Rand Asswad

PhD Student in Applied Mathematics

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PhD candidate in control theory, specializing in the modeling, nonlinear control, and state estimation of dynamical systems, with applications in synthetic biology. Open to a broad range of postdoctoral opportunities in control theory and related areas. Currently seeking a position in the Grenoble area starting in 2026.

Research interests: Nonlinear control, observer design, state estimation, model predictive control, data-driven control, modeling, optimization.

Experience

PhD Student @ Microcosme (Inria - Université Grenoble Alpes)

`October 2022 – September 2025`

Nonlinear control and modeling of biological systems. Focus on algal-bacterial consortia in bioreactors, with mathematical modeling, qualitative analysis, simulations, state estimation, and robust feedback control design.

Visiting Researcher @ IRT (Leibniz Universität Hannover)

`September – November 2024`

Exploration of data-driven control methods, including robust variants of Model Predictive Control accounting for modeling and measurement uncertainties.

Teaching Assistant @ Université Grenoble Alpes

`September 2022 – January 2024`

Delivered lectures, tutorials, and lab sessions for undergraduate science programs. Courses taught:

- Fundamental Mathematical Tools (16h, L1 Life Sciences)
- Applied Mathematics for Image Processing (18h, L1 Computer Science)
- Scientific Computing Introduction (6h tutorials + 18h labs, L1 Computer Science)

Research Intern @ L2S (Centralesupelec, CNRS)

`November 2020 – June 2021`

Worked on a bio-geometric sound reconstruction model based on the Heisenberg group and the Wilson-Cowan integro-differential equation.

Research Intern @ Pixel (Inria - Université de Lorraine)

`June – August 2019`

Improved the C++ pipeline « Mind the Gap! » for generating hexahedral-dominant meshes from tetrahedral meshes.

Education

PhD in Applied Mathematics @ MSTII (Université Grenoble Alpes)

`October 2022 – September 2025`

Modeling, observation, and control of nonlinear microbiological systems.
Key training:

- Nonlinear Systems Control (H. Khalil, EECI-IGSC)
- State Observers for Dynamical Systems (G. Besançon)
- Nonlinear Control (G. Besançon)
- Model Predictive Control (M. Fiacchini)

Skills

Mathematics & Computer Science Theory

- Control & Estimation
- Signal Processing
- Numerical Analysis & Simulation
- Optimization & Metaheuristics
- Probability, Statistics & Data Analysis
- Multi-agent Systems & MARL

Programming Languages

- `Familiar:` Fortran, Matlab/Octave, Prolog, Lisp, Mathematica, SQL, C#.
- `Experienced:` bash/shell, C, C++, Python, Julia, Java, JavaScript.
- `Markup:` LaTeX/TeX, HTML+CSS, Markdown.

Libraries & Frameworks

- `Numerical & ML:` numpy, scipy, matplotlib, scikit-learn, pandas.
- `Lexer & Parser Generators:` Lex+Yacc, GNU Flex+Bison, Antlr4.
- `WebDev:` Django (Python), Jekyll (Ruby).

Software & Tools

- `OS:` GNU Linux (Arch, Debian), MS Windows.
- `Version Control:` Git, SVN.
- `Image Processing:` GIMP, Inkscape, Adobe Photoshop, Adobe Illustrator, Blender.

Languages

French *(TCF C1/C2)*
English *(TOEIC 990/990)*
Arabic *(native)*
German *(B1.1 course)*

Higher Education Teaching Program @ Université Grenoble Alpes
`November 2024 – June 2025`

University-level pedagogy certification (Parcours Enseignement dans le Supérieur) focused on course design, delivery, and reflective teaching practices.

Mathematical Engineering @ INSA Rouen Normandie
`September 2014 – September 2021 (mention bien)`

French graduate engineering program (Diplôme d'Ingénieur, MEng) with focus on applied mathematics and computer science, specialized in IA and Decision-Making.

Theoretical & Applied Computer Science @ Université de Rouen Normandie
`September 2019 – August 2020 (mention assez bien)`

Research-oriented Master's program (M.Sc.) with focus on algebra and theoretical computer science.

Syrian Scientific Baccalaureate
`June 2013 (GPA: 92.17%)`

Publications

Static and dynamic optimal control of vitamin-mediated algal-bacterial co-cultures under optogenetic regulation
`Under review at Automatica journal`

Rand Asswad, Walid Djema, Olivier Bernard, Jean-Luc Gouzé, Eugenio Cinquemani.

Single- and multi-objective performance optimization of an algal-bacterial synthetic process
`Under review at CDC25`

Rand Asswad, Jean-Luc Gouzé, Eugenio Cinquemani.

Optimization of microalgae biosynthesis via controlled algal-bacterial symbiosis
`Published article in the CDC24 conference proceedings – doi.org/10.1109/CDC56724.2024.10886300`

Rand Asswad, Walid Djema, Olivier Bernard, Jean-Luc Gouzé, Eugenio Cinquemani.

Kalman-based approaches for online estimation of bioreactor dynamics from fluorescent reporter measurements
`Published article in the ECC24 conference proceedings – doi.org/10.23919/ECC64448.2024.10591076`

Rand Asswad, Eugenio Cinquemani, Jean-Luc Gouzé.

An auditory cortex model for sound processing
`Published article in the GSI2021 conference proceedings – doi.org/10.1007/978-3-030-80209-7_7`

Rand Asswad, Ugo Boscain, Giuseppina Turco, Dario Prandi, Ludovic Sacchelli.

Miscellaneous

- Violin (Conservatory of Saint-Etienne du Rouvray, Orchestre Symphonique Universitaire de Grenoble, Seyssymphonique)
- Cinema and art
- Camping and hiking