Théophile Sautory

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Education

University of California, Berkeley **May 2023**

MS in Mechanical Engineering, *GPA:3.93/4.00.*

Numerical Solution of Differential Equations, Finite Element Method, Physics-Informed Machine Learning.

Imperial College London

MS in Computer Science, Artificial Intelligence & Machine Learning, *GPA:4.00/4.00.* **Sep. 2020**

Deep Learning, Computer Vision, NLP, Robotics, Reinforcement Learning, Mathematics for ML, Statistics.

BSc in Mechanical Engineering, *GPA:4.00/4.00.* **Jun. 2019**

Embedded C, Advanced Control, Mechatronics, Mechanics, System Design Optimisation, Thermofluids.

Work Experience

Arup **Aug. 2023 – current**

Research Engineer *San Francisco, CA*

- Automating microclimate, wind and datacenter thermal control analyses, using CAD and CFD.
- Enhanced urban scale building energy prediction accuracy by 20% using physics-based deep learning models.

Ansys **May. 2022 – Aug. 2022**

Machine Learning Research Intern, CTO Office *San Jose, CA*

- Designed autoencoders and training mechanisms for multi-objective optimization in ML based physics simulations.
- Led the research on merging Ansys Fluent with deep learning for novel PDE solvers with C++ and Python.

Scortex **Sep. 2020 – Apr. 2021**

Machine Learning Engineer *Paris, France*

- Designed and tested deep learning generative models on a prototype production line equipped with cameras.
- Improved the ROC-AUC performance in anomaly detection on images from the production line from 93 to 98% leveraging unsupervised and transfer learning.

Selected Projects

RL from LLM Feedback to Counteract Goal Misgeneralization (Team of 2) **Sep. 2023 – current**

- Trained a reward model with LLM feedback to enhance a maze-solving reinforcement learning (RL) agent.
- Reduced RL agent biases by integrating LLM feedback, contributing insights to the RL research community.

Google Waymo 2D Object Detection (Team of 3) **Apr. 2020 – May 2020**

- Finetuned an EfficientDetd4 model on 700k-1080p images using GCP and an NVIDIA Tesla V100 GPU.
- Implemented test time augmentation, mixed precision training and k-means clustering for anchor priors.

Bionic Hand for Digital Interface Use (Team of 5) **Sep. 2018 – Jun. 2019**

- Designed and manufactured a bionic hand with motor control, using CAD (SolidWorks), 3D printing and Abaqus.
- Analyzed electromyogram signals from a below-elbow amputee to drive motor actuation and collect user feedback.

Embedded C for Microcontrollers (Team of 2) **Sep. 2018 – Dec. 2018**

- Developed a fully autonomous robot programmed in C, to detect, reach and return from, an infrared-emitting device.
- Manually assembled the printed circuit board and implemented PD control for a pulse-width-modulation DC motor.

Technical Skills

Coding: Python, PyTorch, TensorFlow, OpenCV, C/C++, CUDA, MATLAB, Answer Set Programming, Linux, Git, LateX.
Design: CAD (Rhino, Solidworks), FEM / CFD (Abaqus, Fluent, CFX, STAR CCM+).

Selected Publications

[1] Theophile Sautory, Shawn C. Shadden (2024): Unsupervised Denoising and Super-resolution of Vascular Flow Images by Physics-Informed Machine Learning. Journal of Biomechanical Engineering, 1–22. https://doi.org/10.1115/1.4065165

[2] Theophile Sautory, Nuri Cingillioglu, Alessandra Russo (2021): A Hybrid Spatio-Temporal Event Reasoner for Video Question Answering, Thirty-Fifth AAAI Conference on Artificial Intelligence Workshop on Hybrid AI.

[3] Alvaro Prat, Theophile Sautory & S. Navarro-Martinez (2020): A Priori Sub-grid Modelling Using Artificial Neural Networks, International Journal of Computational Fluid Dynamics, DOI: 10.1080/ 10618562.2020.1789116.