

Nicolas Halbwachs — Short Curriculum Vitæ

Current position: Directeur de Recherche at CNRS, Director of Verimag Laboratory

Date of birth: June 12, 1953

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Education and diplomas

- June 1984 : “State Thesis” in Mathematics, Grenoble
- March 1979 : “Third Cycle Thesis” in Computer Science, Grenoble

Positions occupied

- Since 1992 : Research director at CNRS
- 1992-93 : Invited Professor at Stanford University
- 1980-92 : “Chargé de Recherche” at CNRS

Research Activity: My main research results are the following:

- With Patrick Cousot, I designed the “Linear Relation Analysis”, an abstract interpretation for discovering invariant linear inequalities among variables of a program. I adapted the method to the analysis of synchronous programs, and of timed and hybrid systems. I improved it with dynamic partitioning, Cartesian factoring of polyhedra, and abstract acceleration.
- I am one of the founders of Synchronous Programming. With Paul Caspi, I defined the synchronous data-flow language Lustre, devoted to programming embedded software. I successively worked on the formal definition of the language, its compilation, its use as a logic for specifying properties (the notion of synchronous observer), the verification of synchronous programs by model-checking and abstract interpretation, the automatic testing of synchronous programs, the use of synchronous programming for modeling non synchronous systems. Lustre is an industrial success-story, as it became the core language of the worldwide used toolset Scade, developed by the company Esterel-technology. Lustre can be considered as a notable success of formal methods in industry.
- I proposed a method, sometimes called “symbolic bisimulation”, to generate a minimal state graph from an implicit representation (e.g., a Boolean program), the minimality being considered with respect to the bisimulation according to some observation criterion.
- I designed an automatic method, derived from abstract interpretation, to discover invariant properties about parameterized networks of finite-state processes.
- My most recent work concerns the automatic discovery of invariants in programs manipulating arrays. For instance, our analysis can discover automatically that the result of an “insertion sort” procedure is a sorted permutation of the initial array.

I published a book, 15 articles in international journals, 46 papers in international conferences, including 11 invited papers. According to Google Scholar, my H-number is currently 31.

I supervised 10 PhD theses, and about 13 Master theses. I am editor of the journal “Formal Method in System Design”. I co-chaired the Program Committees of conferences CAV’99, TACAS’05 and EMSOFT’09. I took part in more than 30 program committees of international conferences, I was the coordinator of Esprit project LTR 22703 SYRF, and scientific coordinator of a cluster in the FP6 integrated project ASSERT.