Guillaume Moinard | PhD Student in Computer Science

Somewhere – Maybe Paris – Yes, France

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Academic Background

PhD

LIP6 **Sorbonne Université - CNRS**
Doctoral School EDITE, Paris 2022–2025

Topic: Random Walks in Street Networks: Towards Totally Decentralized Gatherings

Supervisor: Matthieu Latapy

Abstract: How to meet if we are dispersed in a city? Coordinating, by exchanging our positions thanks to modern means of communication, seems easy. But how to achieve the same result if communications are impossible and no meeting point is identifiable? This is the case, for example, during a repressed social movement or a blackout. The objective of my thesis is to find the key ingredients for a movement tactic to ensure that walkers will meet in the same place, regardless of their starting positions. I therefore model them as random walks, on a street network, biased by various observables [2]. Having identified sufficient rules to guarantee the formation of such groups, I subsequently improved this model, and obtained more effective tactics, by incorporating a more realistic vision in the walkers [1]. Finally, in the case of countermeasures or crowd movements, I show that these walks offer guarantees regarding the reformation of groups after a dispersion [4].

Education

Sorbonne Université **Paris**
*Master 2 Physics of Complex Systems, Grade: **Very Good*** 2021–2022
Courses in dynamical systems, machine learning, econophysics, stochastic processes, game theory, statistical field theory and graph theory.

Sorbonne Université **Clermont-Ferrand**
Gap Year 2020–2021
Internship at INRAE, tutoring in a high school, and associative project of solidarity distributions as vice-president at the Maison Des Solidarités Étudiantes.

University of Durham **Durham, England**
*Master 1 in Physics, Grade: **Good*** 2019–2020
Erasmus exchange with Sorbonne Université.

Sorbonne Université **Paris**
*Bachelor in Physics, Grade: **Good*** 2016–2019

Thesis Prizes

Bertalanffy Young Doctoral Award 🌐   **Bordeaux**
Finalist, French Regional Conference on Complex Systems   *2025*
Finalist of a competition for which I presented my thesis work through a 5-minute video.

My Thesis in 180 Seconds 🌐   **Paris**
Finalist, Sorbonne Université   *2025*
Finalist of an eloquence competition for which I presented my thesis topic in 3 minutes.

Summer Schools

Lake Como School of Advanced Studies   **Como, Italy**
Complex Networks: Theory, Methods, and Applications   *2023*
Courses on graph models, epidemiology phenomena in networks, statistical comparison tools for graphs, and introduction to hypergraphs.

Internships

M2 Internship with Matthieu Latapy and Nicolas Maudet   **Paris**
LIP6, 5 months   *2022*
Study of new forms of protests. Implementation of multi-agent models governed by stochastic processes on city graphs obtained by extracting data from OpenStreetMap.

M1 Internship with Guillaume Deffuant   **Clermont-Ferrand**
INRAE, 5 months   *2021*
Participation in the ToRealSim project. Extension, in C++, of the multi-agent opinion propagation model *Léviathan* to social networks.

L3 Internship with Antoine Moreau   **Clermont-Ferrand**
Institut Pascal, 1 month   *2018-2019*
Optimization of the computation time of the *MoosH* software simulating multi-layers for wave optics in Matlab. Study of *Differential Evolution*, an optimization algorithm inspired by natural selection.

Publications

International Conference Proceedings with Peer Review

[1] Guillaume Moinard and Matthieu Latapy. "Improving flocking behaviors in street networks with vision". In: *CompleNet: International Conference on Complex Networks (accepted, to be published)*. Springer. 2025

[2] Guillaume Moinard and Matthieu Latapy. "Fast Flocking of Protesters on Street Networks". In: *ASONAM: International Conference on Advances in Social Networks Analysis and Mining*. Springer. 2024, pp. 194–203. DOI: 10.1007/978-3-031-78538-2_17

[3] Etienne Russeil, Fabricio Olivetti de Francca, Konstantin Malanchev, Bogdan Burlacu, Emille Ishida, Marion Leroux, Clement Michelin, Guillaume Moinard, and Emmanuel Gangler. "Multi-view Symbolic Regression". In: *GECCO: Proceedings of the Genetic and Evolutionary Computation Conference*. 2024, pp. 961–970. DOI: 10.1145/3638529.3654087

Journal Articles

[4] Guillaume Moinard and Matthieu Latapy. "Fast and Robust Flocking of Protesters on Street Networks". In: (submitted). URL: https://arxiv.org/abs/2406.01101v1

Software Contributions

libSG 🌐

Library, Pierre Baumann and Guillaume Moinard 2024

Library written in C to process temporal graphs. The library offers a data structure to represent the abstract type of Stream Graphs developed by Matthieu Latapy. With this method, it is possible to define primitives and efficiently calculate the metrics introduced in the article in question.

POG 🌐

Program, Ivan Mulot-Radojcic and Guillaume Moinard 2023

Simulator of walks on street networks in C associated with an article [2] on the gathering of walkers on street graphs. Project presented in the form of a companion site to explain how to use the code.

