Enrico **Magnago**

R&D Engineer · PhD candidate · Software developer

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Inquisitive, self-motivated and perseverant problem solver with outstanding academic results and strong background in formal verification. Dependable and proficient software developer with experience in design, implementation and evaluation of symbolic model checking algorithms. Would love to combine passion for formal verification and coding skills to build better verification tools and create reliable software products.

Expertise: Symbolic Model Checking, Temporal Logics, SAT, SMT (Satisfiability Modulo Theory), Timed Systems, Hybrid Systems.

Experience

- **Research and Development Engineer** — *Dublin, Ireland*
  Synopsys Inc. — *09/05/2022 - 27/10/2022*
  - Design and development of tools for **static analysis** of software.

- **PhD Student/Candidate** — *Trento, Italy*
  University of Trento, Fondazione Bruno Kessler — *01/11/2018 - 18/11/2022*
  - Significantly enhanced the **falsification** capabilities of model checkers in **infinite-state** and **timed systems**.
  - Designed an effective **SMT-based symbolic algorithm** capable of finding counterexamples that other state-of-the-art procedures miss.
  - Developed a novel **compositional** semi-automated approach to falsify temporal properties.
  - Evaluated the viability of cloud platforms (**AWS**, **Azure**) for performance testing.
  - Published **4 research papers**: 3 in highly rated international conferences and 1 in a technical journal.

- **Teaching assistant: formal methods course, master in Computer Science** — *Trento, Italy*
  University of Trento — *15/03/2019 - 31/12/2020*
  - Gave the laboratory lectures, defined the exam exercises and evaluated the students' solutions.
  - Topics: model checking using **Spin**, **NuSMV** and **nuXmv**; verification of timed systems using **timed-nuXmv** and **HyCOMP**.

- **Software Developer** — *Trento, Italy*
  Fondazione Bruno Kessler, Embedded Systems unit — *27/03/2017 - 31/10/2018*
  - Extended the symbolic model checker nuXmv to support verification of **timed systems**.
  - Designed and implemented techniques to verify expressive specifications: **Metric Temporal Logic**.
  - Defined and evaluated a novel and effective approach to identify infinite **non-lasso counterexamples** for timed systems.
  - Developed a **new compiler module** in nuXmv to meet software re-usability and extensibility requirements.
  - Testing, bug fixing, refactoring and documentation of **large code base**:
    >1M lines of **C** code, **>200K** lines of **Python**, **>150K** lines of **C++**, **>50k** lines of **LaTeX**.

- **Software Developer (Internship)** — *Trento, Italy*
  Fondazione Bruno Kessler, Data & Knowledge Management (DKM) unit — *20/07/2015 - 20/10/2015*
  - Implemented a Semantic Web application database interface using **Elasticsearch Java** API.

Education

- **PhD in Information and Communication Technology** — *Trento, Italy*
  Fondazione Bruno Kessler, University of Trento — *01/11/2018 - 18/11/2022*
  - Advisor: Alessandro Cimatti, Co-advisor: Alberto Griggio

- **Summer / Winter Schools about Formal Verification** — *Marktoberdorf, Verona, Lisbon*
  Technical University of Munich, University of Verona, University of Lisbon
  - **MOD 2019**: Summer School on Safety and Security of Software Systems: Logics, Proofs, Applications. — *31/07/2019 - 09/08/2019*
  - **CPS 2019**: Summer School on Formal Methods for Cyber-Physical Systems. — *03/06/2019 - 07/06/2019*
  - **VMCAI 2019**: Winter School on Verification, Model Checking, and Abstract Interpretation. — *09/01/2019 - 12/01/2019*

- **Master degree in Computer Science** — *Trento, Italy*
  University of Trento — *08/08/2016 - 10/10/2018*
  - Final Grade: **110L/110**, Average Grade: **29.24/30**.
  - Notable project: distributed consensus protocol in Go.

- **Post-graduate Erasmus student** — *Edinburgh, United Kingdom*
  University of Edinburgh, School of Informatics — *05/09/2016 - 24/12/2016*
  - Notable project: algorithms using Hadoop Map-Reduce.

- **Bachelor degree in Computer Science** — *Trento, Italy*
  University of Trento — *08/08/2013 - 18/07/2016*
  - Final Grade: **110L/110**, Average Grade: **28.11/30**.
  - Notable project: multi-process question-answer game in C.

Programming Languages

C NuSMV[1], nuXmv[1].
Python F3[2], pySMT[1], General Scripting.
C++ nuXmv[1], Academic Projects.
Java Academic Projects: web-based applications, J2EE, EJB.
LaTeX Publications, Tools Documentation, BSc, MSc and PhD Theses.
Lex-Yacc NuSMV[1], nuXmv[1], Academic Project.
Tcl General Scripting.
Bash General Scripting.
Go Academic Project: consensus protocol.
OCaml Academic Course.
Dafny Academic Project.

1: Pre-existent tool or library.
2: Standalone software.

Skills

LANGUAGES: ●●●●● **Italian** ●●●●○ **English**
HOBBIES: ●●●○○ **Trumpet** ●●●○○ **Skiing** ●●○○○ **Tenor singer**

Publications

[1] Alessandro Cimatti, Alberto Griggio, and Enrico Magnago. Ltl falsification in infinite-state systems. *Information and Computation*, page 104977, 2022.

[2] Alessandro Cimatti, Alberto Griggio, and Enrico Magnago. Automatic discovery of fair paths in infinite-state transition systems. In *The 19th International Symposium on Automated Technology for Verification and Analysis, ATVA 2021, Gold Coast, Australia, October 18-22, 2021*, Lecture Notes in Computer Science, 2021.

[3] Alessandro Cimatti, Alberto Griggio, and Enrico Magnago. Proving the existence of fair paths in infinite-state systems. In Fritz Henglein, Sharon Shoham, and Yakir Vizel, editors, *Verification, Model Checking, and Abstract Interpretation - 22nd International Conference, VMCAI 2021, Copenhagen, Denmark, January 17-19, 2021, Proceedings*, volume 12597 of *Lecture Notes in Computer Science*, pages 104–126. Springer, 2021.

[4] Alessandro Cimatti, Alberto Griggio, Enrico Magnago, Marco Roveri, and Stefano Tonetta. Extending nuxmv with timed transition systems and timed temporal properties. In *Computer Aided Verification - 31st International Conference, CAV 2019, New York City, NY, USA, July 15-18, 2019, Proceedings, Part I*, pages 376–386, 2019.

[5] Alessandro Cimatti, Alberto Griggio, Enrico Magnago, Marco Roveri, and Stefano Tonetta. Smt-based satisfiability of first-order ltl with event freezing functions and metric operators. *Information and Computation*, page 104502, 2019.

Authors in alphabetical order.

Professional Activities

- Artifact Evaluation Committee FORMATS 2022, 20th International Conference on Formal Modeling and Analysis of Timed Systems.
- Artifact Evaluation Committee CAV 2022, 34nd International Conference on Computer-Aided Verification.
- Artifact Evaluation Committee CAV 2020, 32nd International Conference on Computer-Aided Verification.
- Peer-reviewer for a total of 12 International Conferences : ATVA 2019, 2021; CAV 2020; CONCUR 2020; DAC 2020; FMCAD 2022; ICAPS 2020; ICCAD 2022; TACAS 2019, 2020, 2021; VMCAI 2020 .