Postdoc Opening

Simulation Techniques for the Validation of
Analog and Mixed Signal Circuits.

Beginning: September 2007
Duration: 12 months
Location: Laboratoire Jean Kuntzmann, Grenoble, France
Web: `http://ljk.imag.fr/`
Contact: Antoine Girard (`Antoine.Girard@imag.fr`)

Scientific context

This post-doc position is opened within the ANR funded project VAL-AMS (*High Confidence Validation of Analog and Mixed Signal Circuits*) :

`http://www-verimag.imag.fr/~tdang/VAL-AMS/`

The VAL-AMS project brings together researchers from the Laboratory Verimag and the Laboratory Jean Kuntzmann. The goal of this project is to improve the state of the art of analog and mixed signal design by investigating simulation-based analysis methods which can guarantee some level of confidence in the results. The project intends to build an experimental platform for validating the correctness of analog and mixed-signal circuits, a component of increasing importance for the functioning of modern embedded system. The platform will combine two technologies currently being developed by the partners: an efficient and physically-accurate simulator for large analog and mixed-signal circuits and the methods for covering the state space of such circuits by choosing appropriate input signals. The results of this project will offer the following scientific and technical benefits.

- The methods for high confidence validation of analog and mixed signal circuits developed in this project will improve the design process, both in terms of reliability and cost. These methods can also be used to validate in various embedded systems which can be modelled by hybrid systems, such as airplane and car control systems.

- The theoretical foundations developed in the project will contribute to advance the state of the art of the two domains: formal verification of continuous and hybrid systems and numerical analysis of non-smooth dynamical systems.

Job Scope

The recent notion of bisimulation metrics allows us to infer from a trajectory of a dynamical system, the behaviour of an infinite number of trajectories located in its neighbourhood. Thus, the validation of an infinite number of trajectories is made possible using only a finite number of numerical simulations [1, 2]. Particularly, the postdoctoral fellow will work on the following problems:

- Definition of algorithms for the selection of the trajectories that need to be simulated. The goal is to find efficient strategies allowing the minimization of the number of numerical simulations needed for the validation of the system.

- Development of bisimulation metrics for models of analog and mixed signal circuits.

Requirements

The succesful candidate should have a Ph.D. in Applied Mathematics or a related area (such as Computer Science or Automatic Control). Programming experience (C++, Matlab) and knowledge of mathematics required.

References

[1] G.E. Fainekos, A. Girard and G.J. Pappas, Temporal logic verification using simulation, *Formal Modelling and Analysis of Timed Systems*, vol 4202 in LNCS, pp 171-186, Springer, 2006.

[2] A. Girard and G.J. Pappas, Verification using simulation, *Hybrid Systems : Computation and Control*, vol 3927 in LNCS, pp 272-286, Springer, 2006.