Presentations

Conferences without Proceedings with Peer Review

International Network for Social Network Analysis **Paris**

Sunbelt "Social Networks, Mechanisms, and Algorithms" *2025*

BeWater: Effective Protesters Navigate Watersheds in Street Networks

Institut des Systèmes Complexes **Paris**

Bridging Theoretical and Empirical approaches for the study of Social Dynamics *2024*

Flocking of Protesters on Street Networks

Institut National des sciences appliquées **Lyon**

Archipel *2024*

Le Dernier Kilomètre

University of Pennsylvania **Philadelphia, USA**

International Conference on Computational Social Science *2023*

Gathering and Flocking of Protesters on Street Networks

Université Le Havre Normandie **Le Havre**

French Regional Conference on Complex Systems *2023*

Impact of pedestrian flocking tactics on urban networks

Workshop

Sciences Po **Toulouse**

Colloque inter-AtÉcoPol *2025*

Organizer and animator of the workshop *Recherches pour les luttes*. A workshop in the format of a world café to develop research dedicated to social and ecological struggles.

KTH Royal Institute of Technology **Stockholm, Sweden**

ICT4S *2024*

Creation of a video to present the concept of the "inverse Moore's law".

Seminars

LIFAT **Tours**

Team seminar Reconnaissance des Formes & Analyse d'Images *2025*

BeWater : Vers des Rassemblements Décentralisés Efficaces Dans les Réseaux de Rues

LIASD   **Saint-Denis**
Seminar ouverture en informatique et de formation of the PASTIS team   *2025*
BeWater : Vers des Rassemblements Décentralisés Efficaces Dans les Réseaux de Rues

Centre Georges Pompidou   **Paris**
Day of the École Doctorale Informatique, Télécommunications et Électronique   *2025*
Presentation of my PhD work with the my thesis in 180 seconds format.

LIP6   **Paris**
PhD student day for the A.I. & Data Science laboratory research axis   *2024*
Flocking and Be Water: Robust Tactics for Protests on Street Networks

Doctoral Collective of Sorbonne Université   **Paris**
Sorbonne Actuelle   *2024*
Doctorant.e face à son sujet : comment politiser sa recherche.

LIP6   **Paris**
Séminaire des doctorant.e.s de la SIF   *2024*
Flocking Tactics for Protests on Street Networks

Inter-team Colloquium   **Arc-et-Senans**
Project CNRS - Mission pour les Initiatives Transverses et Interdisciplinaires *2023*
Flocking Tactics for Protests on Street Networks

Lake Como School of Advanced Studies   **Como**
Complex Networks: Theory, Methods, and Applications, Italy   *2023*
Flocking Tactics for Protests on Street Networks

Symposium on Academia and Activism   **Fribourg**
Université de Fribourg, Switzerland   *2022*
Presentation of the results of my M2 internship, as well as the research perspectives of my thesis.

Posters

Sorbonne Université   **Paris**
Yearly day of LIP6   *2024*
Modélisation et Analyse de Traces de Mobilités

Sorbonne Université   **Paris**
Yearly day of LIP6   *2023*
Robustesse et Fragilité des Réseaux d'Infrastructures

Sorbonne Université   **Paris**
Day of the École Doctorale Informatique, Télécommunications et Électronique   *2023*
Robustesse et Fragilité des Réseaux d'Infrastructures

Teaching

Supervision of Internships

Sorbonne Université   **Paris**
Co-supervision, 2-month internship   *2024*
Supervision of Pierre Baumann in a L3 internship, with Matthieu Latapy, to implement a library of Stream
Graph functions in C.

Sorbonne Université   **Paris**
Co-supervision, 3-month internship   *2023*
Supervision of Ivan Mulot-Radojcic in a L2 internship, with Matthieu Latapy, to optimize random walk programs in C.

Courses

UFR d'Ingénierie de Sorbonne Université   **Paris**
Doctoral Teaching Mission, 193.5 hours   *2022-2025*

o During my teaching, I notably had the responsibility of teaching part of the M2 *Graph And Networks* lecture course, for which I chose the pedagogical content and prepared the slides. I completed my course by creating a set of Anki ❂ flashcards to help students in their revisions.

o I also participated in the correction of exam papers and that of codes submitted in practical work. I wrote the subjects of several continuous assessments for the tutorials.

Course	Level	Format	Volume	Content
Introduction to Programming	L1	TP	39.5h	Learning Python. Presentation of functions, loops, and data structures.
Supervised Research Project	L1	Project	28h	Programming project of dynamical systems and discovery of the bibliographic method.
Introduction to Programming	L1	TD	35h	Learning Python. Presentation of functions, loops, and data structures.
Algorithms	L2	TD	43.5h	Discrete mathematics, proofs of termination and validity of classical algorithms.
Research Project	L3	Project	12h	Supervision of a group around the study of an issue on temporal graphs.
Advanced C	L2	TP	12.25h	Deepening of concepts such as pointers, structures, strings, the libC.
Graphs and Networks (course in English)	M2	CM	5h	Course on propagation phenomena in real networks (epidemics, rumors, etc).
Data Structures	L2	TP	19.25h	Programming of data structures in C. Implementation of a CPU simulator.

