

Semester / Master Thesis:

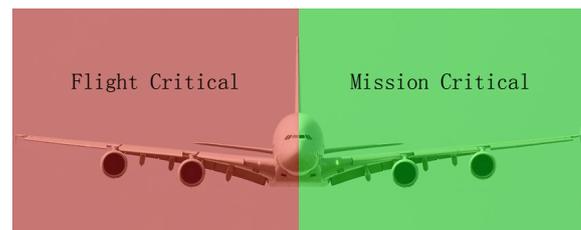
Safe Software for Safe Flights

Implementation and Evaluation of Mixed-Criticality Scheduling Approaches

The Problem: Complex embedded systems typically have functionalities of different importances (criticalities). As an example, the airplane software applications can be usually categorized as flight critical or mission critical, where for flight critical applications like the autopilot, failures (e.g. pilot commands not being transmitted in time) could result in an airplane crash, while for mission critical applications like the radio communication or the passengers' video entertainment, the consequences of failures (e.g. loss of communication or wrongly decoded videos) are not severe. On the other hand, various unexpected situations may happen during the operation of an airplane, since neither the hardware nor the software we build for airplanes are perfect. How should the system react to such unexpected situations? And which properties should/can we guarantee in such dynamic and mixed-criticality environments? To answer those questions, smart online scheduling algorithms that can react to unexpected scenarios need to be developed.

The Thesis: Recently, in our group, we have developed a scheduling algorithm that can adaptively assign resources to processes according to the actual scenarios that can occur when a system is running.

In this semester thesis, you will evaluate the runtime behavior of this scheduling algorithm by implementing it on a real platform. You need to propose good metrics to quantify the performance and overheads of it and compare it with other existing approaches. Through the thesis:



- you will get to know the challenges that are faced by the automotive and avionics industry;
- you will apply the exciting scheduling techniques that are designed to tackle those challenges;
- you will be given the opportunity to develop practical programming skills on modern hardware platforms.

Requirements:

Courses: Embedded Systems

Programming: Familiarity with C/C++

Interested? Please have a look at <http://www.tec.ethz.ch/research.html> and drop by for more details!

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