

Professional Experiences

2023 – 2024 **Postdoctoral Researcher - ANR BasisUS**, *Université Sorbonne Paris Nord*, Paris
LIPN - LOVE team, Villetaneuse

Keywords *Verification, Parametric timed automata, Control, Opacity*

Real-timed systems have become ubiquitous in recent years. Checking for errors and avoiding them is paramount. Although tests can be carried out to detect errors, they do not guarantee safety, unlike formal methods such as model-checking. Timed automata and their various extensions are widely used in this context. On the other hand, opacity problems, where the system aims to be opaque enough that an outside observer cannot deduce the actions performed from the execution time, have also been studied in the context of timed automata, whether parametric or not. The problematic here is to tackle opacity problems with controllers for (parametric) timed automata.

2022 – 2023 **Postdoctoral Researcher - European project BIOS**, *Université Paris-Saclay*, Paris
INRAE - Micalis lab, Jouy-en-Josas

Keywords *Artificial Neural Network, Metabolic Network, Mechanistic Modeling, FBA*

In this postdoc, I used active learning for synthetic biology in various projects. In machine learning, we need data to train our models. In synthetic biology, these data are the results of experiments. Having a good set of data is crucial to having a good model, but doing all the possible experiments can be too costly, in terms of time or resources. Active learning is a branch of machine learning that can be used to select the relevant data for training and therefore limit the number of experiments.

2021 – 2022 **Teaching and Research Associate (ATER)**, *Université Côte d'Azur*, Nice

Education

University

2018 – 2021 **Ph.D. in Computer Science**, *Université Côte d'Azur*, Sophia-Antipolis
Laboratoire I3S, COMRED & MDSC teams

Title **Synchronizability for distributed systems**

Advisors Étienne LOZES, *Directeur*
Professeur des Universités, Université Côte d'Azur

Cinzia DI GIUSTO, *Co-encadrante*
Maîtresse de Conférences, Université Côte d'Azur

Keywords *Distributed Systems, Verification, Communicating Automata*

Abstract In order to check for errors in distributed systems, they can be modeled as systems of communicating automata. Verification problems such as reachability are undecidable in such a model. Because of that, the use of approximations is necessary. k-synchronizability is one of these techniques. A system is k-synchronizable if, for all executions, there is an equivalent execution that can be divided into phases containing k messages. This thesis contains an analyse of k-synchronizable systems (reachability problem, various cases of membership problem) but also some variations to the definition of k-synchronizability and a comparative study of the state-of-art classes of systems and our new classes.

- 2016 – 2018 **Research Master in Computer Science**, *Université de Nice Sophia-Antipolis*, Nice
Fundamental Computing Research
- Title **Decidability of synchronizability for mailbox systems**
Research Internship Master 2
Laboratoire I3S, MDSC team, Sophia-Antipolis
- Advisors Dr. Cinzia DI GIUSTO & Pr. Étienne LOZES
- Abstract We focus on the synchronizability property of distributed systems modelled in communicating automata. A system is synchronizable if its asynchronous behavior is equivalent to the one with synchronous communication, according to their send traces. By reduction to Post’s problem, we give an alternative proof of the undecidability of synchronizability for a peer-to-peer system, as well as for systems communicating in mailbox with the addition of final states.
- Title **Parameter learning for neural networks modeled as timed automata**
Research Internship Master 1
Laboratoire I3S, MDSC team, Sophia-Antipolis
- Advisors Dr. Elisabetta DE MARIA & Dr. Cinzia DI GIUSTO
- Abstract In this work, biological neurons are formalized as timed automata. The objective is to study the learning of parameters by model checking and by simulation. In the second case, two back-propagation algorithms are defined. We find that by enriching the neuron model, in particular by adding a priority on the algorithm to be applied on each neuron of the system, better results can be achieved.
- 2013 – 2016 **Bachelor Degree in Computer Science**, *Université de Nice Sophia-Antipolis*, Nice
- Schools**
- 2023 **Summer School: Formal Modelling of Biological Regulation Networks (Bioregul)**, *Université Côte d’Azur*, Porquerolles, Pr. Jean-Paul COMET
- 2022 **School for Young Researchers in Mathematical Informatics (EJCIM)**, *Université Côte d’Azur*, Nice, Pr. Bruno MARTIN
- 2018 **Summer School: Verification Technology, Systems and Applications**, *INRIA*, Nancy, Dr. Stephan MERZ
- 2018 **Winter School: Software Verification and Computer Proof**, *INRIA*, Sophia-Antipolis, Dr. Yves BERTOT

