safety-critical systems towards supporting functionalities of different degrees of importance (or criticalities) upon shared platforms. Such platform integration is essential to make more efficient use of platform resources; however, care must be taken to prevent failures of non-critical components from affecting the behavior of critical components. This project is directed at developing new tools, techniques, and methodologies for deriving mixed-criticality system designs that ensure such isolation, particularly on platforms that utilize multicore processors. The thesis explored in this project is that ensuring both correctness and resource-efficiency in mixed-criticality systems requires the development of fundamentally new perspectives on the modeling of these systems, and different approaches to resource allocation and scheduling.

**Methodology**

The objectives of the project will be accomplished by devising new models for representing mixed-criticality systems, new metrics for quantifying the effectiveness of techniques for designing such systems, and new methods for performing resource allocation and scheduling upon integrated architectures that support mixed-criticality systems. These new models, metrics, and methods will inform the development of new tools and methodologies for deriving mixed-criticality system designs that are both correct by construction and implementable in a resource-efficient manner. Continuing collaborations with partners in the avionics and automotive industries will enable these results to direct the research agenda on mixed-criticality systems to better address current and future industrial needs.

**Selected Publications**


**Project Members**

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**Research Sponsor**

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