# Guillaume Baudart

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#### Research

I am a PhD candidate in the Parkas team of the Computer Science department (DI) at École normale supérieure in Paris under the supervision of Marc Pouzet and Timothy Bourke. My research focuses on systems mixing discrete logic and real-time requirements and in particular the link between continuous- and discrete-time. I have worked on the following topics:

- The Quasi-Synchronous Abstraction is a discrete time abstraction proposed by P. Caspi (inventor with N. Halbwachs of the synchronous language Lustre) for analysing quasi-periodic architectures where computing units execute almost periodically. We showed that this abstraction is not sound for general systems and give necessary and sufficient conditions to recover soundness [2]. Large parts of the proofs have been mechanized in the Isabelle/HOL theorem prover and the Uppaal model checker.
- Loosely Time-Triggered Architectures (LTTAs) are a proposal for implementing synchronous programs over networks of embedded controllers [5]. We showed that the deployment of a synchronous application can be modeled using a synchronous framework and present controller models that can be compiled for execution [3,4].
- CloudLens a Scripting Language for Analysing Semi-Structured Data. We designed a scripting language, built on top of JavaScript, with dedicated streaming features for analysing streams of raw data [1]. A CloudLens script extracts information from the data and either report error states (monitoring), or find the causes of a crash (troubleshooting).
- Antescofo as a ReactiveML Embedded Domain Specific Language (eDSL). We gave a synchronous semantics to the Antescofo language, a DSL for authoring mixed music, and an alternative implementation of the sequencer based on an embedding inside a synchronous language, ReactiveML [7]. We used this embedding to allow live coding with Antescofo [6].

I was external reviewer for the following conferences: EMSOFT(2016-2015), DAC(2015), JFLA(2015), JIM(2014)

#### **Publications**

- [1] G. Baudart, L. Mandel, O. Tardieu, and M. Vaziri. CloudLens, un langage de script pour l'analyse de données semi-structurées. In *Journées Francophones des Langages Applicatifs (JFLA'17)*, Gourette, France, Jan. 2017.
- [2] G. Baudart, T. Bourke, and M. Pouzet. Soundness of the Quasi-Synchronous Abstraction. In *FMCAD'16*, Mountain View, USA, 2016.
- [3] G. Baudart, A. Benveniste, and T. Bourke. Loosely Time-Triggered Architectures: Improvements and Comparison. *Transactions on Embedded Computing Systems (TECS)*, 15(4):71:1–71:26, Aug. 2016.
- [4] G. Baudart, A. Benveniste, and T. Bourke. Loosely Time-Triggered Architectures: Improvements and Comparisons. In *EMSOFT'15*, Amsterdam, The Netherlands, 2015. Best paper nominee.
- [5] G. Baudart, A. Benveniste, A. Bouillard, and P. Caspi. A Unifying View of Loosely Time-Triggered Architectures. Research Report RR-8494, INRIA, 2014. Corrected version of a paper which appeared at *EMSOFT'10*.
- [6] G. Baudart, L. Mandel, and M. Pouzet. Programming mixed music in ReactiveML. In FARM'13, Boston, USA, 2013. Workshop ICFP 2013.
- [7] G. Baudart, F. Jacquemard, L. Mandel, and M. Pouzet. A synchronous embedding of Antescofo, a domain-specific language for interactive mixed music. In *EMSOFT'13*, Montreal, Canada, 2013. Best paper nominee.

## Sofware Development

Quasi.thy 2.5 kLoC Isabelle/HOL Proofs on quasi-synchronous systems

CloudLens 6.2 kLoC Java & JavaScript CloudLens Interpreter

ReactiveAsco 2.3 kLoC OCaml & ReactiveML Alternative sequencer for Antescofo

#### **Education**

2013 - PhD in Computer Science,

École normale supérieure, Paris, France.

- 2013 Graduated from École normale supérieure de Cachan (Rennes).
- 2012 Master of Science in Computer Science,

Acoustic, Signal Processing and Computer Science applied to Music, École normale supérieure de Cachan,

IRCAM, University Paris VI (UPMC), Telecom Paristech, Paris, France.

- 2010 Bachelor of Science in Computer Science,
- 2010 Bachelor of Science in Mathematics,

École normale supérieure de Cachan, University of Rennes 1, Rennes, France.

## **Experience**

2016 Research Internship, 4 months, IBM Research, New York, USA

CloudLens: a Scripting Language for Semi-Structured Data

- Supervised by Mandana Vaziri.

2013 Research Internship, 1 year, École normale supérieure, Paris, France,

Antescofo as a ReactiveML Embedded Domain Specific Language

- Supervised by Marc Pouzet and Louis Mandel.

2012 Master Internship, 5 months, IRCAM & École normale supérieure, Paris, France,

Toward a Synchronous Programming of Antescofo

- Supervised by Florent Jacquemard and Marc Pouzet.

2011 Research Internship, 4 months, Goldsmiths College, London, UK,

Expectations and Information-Theoretic Generation of Music

- Supervised by Geraint A. Wiggins.

2010 Research Internship, 3 months, IRCAM, Paris, France,

Evaluation of Real-Time Algorithms (Gesture Follower, Antescofo)

- Supervised by Arshia Cont.

#### **Invited Talks and Seminars**

2016 <b>S</b>	ynchron'16	CloudLens -	Bamberg,	Germany.
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FMCAD'16 Soundness of the Quasi-Synchronous Abstration – Mountain View, USA.

**Hybrid Group** Symbolic Simulation of Clocks – Ploërmel, France.

2015 **Synchron'15** Soundness of the Quasi-Synchronous Abstraction – Kiel, Germany.

**EMSOFT'15** LTTA: Improvements and Comparisons – Amsterdam, The Netherlands.

**68NQRT Seminar** A Synchronous View of LTTA – IRISA, Rennes, France. **LINCS Seminar** A Synchronous View of LTTA – LINCS, Paris, France.

2014 **Synchron'14** Synchronous Modeling of LTTA – Aussois, France.

2013 G. Berry Seminar The Antescofo Language in ReactiveML – Collège de France, Paris, France.

**Synchron'13** From Quasi-Synchrony to LTTA – Dagstuhl, Germany.

**EMSOFT'13** A Synchronous Embedding of Antescofo – Montreal, Canada. **FARM'13** Programming Mixed Music in ReactiveML – Boston, USA.

2012 **Synchron'12** Synchronous Interpretations of a Language for Mixed Music – Le Croizic, France.

### Other Skills

Languages Music

English Fluent Violin since 1996 French Native Piano since 2005

Russian Notions

# **Teaching**

I teach at University Paris VI (UPMC) in first and second year undergraduate courses.

2015 – 2016 **Discrete Structures**, second year – 10h,

Orders, inductions, automata, rational languages.

2014 – 2016 Introduction to Algorithmic, second year – 40h,

Recursive and iterative algorithms, lists, arrays, trees, graphs.

Introduction to Python Programming, first year – 20h,

Basic notions and data structures.

2013 – 2014 Introduction to C Programming, first year – 42h,

Basic notions and data structures.

Recursive Programming in Scheme, first year - 30h,

Basic notions and data structures, higher order.

May 2015 Salon of Mathematical Culture and Games, INRIA – 2 days,

Computer science and programming activities for children.