Institution Saint-Alyre   **Clermont-Ferrand**
Tutoring, 2 years ≈ 200h   *2017 et 2020*
Weekly tutoring sessions in Physics-Chemistry, provided to high school students, set up within the institution, in 3-hour slots. Additional private lessons in the evenings for a few students.

Scientific Outreach

Conference cycle on les mystères de l'*Autre*   **Université Populaire de Bagnolet**
Speaker   *2025*
Connecting with Others: Understanding Networks, with Matthieu Latapy.

Stand Up For Science   **Paris**
Animator   *2025*
Introduction to computer science for passersby in a Parisian place, with a mediation workshop on algorithms: the *psychorigid pancake maker*, where the goal is to successfully sort pancakes, during the scientific outreach event on April 3.

La fête de la science   **Sorbonne Université**

Animator   *2024*

Introduction to computer science for primary school classes with a mediation workshop on sorting algorithms: the *psychorigid pancake maker* 🌐.

Paris en Science   **Sorbonne Université**

Writer   *2023*

Writer of the quantum physics section for a scientific outreach booklet distributed in high schools and on the campuses of Sorbonne Université by the student association Connectome In Science.

Scientific Outreach Competition   **Sorbonne Université**

Winner   *2022*

Winner of the scientific eloquence competition of the association Connectome In Science.

OpenRadiation   **Festival d'Astronomie de Fleurance**

Animator   *2022*

Demonstrations of radioactivity measurements made with the sensor of the OpenRadiation association and promotion of open science to the participants, general public, of the festival in partnership with OpenRadiation.

Journal Alma Mater   **Sorbonne Université**

Writer   *2018–2019*

Writing articles in a monthly inter-university student newspaper, both in print and online. Distribution of newspapers and writing articles on science and climate. Editor-in-chief for one issue.

Collective Responsibilities

Peer Review

IC2S2, KDD, CompleNet, WSDM, TMA, ASONAM, FRCCS

Sub - Reviewer   *2022-2025*

Peer review of articles, delegated by members of the editorial committee of several conferences.

Event Organization

Seminar of ComplexNetworks   **LIP6**

Team Seminars   *2024-2025*

Invitation of speakers: *Pablo Rauzy, Erwan Taillanter*. Organization of events, reservation of the restaurant and transportation, animation of the seminar.

Sorbonne Actuelle   **Sorbonne Université**

Interdisciplinary Seminar   *2024*

Organization of the interdisciplinary seminar on the theme "Doctorant·e face à son sujet" with the Collectif Doctoral de Sorbonne Université.

Colloquium at the Saline Royale   **Arc-et-Senans**

Perturbation des Infrastructures en Réseaux par des Mouvements Sociaux   *2023*

Organization of seminars over 3 days between several teams as part of the CNRS project *MITI-PRIMS* on the study of social movements. Invitation of speakers: César Ducruet, Julien Randon-Furling, Claire Lagesse. Preparation of a schedule, reservation of the venue, and animation of the colloquium.

Institutional Representation

Doctoral College **Sorbonne Université**
Elected PhD Student *2025-2027*
Elected on the list of the collectif doctoral to link the different doctoral schools, which make up the doctoral college of Sorbonne Université, and the PhD students.

Laboratory Council **LIP6**
Elected PhD Student *2025*
Member of the laboratory council. Intermediary between the PhD students and the laboratory management.

Council of the Faculty of Sciences and Engineering **Sorbonne Université**
Elected PhD Student *2023-2025*
Elected on the list of Solidaires Étudiant·e·s. Link between the faculty of sciences and the students of this faculty. Organization of a survey around the question of continuous integral training.

Council of PhD Students **LIP6**
Team Representative *2022-2025*
Discussions with the laboratory management, welcoming new students. Interview with the HCÉRES committee to represent the PhD students. Arrangement of a PhD student room.

Council of the UFR of Physics **Sorbonne Université**
Elected Student *2021–2023*
Link between the Physics students and the UFR. Vote on the allocations of the UFR budget. Participation in the rewriting of the internal regulations.

Scientific Associative Commitments

CurieOsity **Sorbonne Université**
Vice-President *2021–2022*
Association, under the 1901 law, of physics students. Organizer of the master's forum, the M2 graduation ceremony, conferences with Jean-Philippe Bouchaud, with Francis Rocard and professor coffee breaks. Animator of tutoring sessions and astrophotography evenings. Organizer of the trip to the 2022 edition of the Fleurance Festival. In charge of managing partnerships.

Débattre en Sorbonne **Inter-University**
Member *2018–2023*
Association recognized as being of public interest, inter-university of oratory art. Responsible for the links between the association and the administration of Sorbonne Université. Organization of a conference with Étienne Klein. Writing and declamation of a eulogy of Marie Curie at the Panthéon.

Dédale **Université Clermont Auvergne**
President *2017–2018*
During my first year of bachelor's degree, completed in Clermont-Ferrand, creation of Dédale, collective of physics students at the Université Clermont Auvergne. Writing of course notes in collaboration with the teachers. Sharing these on the university's moodle site.