Théophile CABANNES

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PROGRAMMING LANGUAGES: Java, Python, C/C++, OCaml

Website, GitHub, Google Scholar, LinkedIn

RESEARCH EXPERIENCE

AUG 2018 - MAY 2022 — PhD student, EECS, UC Berkeley.

Develop routing behavior control for traffic management with 6 academic publications by working on dynamic traffic assignment, routing game, advanced traffic management systems, Markovian decision process, mean field games and convex optimization in the Mobile Sensing Lab, EECS, ITS, UC Berkeley with Pr. Alexandre M.Bayen.

AUG 2019 - AUG 2022 — Doctorant, LIX, Institut Polytechnique de Paris.

PhD student at Laboratoire d'informatique de l'Ecole Polytechnique (LIX) part of Institute Polytechnique de Paris. Supervised by Pr. Eric Goubault.

AUG 2020 - MAY 2021 — Research intern, Google research and Google Maps.

Develop a socially aware routing algorithm by evaluating marginal cost of routing using fundamental diagram of traffic flow fitted from ground and simulated data. Contribute to more than 6,000 lines of code (in python, C++, protocol buffer, and borg) in the Google code base. Part of the Spacetime team in Google research (mentored by Neha Arora) and the Driving Quality team in Google Maps (mentored by Haizheng Zhang). This contributed to the launch of eco-routing.

AUG 2019 - PRESENT — Project leader, Managing Cut-Through Traffic in the City of Fremont. Mobile Sensing Lab, EECS, ITS, UC Berkeley

Improving traffic in Fremont, CA by leading a project with the public work department of the city of Fremont and the Institute of Transportation Studies (ITS) at UC Berkeley with three Ph.D. students (EECS, CEE), six EECS M.Eng. students and two EECS undergraduate students that aims to create microsimulation traffic model of the Mission San José district and optimize traffic management strategies.

SEP 2017 - MAI 2018 — Lead student. Mobile Sensing Lab, EECS, ITS, UC Berkeley

Supervised a capstone project of five MEng students at UC Berkeley. Modeling and data analysis. Evaluation of the impact of navigational applications on traffic.

APR 2017 - AUG 2017 — Visiting scholar. Mobile Sensing Lab, EECS, ITS, UC Berkeley

Assessed the impact of navigational apps on traffic with two research articles by leading a team of six researchers working on network traffic flows model with game theory in the *Driving Under Influence* group within the *Institute of Transportation Studies* at UC Berkeley. Received the Research Internship Prize from *École Polytechnique* for the work.

Government and Industry Experience

Oct 2021 - Present | Research scientist, Google research.

Quantifying and mitigating the impact of individual vehicle routing on congestion and gas emission by measuring link externality cost and congestion functions.

Sep 2017 - Present | Civil servant under the supervision of the French Department of Transportation (Ministère de l'écologie)

Selected as one of the 3,800 *Ingénieur du Corps des Ponts, des Eaux et des Forets* nationwide, a leading corps of French Civil Servants which includes Jean Tirole, Nobel price in Economic Sciences and Elizabeth Borne, French Secretary of State in charge of Transportation. Developed planning rules for a Local Planning and Development Authority (EPA ORSA).

Apr 2018 - Aug 2018 | Project manager, Hub France IA

Developed the Hub France IA - the "operating system" of the French AI ecosystem - by managing teamwork on mobility, energy and city planning.

Dec 2016 - Jun 2017 | Ghost writer for the former CEO of Air France (French national airline)

Built and managed a team of 5 ghostwriters (including myself) with top-level scientific backgrounds who wrote a book on the Digital Revolution for the French business executive Bernard Attali (former CEO and chairman of Air France).

Jun 2016 - Sep 2016 | Legislative assistant, French Parliament.

Target potential voters for a congressman (former secretary of state in France and Member of the French Parliament) during the French presidential election through development of 15 SQL tables by cross-identifying petition supporters, nonprofit organization donors and political party members. This work helped the congressman to get 500 city mayor and 2500 citizens official supports and to raise funds.

Sep 2014 - Apr 2015 | Cadet Officer, Gendarmerie nationale, Aix-en-Provence

Served as a military officer directly reporting to the Air Transport Gendarmerie (French FBI) South Group commandant. Conduct 23 interviews across 7 organization (including Directorate for Civil Aviation, customs and the border policy) and design an geographical information system to streamlined 6 actions against illegal trafficking using non commercial aviation. Rewarded for my dedication by the air transport Gendarmerie commandant.

