Component-based Design of Reliable Real-Time Systems

duration: 12 months
location: INRIA Rhône-Alpes, Grenoble, France
income: \(\sim 1915\) euros net per month (no taxes, health insurance included)

Background

The POP ART project Team at INRIA Rhône-Alpes (Grenoble) is offering a one-year post-doc position. The main goal of the POP ART team is the safe design of real-time embedded systems. This goal is explored according to several research directions (programming, static analysis, verification, implementation,...). See also http://pop-art.inrialpes.fr.

Summary

Due to the applicative domains (automotive, space, avionics, nuclear,...), reliability and security are key issues of embedded systems. To this aim, domain specific languages (e.g., synchronous languages) and associated verification tools have been introduced. However, the programming of large size critical embedded systems raises several new issues: reuse, composition, and encapsulation.

The goal of this project is to develop a new component-based design framework for the design of reliable real-time systems. This framework should be based on a formal semantics (taking time and reliability into account) to allow static analysis and verification. It should lead to efficient and predictable implementations and therefore should not rely on middleware or complex run-time systems.

Concretely, this research project consists of the following phases:

1. A notion of real-time and reliable component should be defined. The interface of such components should include types, time, and reliability properties. The ability to model the environment (e.g., using contracts) is crucial since components are usually designed to behave correctly only in some well specified environments.

2. It should be shown how the system's global reliability can be guaranteed on an assembly of components. A desired reliability level can be achieved by increasing the redundancy on certain components (the less reliable ones). This technique shall be modular and incremental.

3. The component-model and its associated tools should be validated on a case study.

References


Contact People

Candidates should have a PhD in programming or formal methods (e.g. semantics, analysis, verification, validation, compilation ...).

Applications, including curriculum vitae and bibliography, and the names and email addresses of two references, should be sent to:

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