Schedulability analysis of probabilistic real-time tasks under end to end constraints

Mots clés :

- Directeur de thèse : Liliana CUCU-GROSJEAN
- Co-encadrant(s) :
- Unité de recherche : INRIA-Paris
- Ecole doctorale : École Doctorale Informatique, Télécommunications, Électronique de Paris
- Domaine scientifique principal: Divers

Résumé du projet de recherche (Langue 1)

Cyber-physical systems and more precisely those with real-time constraints are becoming central to our society by daily utilisation in fields like transportation (automotive, avionics, railways), networks, robotics, etc. These systems require on one hand ensuring time critical properties and on another hand low development costs. In order to answer these double purposes, the team-project AOSTE (Rocquencourt) provides probabilistic timing analysis for embedded systems while obtaining correct implementations. More precisely, one of our main research axes concerns the time constraints appearing during the design process of an embedded real-time system. Thus the study is done either at the level of one program or several programs and in this later case the constraints are defined from end to end while taking into account data dependences and other interactions with the physical environment through sensors and captors. The research is done in collaboration with different academic partners (e.g., University of York, Université de Rennes etc.) and industrial partners (Airbus, Thales, IFPEN, etc.) by direct collaborations or under collaborative funded projects. This PhD thesis study the uncertainties in applications or in the environment as a key factor affecting the safety of real-time systems. By considering probabilistic and statistical approaches we may take into account the uncertainties and propose timing guarantees with different levels of confidence while statistical and functional dependences. The existing probabilistic and statistical results take into account the study of real-time constraints in isolation, i.e. the cost of operating systems and its associated costs are neglected. This hypothesis is not always true for any real-time system. Therefore, we would like to model different dependences through end to end constraints, mainly described as precedence constraints. The PhD student will interact with the different industrial partners of AOSTE and especially with Thales and RTaW within the FUI projects Waruna and Céos.

Résumé du projet de recherche (Langue 2)

Timing analysis of cyber-physical systems Probabilistic approaches for time Real-time precedence constraints

Informations complémentaires (Langue 1)

The research is done under a tight collaboration with researchers from University of York, University of Malardelan and ISEP Porto.