Mixed Criticality Modeling and Analysis Paradigms for Real-Time Embedded Systems.

Soutenance HdR – Luca SANTINELLI

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Salle de thèses - INP Toulouse ENSEEIHT- 2 Rue Charles Camichel - Toulouse

Devant le jury composé de :

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Résumé

This manuscript motivates and details the research project chosen for investigating today's and future real-time embedded systems. In it, the research activities as well as the research perspectives are described in order to outline project challenges, achievements already made, and future works. The manuscript and the research project are also for preparing and defending the "Habilitation Diriger des Recherches" (HDR).
As research project, it has been chosen to investigate mixed criticality real-time embedded systems. In few words, the project aims at guaranteeing timing constraint and schedulability of applications with different requirements/criticality that are running together. Mixing criticality tries to reconcile efficient resource usage and safety assurance, thus it is critical with today's and future multi-core and many-core implementations for real-time embedded systems. It is a complex problem and has some interesting open problems that requires to be studied.
The project is presented with respect to works already made, and more importantly with perspectives that will be elaborated with future achievements. Previous research on non-mixed critical real-time embedded systems for timing analysis and schedulability analysis is also described; it is background work for mixed criticality achievements.
The research project is the results of the twofold motivation from professional as well as academic experience made on real-time embedded systems. In it, both academic and industrial perspectives to mixed criticality are considered with solutions that will benefit both. The achievements will continue to come from research and technology transfer projects, from the collaborations with academic and industrial partners, and from the supervision of PhD as well as Master students

Mots-clés

Deterministic real-time, probabilistic real-time, mixed criticality, timing analysis, schedulability analysis, adaptivity, mode change, resource reservation, sensitivity analysis.

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