Publications

Conferences

- 2023 **A Partial Order View of Message-Passing Communication Models.**
Cinzia DI GIUSTO, Davide FERRÉ, Laetitia LAVERSA, Étienne LOZES
In 50th Symposium on Principles of Programming Languages, POPL 2023 (Rank A*), (Vol. 7, p. 1601-1627)
- 2021 **A Unifying Framework for Deciding Synchronizability**
Benedikt BOLLIG, Cinzia DI GIUSTO, Alain FINKEL, Laetitia LAVERSA, Étienne LOZES, Amrita SURESH
In 32th International Conference on Concurrency Theory, CONCUR 2021 (Rank A) (Vol. 203 of LIPIcs, pp.14:1- 14:18)
- 2021 **Guessing the Buffer Bound for k-synchronizability**
Cinzia DI GIUSTO, Laetitia LAVERSA & Étienne LOZES
In 25th International Conference of Implementation and Application of Automata, CIAA 2021 (Rank B) (Vol. 12803, p. 102)
- 2020 **On the k-synchronizability of Systems**
Cinzia DI GIUSTO, Laetitia LAVERSA & Étienne LOZES
In 23th International Conference of Foundations of Software Science and Computation Structures, FOSSACS 2020 (Rank A) (Vol. 12077, p. 157)

Journals

- 2022 **Guessing the Buffer Bound for k-synchronizability**
Cinzia DI GIUSTO, Laetitia LAVERSA & Étienne LOZES
Long version of CIAA 2021 paper
International Journal of Foundations of Computer Science, 2022 (Vol. 34, 8, p. 1051-1076)
- 2019 **Spiking Neural Networks Modelled as Timed Automata: with Parameter Learning**
Elisabetta DE MARIA, Cinzia DI GIUSTO & Laetitia LAVERSA
Natural Computing (Vol 19.1, p. 135-155)

Teaching & Supervisions

384h – In Computer Science Departement, Université Côte d’Azur
Computer Science Basis Licence 1 - 54h (2018), 40h (2019), 56h (2020), 168h (2021)
Database Licence 2 - 22h (2019), 24h (2021)
Object-oriented Programmation Licence 3 - 18h (2018)
Communication and concurrency Master 1 - 2h (2021)

Supervisions of Research Internship

- 2023 **Ambre Picard-Marchetto**, M2 - *Probabilistic Automata, Spiking Neural Networks*
2022 **Davide Ferré**, M2 - *Communicating Systems, Temporal Logic*
2020 **Thomas Portet**, M1 - *Communicating Automata, k-synchronizability*

Invited Stay

- 2020 **Laboratoire Spécification et Vérification, Université Paris-Saclay**
Collaboration with Pr. Finkel Alain, Pr. Bollig Benedikt and Suresh Amrita
(Ph.D. student) during 2 months

Communications

Conferences

- 2021 **Guessing the buffer bound for k-synchronizability**
CIAA – in remote
- 2020 **On the k-synchronizability of Systems**
FOSSACS – in remote

Seminar

- 2023 **Active learning for BIOS project**
BIOS Meeting – Palma de Majorque, Spain
- 2022 **Formal methods for distributed systems**
Liechtenstein meets Côte d’Azur – Sophia-Antipolis
- 2021 **Guessing the buffer bound for k-synchronizability**
GT ALGA – in remote
- 2020 **Decidability of existentially strong-synchronizability**
Seminar during invited stay – LSV, Gif-sur-Yvette
- 2020 **Synchronizability for distributed systems**
Internal seminar – I3S, Sophia-Antipolis
- 2018 **Synchronizability for communicating state machines**
Team day MDSC – I3S, Sophia-Antipolis

Popularizing science

- 2020 **“Ma thèse en 180 secondes”**
Explain the context and the aim of our Ph.D. in 3 minutes
- 2018, 2019 **“Fête de la science”**
Games presentations as help for computer science and algorithms introduction

Responsabilities

- 2020 – 2022 **Treasurer of the Association of Ph.D. Students STIC (ADSTIC)**
Association of interns, Ph.D. students and post-doctoral fellows of the Sophia-Antipolis STIC campus
- Organisation of social, sporting and scientific events
 - Account management and budgeting
 - Support for Ph.D. students in difficulty
- 2021 **Member of the organising committee for JFPC 2021**
- Organisational assistance
- 2018 **Programming competition**
Université de Nice Sophia-Antipolis
- Organisational assistance
 - Support for students

Skills

Programming languages and other tools

LaTeX, Python, Java, SQL, OPL, Scheme, Netlogo
Use of Cplex, Uppaal, CADP, STABC

Languages

French (Mother tongue), English (Fluent), Spanish (Fluent)

References

Pr. Étienne LOZES, etienne.lozes@unice.fr, 04.89.15.44.00
Dr. Cinzia DI GIUSTO, cinzia.digiusto@gmail.com, 04.89.15.43.85
Dr. Elisabetta DE MARIA, edemaria@i3s.unice.fr, 04.89.15.43.72