

Nicolas Amat

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PhD Student in Model Checking

FORMATION

LAAS-CNRS | PHD, VERTICS GROUP

2020-Present | Toulouse, FRANCE | Model-Checking Petri nets with a Polyhedral Method.

MOSIG - HECS | UNIV. GRENOBLE ALPES, MASTER OF SCIENCE | PERSYVAL-LAB EXCELLENCE SCHOLARSHIP

2020-2019 | Grenoble, FRANCE | Rank 1/75 | High-confidence Embedded and Cyberphysical Systems.

ENSIMAG | NATIONAL POLYTECHNIC INSTITUTE OF GRENOBLE, ENGINEERING DEGREE

2020-2017 | Grenoble, FRANCE | 1Y - Rank 6/237 | 2Y - Rank 1/79 | Computer Science and Math department.

LA PRÉPA DES INP | INTEGRATED EDUCATION ENGINEERING SCHOOL, EQUIVALENT TO UNIVERSITY-LEVEL

2017-2015 | Toulouse, FRANCE | A 2-year school preparing for the competitive entrance to engineering schools.

SENIOR HIGH SCHOOL | SCIENTIFIC BACCALAURÉAT WITH HONORS

2015 | Toulouse, FRANCE | Engineering Sciences, Computer Science and European options (Physics taught in English).

EXPÉRIENCE

LAAS-CNRS | INRIA | FORMAL METHODS INTERN

February 2020 – August 2020 | Toulouse and Grenoble, FRANCE

- Main developer of the SMPT model-checker for reachability properties on Petri nets.
- Combination of polyhedral abstraction with SMT-based methods.
- Main developer of the tool Kong for the “concurrent places” problem.
- Formalization of the E -abstraction equivalence.

ARM LTD. | EMBEDDED SOFTWARE INTERN

June 2019 – August 2019 | Cambridge, UK

- A single C three month programming project related to the Arm Mali GPU software driver stack.
- Running the Mali GPU driver on User-mode Linux (UML).
- Modification of the driver to allow compatibility with UML.
- Development of a Linux kernel patch to provide: Direct Memory Access (DMA), Device Tree.

LIG - GRENOBLE INFORMATICS LABORATORY | INTRODUCTION TO LABORATORY RESEARCH

January 2019 – June 2019 | Grenoble, FRANCE

- Formalization of Separation Logic using the Isabelle/HOL proof assistant.
- Proof of formula transformation results of the separation logic.
- Based on “On the Expressive Completeness of Bernays-Schönfinkel-Ramsey Separation Logic”.
- Approximately 1,500 lines .

IRIT - TOULOUSE INSTITUTE OF COMPUTER SCIENCE RESEARCH | CRYPTO DEVELOPER INTERN

May 2017 – June 2017 | Toulouse, FRANCE

- Open source project named XPIR : Private Information Retrieval for Everyone.
- Private Information Retrieval software based on homomorphic encryption.
- C++ and Python development.
- Security improvement.

PUBLICATIONS

- Amat, N., Dal Zilio, S., Berthomieu, B.: On the Combination of Polyhedral Abstraction and SMT-based Model Checking for Petri nets, Petri Nets (2021)
- Amat, N.: A New Approach for the Symbolic Model Checking of Petri nets. Master's thesis, University of Grenoble (2020)

TEACHING

- Algorithms and data structures (ADA language) at INSA Toulouse.

SCHOOL PROJECTS

- Sudoku solver including the development of a SAT solver based on the DPLL algorithm.
- Minimal operating system for RISC-V architecture.
- Compiler of a subset of the Java language with implementation of a library of mathematical functions .
- JPEG compressor in C language.

COMPUTER SKILLS

OPERATING SYSTEMS & SOFTWARE

GNU/Linux (ArchLinux & Debian) • Windows 10 • macOS
Z3 • Uppaal • Frama-C • Simulink
IDA Pro • QEMU • Docker • Wireshark • Scilab
L^AT_EX

PROGRAMMING

Over 10000 lines: C • Python • Java
Over 5000 lines: C++ • Shell • VHDL • Assembly
Familiar : HTML - CSS • JavaScript • SQL • R • OCL • XText
Proof Assistant : Isabelle/HOL
Model Checking : LNT

LANGUAGES

French: Native speaker.

Anglais : Fluent, very good understanding of technical documentation.

Spanish : Intermediate.

INTERESTS

FORMAL METHODS

- Model Checking • Mathematical Logic • Interactive Theorem Proving • SAT Problem

ETHICAL HACKING

- Organization of cybersecurity events: Gre'Hack 2019, Gre'Hack 2018, Gre'Hack 2017.
- Participation in cybersecurity competitions (CTF - Capture The Flag):
Insomni'Hack 2018, Gre'Hack 2019, Gre'Hack 2018, Gre'Hack 2017

SPORT

- Skateboarding • Surfing • Snowboarding • Rock climbing • Cycling