Chanattan Sok

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linkedin.com/in/chanattan-sok | github.com/chanattan | Born on the 6th of August 2002

Current position

I am an M.Sc. student in computer science in the penultimate year at École normale supérieure (ENS) de Rennes, France. I am an aspiring researcher focusing on modeling, simulation, and optimization techniques to address complex, real-world problems. My research interests lie at the intersection of decision-making aid, environmental sustainability, and artificial intelligence.

I explore the potential of multi-agent systems in critical fields: using game theory to analyze decision-making in economics and public policies, and agent-based modelling to simulate complex human and robotic behaviors. This dual approach addresses key challenges at the intersection of technology and society.

As a young scientist, I strive to tackle challenges creatively and bring diverse perspectives to problem-solving. My aim is to bridge the gap between technical expertise and societal impact through innovative research.

Education

ENS Diploma - École normale supérieure de Rennes, Rennes, France   Aug 2022 - Aug 2026

The ENS is a global leader in research and excellence, among the top and hardest schools to obtain after one of the most competitive exams in France. With world-class faculties and laboratories, the ENS Diploma consists of a selective and intensive 4-year program focused on research. More than 90% of the students pursue with a PhD.

- 1st year as last B.Sc. year of Fundamentals of Computer Science
- 2nd year of MS in Fundamentals of Computer Science - coursework: *Signal processing, Complexity theory, Advanced operating systems, Compilers, Advanced algorithms, Machine learning, Representation of knowledge and logic and Semantics and assisted proof with Coq.*
- 3rd year dedicated to research internships - *students can also choose to pass the* French Agrégation, *the most competitive and prestigious examination for civil service in the French public education system.*
- 4th year as a research M.Sc. in computer science

B.Sc. in Fundamentals of Computer Science - École normale supérieure de   Aug 2022 – Aug 2023
Rennes & Univ Rennes, Rennes, France

- Highly-intensive program to provide wide knowledge to tackle research problems.
- *Coursework:* Algorithms and combinatorial optimization, Image processing, Distributed algorithms, Computer Architecture, Calculability and formal languages, Theory of programming languages, Cybersecurity and Logic.

2nd year of B.Sc. in Computer Science - Sorbonne University (ex-UPMC),   Sept 2021 - May 2022
Paris, France

- Solid theoretical and broad background on the fundamentals of computer science.
- Ranked $5th$ among 300+ students in computer science and mathematics, and $2^{nd}/345$ in object-oriented programming.

Preparatory classes to Grandes Écoles (CPGE) - Lycée Albert Schweitzer,   Sept 2020 - May 2021
Raincy, France

- Highly-selective program to enter the best ranked schools in France.
- Intensive courses in mathematics, physics and engineering sciences are given. I ranked $1^{st}/35$ in theoretical computer science class.

Research positions

Research assistant in the *Multi-Robot Systems/Human-Centered AI/AI for Humanity group* (CHROMA) - Inria Lyon & INSA Lyon, France   Sept 2024 - Dec 2024

Resolution of spacial conflicts between pedestrians with agent-based modeling, game and social choice theories, supervised by Olivier Simonin

- Studied state-of-the-art of crowds/social interactions models
- Designed and implemented an innovative multi-agent model integrating social choice theory, enabling pathfinding through negotiation-based strategies.
- Integrated the model in a physics model in PedSim, a renowned crowd simulator.

Research assistant in the *Programming Languages group* - Aarhus University, Denmark   May 2024 - Aug 2024

Software research on type inference and reduction of Java types, supervised by Magnus Madsen

- Conducted research on type inference, focusing on type construction and reduction, and proposed novel Java type representations in Flix.
- Implemented Java interoperability for Flix, a functional-first programming language developed in Scala, enabling seamless Java integration and expanding the language's modularity and reasoning capabilities.

Research assistant in the *Data Management team* (SHAMAN), IRISA, Univ Rennes, Thales group - Rennes & Lannion, France   Sept 2023 – May 2024

Research project at ENS Rennes to initiate research perspectives with WebAssembly on data management, supervised by Laurent d'Orazio

- First author of a research paper on WebAssembly in serverless computing, published at the SSDBM 2024 conference (<30% acceptance rate), in collaboration with Thales, a global leader in aerospace, defense, and digital solutions.
- Developed Blossom, an experimental and open-source Rust-based platform to compare Wasm-based and Rust-native joins in serverless environments, providing valuable insights into WebAssembly's performance and energy consumption.

Student research fellow in data management/UX/UI/AI, ENS Rennes - Bruz, France   Nov 2023 – May 2024

Provide computer science knowledge in collaboration with lawyers from Anticor (French association) and ENS Rennes: assist lawyers in the detection of frauds in France public markets, supervised by Julien Perez

- Conducted research on using a stable LLM for data pre-processing and real-time user applications.
- Studied of data management on public data sources in SQL and Panda in Python.
- Researched on UX/UI and software development to build an assistant tool for lawyers.
- Laid the foundations for interdisciplinary research with the French anti-corruption association Anticor, influencing the French government to further these initiatives.