Academic service and professional societies memberships

Jan 2020 - Present | Instructor at *GEC*

Instructor of PAST 13: introduction to nonlinear programming. Teach 8 6-weeks long programs with more 100 students (around 15 students per program). Develop the class content (interactive lecture content and homework) using Edstem, Piazza and Gradescope.

Aug 2019 - May 2020 | Graduate Student Instructor at *University of California, Berkeley*

Recipient of the outstanding graduate student instructor (OGSI) award for being the head of the teaching team of 16 teaching assistant (TA) for EECS 127/227A - Optimization Models and Applications in Fall. Discussion TA in Spring. EECS 127/227A is an upper-division undergraduate and introductory graduate class on convex optimization and its applications lectured by Prof. Alexandre Bayen and Pr. Gireeja Ranade with more than 300 students.

Apr 2016 - Present | Member of the *Cercle du Comitium*

A think tank which receives extremely prestigious guests to debate (former Prime Minister, CEOs of Fortune Global 500 companies, journalists, Ambassadors, Ministers). Only 20 members (more than 200 candidates).

Dec 2016 - Fev 2017 | Founder of *Tribunes de l'X*

A student organization focused on debating which gathers students from École polytechnique, HEC, CentraleSupelec (the 3 best French "Grandes Écoles"), and from Paris Saclay university. Organization of conferences for students.
Organized a symposium with top-level French personalities (Ministers, President of the National Academy of Science, CEOs) on the role of sciences in public life.

Oct 2015 - Dec 2016 | Head of *PolitiX*

The student debating organization of *École Polytechnique*. Organizing lecture series - 3 every 2 months with an average audience of 400 students - from top French personalities (CEOs, ministers).
Introduced lectures and organized debates.

Fev 2016 - Fev 2017 | Vice-President of *X-Carrières publiques*

A student organization which sets up meetings between students and *École Polytechnique* alumnis working as civil servants.

Sep 2015 - Apr 2017 | Physics teaching assistant, Lycée Hoche, France

Oral examiner for students preparing French competitive entrance exams.

Education

Aug 2018 - May 2019 | Master of Science in Computer sciences, **UC Berkeley**

Relevant Coursework: Optimization, Linear System, Control, Parallel computing, Entrepreneurship in Engineering.
Master thesis: Capturing the impact of navigational app usage on road traffic from a game theory point of view.

Sep 2017 - Jul 2018 | Master of Science in Urban planning, **ENPC**, France

Government Executive Program, **Corps des Ponts, Eaux et Fôrets**: Leading corps of French Civil Servants. Public Servant under the supervision of the French ministry of Environment, Infrastructure, and Transportation.
Working with *EPA ORSA* (a Local Planning and Development Authority) in the context of the Master of Science at *École des Ponts ParisTech* - a top French "Grande École".

Sep 2014 - Aug 2017 | Master of Science in Applied maths, **École polytechnique**, France

The best French "Grande École" providing elite researchers and industry executives.
Major: Information System Design. Minors: Physics, Economics, Operational Research

Sep 2012 - Jul 2014 | Classes préparatoires Physique Chimie, **Lycée Hoche**, France

Two years of extensive studies for the national competitive exams leading to French "Grandes Ecoles".

Specialized in Mathematics, Physics and Chemistry.

Jun 2012 | Baccalauréat, Série scientifique, **Passy Buzenval**, France

Major in mathematics, with high honours (French equivalent of the A level).

Languages

French: Mother tongue
English: Full professional proficiency
German: Elementary proficiency

Honors & Awards

July 2020 | Recipient of the France Berkeley Fund, **awarded by France Berkeley Fund**
To co-develop joint methods in the field of control/optimization and systems verification in the context of large-scale networks. The project will apply the results to a specific problem in transportation engineering: the impact of traffic information on large scale mobility patterns in urban environments.

May 2020 | Outstanding Graduate Student Instructor, **awarded by UC Berkeley**
For re-structuring the management process for the teaching staff of EECS 127/227AT in Fall to be able to scale-up the number of students enrolled in the class.

Aug 2018 | William Oldham Fellowship
EECS Departmental fellowship for tuition fees remission and stipend.

