curriculum vitæ of
Sebastian Partarrieu

Passionate about Applied Mathematics, Computer Science,
Neuroscience, Healthcare and intelligent systems

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Education

Sep. 2019 – Jul. 2023 **M.S.** Applied Mathematics and Engineering — Mines ParisTech | part of PSL University

The cycle ingénieur civil of Mines ParisTech is inherently multidisciplinary and one of the most prestigious[1] curriculums in France. Students enter after taking nationwide exams ranking them across scientific and literary disciplines. GPA: 3.88/4.0.

Major subjects: Mathematics, Physics and Computer Science. Specific modules: Stochastic, Integral and Differential Calculus, Optimization, Deep Learning for Image Analysis, Advanced Data Science, Signals Processing, Operations Research applied to the Airline Industry, Databases & Networking, Software Engineering for mobile application development. Miscellaneous: Quantum Physics, Statistical Physics, Microeconomics, Industrial Economics, Sociology.

Sep. 2017 – Jul. 2019 **B.S. equivalent** Mathematics, Physics and Chemistry — Lycée Privé Sainte-Geneviève

Two year multidisciplinary, intense and competitive curriculum in preparation for nationwide exams ranking France's top students[2] for entrance into the top graduate schools. GPA: 3.91/4.0. **National rank for entrance to Mines ParisTech: 13th out of around 7000** undergraduate students with the same majors.

Major subjects include Mathematics, Physics, Chemistry and Computer Science.

Research & Work Experience

Oct. 2021 – Apr. 2022 **Visiting Graduate Assistant** — Cornell University

Advisor: Prof. Dan Landau (Landau lab is part of Weill Cornell Medicine and the New York Genome Center). Projects :

- Data analysis of single-cell multi-omics (scRNA and DNAme) of longitudinal glioma samples to uncover biological mechanisms driving tumor evolution
- Development of a novel liquid biopsy (cfDNA) based CNV detection platform leveraging fragmentomics to uncover minimal residual disease.

Mar. 2021 – Aug. 2021 **Visiting Researcher** — Harvard University

Advisor: Prof. Jia Liu. Projects & soon to be papers :

- Statistic analysis of the stability of mesh electronics Brain-Machine Interface in lifespan recording of behaving mice.
- Self-supervised deep neural networks for multi-modal analysis of single-cell data.
- Performing accurate spatial mapping of neuron location using in-situ electro-sequencing data.

Jul. 2020 – Aug. 2020 **Summer Research Intern** — National Physical Laboratory (NPL)

Advisor: Dr. Jenny Venton.

- Created deep Convolutional Neural Networks (CNNs) for supervised detection of cardiac conditions such as Myocardial Infarction from raw multi-channel electrocardiogram timeseries. Testing was performed on publicly available datasets such as PTB Diagnostic ECG Database or PTB-XL, with a focus on the diagnostic classes. Performance showed average class-wise (macro) AUC of 0.9, matching state-of-the-art.

Nov. 2019 **Data Analyst Intern** — Prüftechnik group | CRC Laboratory Mines ParisTech

- Developed an ML-based predictive maintenance platform for both early warning and health prognostics leveraging wind-turbine accelerometer data demonstrating important cost savings when deployed on real-world test cases.

Projects, Skills & Activities

Projects[3] include:

- Worked with E-Cube to improve the valuation accuracy of Natural Gas (NG) storage facilities. Three complementary python modules can (1) webscrape relevant data , (2) generate scenarios of spot and forward prices of NG markets and (3) solve the optimization problem of optimal buying/selling strategy.
- Using style transfer powered by deep learning (CycleGAN) to create a Virtual Reality (VR) application with Unity plunging the user into the immersive worlds of Van Gogh, Monet, Kirchner and many others...
- Developped a mobile application linking small store owners with nearby customers. Front-end was written using React Native and back-end in Python with the help of Flask, PostgreSQL and other relevant libraries.

[1] Generally ranked #2 or #3 Grande Ecole d'Ingénieur in France whilst PSL ranked 21st worldwide in CWUR 2021
[2] Ranked #1 Classes Préparatoires aux Grandes Ecoles in France
[3] For a complete overview of the different projects: sebastianpartarrieu.github.io and https://github.com/SebastianPartarrieu

Technical skills: Advanced knowledge of Python and it's scientific libraries/deep learning frameworks (pandas, scipy, sklearn, tensorflow, keras, pytorch, ...), Flask, Git. Knowledge of HTML, CSS/Sass, JS and React Native, PostgreSQL, LaTeX, Arduino and C#.

Linguistic skills: French (native), English (native - TOEFL 119/120), Spanish (advanced)

Activities: Tennis, Ski, Philosophy, Writing, Hiking and lots and lots of Reading (non-fiction mostly).

Publications

Authors who contributed equally to a publication are marked by †. Corresponding authors are marked by *.

Journal Publications

1. Siyuan Zhao†, Xin Tang†, **Sebastian Partarrieu**†, Shiqi Guo, Ren Liu, Jaeyong Lee, Zuwan Lin, Jia Liu*. Tracing the single-cell electrophysiology from the same group of neurons over the entire lifespan of adult mice. Manuscript under review.

2. Shiqi Guo†, Siyuan Zhao†, Xin Tang†, Blake Bordelon, **Sebastian Partarrieu**, Jaeyong Lee, Cengiz Pehlevan* and Jia Liu*. A self-programmable and long-term stable brain-machine interface. Manuscript under review.

3. Paul Le Floch†, Siyuan Zhao†, Nicola Molinari, Eder Medina, Junsoo Kim, Hao Sheng, **Sebastian Partarrieu**, Chanan Sessler, Guogao Zhang, Xiao Wang, Katia Bertoldi, Boris Kozinsky, Jia Liu*. Fluorinated elastomers for scalable single-cell brain electrophysiology. Manuscript under review.