Research assistant in the *Multi-Agent Systems team (MAS)*, Sorbonne University, LIP6, CNRS, CES - Paris, France   May 2022 – July 2022

Study of Earnest's model (2008) based on Putnam's two-level game theory, supervised by Nicolas Maudet and Aurélie Beynier (gitlab.lip6.fr/sok/tweakable_model)

- Re-implemented and extended an economic-political model to a global generic negotiation model on Python with Mesa. The model took inspiration from COP meetings.
- The new model emphasized the instability of stochastic ABM models, highlighting counter-intuitive interpretations in negotiations compared to the original Earnest's model, and gained attention from communities for its novel insights.
- Participated in the NEGOCLIM project: research and work with humanitarians, mathematicians and renowned economists from the Centre d'Économie de la Sorbonne (CES) such as Stéphane Zuber or Agnieszka Rusinowska.

Teaching

- **Referring tutor and founder of the computer science and maths tutoring for bachelor students**, ISTIC - Univ Rennes, Rennes, France   Sept 2023 - March 2024

- **Guest lecturer in multi-agent systems**, invited by Pr. Franz Kurfess - Calpoly University, San Luis Obispo, California.
  Gave a talk on agent-based modelling and simulations, an application to negotiations for consensuses. Jan 2024

- **CPES (Cycle Pluridisciplinaire d'Enseignement Supérieur) science tutor in maths and computer science for first year bachelor students.** - Lycée Châteaubriand, Rennes
  CPES is along prepatory classes, a highly-selective and intensive 3-year program to prepare for the most competitive entrances for the best ranked schools in France. Sept 2023 - March 2024

- **High-school tutor in general sciences (maths, computer science and physics)** - Rennes
  Taught and mentored through the Cordées de la réussite program, empowering high school students to succeed academically and fostering greater social equality and opportunity. Sept 2023 - March 2024

- **Assistant professor in mathematics and physics for middle-school students** - Collège Évariste Galois, Paris.
  Competitive program for bachelor's students, I taught general science classes and assisted a math teacher with classroom management in a middle school. Sept 2021 - March 2022

- **Private teacher in computer science** - Independent.
  Provided private tutoring in Python, Java OOP, C, C++, and algorithms to students ranging from primary school to university, preparing for selective programs. 2015 - 2024

Publications

WebAssembly Serverless Join: A Study of its Application July 2024

Chanattan Sok, Laurent d'Orazio, Reyyan Tekin, Dimitri Tombroff

SSDBM 2024, Rennes, France
10.1145/3676288.3676305

Projects

Here is a list of projects I have been involved in, as a member or participant.

NEGOCLIM project (from summer 2023) sites.google.com/view/negoclim

The NEGOCLIM project brings together researchers in economics and computer science to study climate negotiations. It is funded by the MITI - Aide à la décision action of the Centre National de la Recherche Scientifique (CNRS). I have been a participant of this project during my research internship starting May 2023.

An ENS Rennes - Anticor Law-clinic project (2023 - 2024) github.com/chanattan

Research project led by a collaboration between Anticor (French anti-corruption association), ENS Rennes and computer science students, with the ambitious aim of using computer methods to help lawyers detect fraud in French public market.

Additional Experiences and Activities

Co-president of the oenology club, ENS Rennes Sept 2023 - March 2024

- Organized wine-tasting events in partnership with a local winery. Led presentations on wine tasting techniques and the various types of wines, enriching attendees' experience.
- Managed event logistics, including overseeing the budget and administrative tasks.

Founder of Tutorat ISTIC, tutoring program for bachelor students in computer-science/engineering, Univ Rennes (ISTIC) Sept 2023 - March 2024

- Managed tutors sessions & tutoring classes as the representative tutor
- Organized meetings with ISTIC administration for reports & organization (student difficulties, programs, sessions...)

Finalist in an eloquence competition (Concours d'éloquence ENS Rennes), ENS Rennes   2023

Winner of a local hackathon (Palm'Hackathon ISTIC 2023), Univ Rennes - ISTIC   2023

- Developed a Rust game in group under 24 hours in competition against other university students, the theme was "investigation". We ranked 1st among 6 other groups of students.

Treasurer of RJMI Rennes 2023 (Rendez-vous des Jeunes Mathématiciennes et Informaticiennes) - ENS Rennes   Oct 2022 - March 2023

- Led treasury management for an annual event bringing together high school girls to promote and support excellence in mathematics and computer science, empowering the next generation and advancing equal opportunities in these critical fields.

Freelance developer - Online   2015 − 2019

- Built automated tools with Java 7-8 Swing as an independent developer (scrapper, data management software, ...)

Technologies

Languages & more: Java 7/8, Python, Scala 2, C, C++, SQL, OCaml, Rust, Coq, GAMS

Languages

French (native), English (proficient), German (notions)