Aug 2018 | CSCRS Student Road Safety Travel Grant
For presenting my work at the 21st IEEE ITSC

Oct 2017 | Research Internship Prize, **awarded by École polytechnique**
Research Internship Prize for my work during an internship in the Mobile Sensing lab of the EECS department at UC Berkeley.

Dec 2016 | Outstanding Investment Award, **awarded by the Director of Military Training and Behavioral Skills Development, École polytechnique**
"For distinguishing himself through his dedication and commitment to the student body. His attitude has been particularly remarkable as a core member of the Head of association in charge of political and social conference"

Jun 2015 | Médaille de la défense nationale, **awarded by the French Army**
Received in exceptional circumstances: "Active military which has distinguished himself by the quality of his service". Ribbon: "Gendarmerie des Transports aériens".

Jun 2015 | Commendation letter, **from the commandant of the Air Transport Gendarmerie, Gendarmerie nationale**
"For his exemplary dedication, his excellent state of mind and his sense of analysis, Théophile Cabannes has largely contributed to the success of a project that has been presented in different occasions. He has shown in those circumstances social, moral and intellectual skills that deserve to be highlighted."

Academic Publications

7.1 Journal publications

1. Regrets in routing networks: measuring the impact of routing apps in traffic, T. Cabannes, M. Sangiovanni Vincentelli, A. Bayen, *ACM Transactions on Spatial Algorithms and Systems*, Jul 2019.

7.2 Conference publications

Postpone No regret Markovian Dynamic Traffic Assignment, T. Cabannes, H. Dong, E. Goubault, and A.Bayen, *The 8th International Symposium on Dynamic Traffic Assignment*, June 2020.

Postpone Design of counter measures to selfish, uncoordinated routing behavior in networks, D. Zhang, T. Cabannes, Y. Farid, J. Macfarlane and A. Bayen, *The 8th International Symposium on Dynamic Traffic Assignment*, June 2020.

Postpone A Proposed Framework for the Analysis of Selfish Routing, T. Cabannes, J. Lazarus, B. Zhao, J. Li, A. Keimer and A. Bayen, *The 8th International Symposium on Dynamic Traffic Assignment*, June 2020.

1. Learning optimal traffic routing behaviors using Markovian framework in microscopic simulation, T. Cabannes, and al., A. Bayen, *TRB 99th Annual Meeting.*, Jan 2020
2. Sensitivity analysis and relaxation of the Static Traffic Assignment Problem with Capacity Constraints to access the impact of traffic incidents, T. Cabannes, and al., A. Bayen, *IEEE Conference on Decision and Control*, Dec 2019
3. Measuring regret in routing: assessing the impact of increased app usage, T. Cabannes, and al., A. Bayen, (paper 650), *IEEE International Conference on Intelligent Transportation Systems*, Oct 2018.
4. Analysis of the impact of GPS-enabled mobility: a game theoric approach, T. Cabannes, and al., A. Bayen, (paper 18-02304) *TRB 97th Annual Meeting*, Jan 2018.

Relevant Projects

Jan 2017 | Sign language recognition application **(C++)**
Conception and implementation of a sign language recognition application with C++ in a group of 10 people. I was in charge of implementing the detection of the hand and the image processing to feed a neuronal network.

Jan 2017 | Compiler of a Turing complete sub-language of C (no pointers) **(Java)**
Wrote a compiler of C (without pointers) in Java (grammatical analysis, syntax analysis, instruction selection, Register transfer language, Explicit register transfer language, Location transfer language, x84_64, assembly language)

Jun 2016 | Multiplayer Snake game **(Java)**
Designed and implemented a multiplayer version of the Snake game in Java. Communications between server and players use the User Diagram Protocol.

Jan 2016 | Picross solver **(Java)**
Implemented a Picross (a game similar to Sudoku) solver. As solving a Picross is NP-complete, the code uses backtracking, combination and memoization. Under some conditions on the Picross game, the code with backtracking and combination has a polynomial complexity.

More projects are available on `Github`.

Non technical writing

Sep 2017 | "Paris et ses banlieues : une équation impossible", **Cercle du comitium Press**
Political article (*Why suburbs of Paris will always remain landlocked ?*) for a French think tank.

Computer skills

Programming languages C/C++, Java, OCaml, Python, CUDA, Assembly language

Hobbies

2010 - 2016	Soccer
2010 - 2015	Drama club
Other activities	Volunteering, Music
Interests	Sociology, economics, programming, game theory, urban planning