# 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*

- Developing physics-based deep learning models to predict urban scale building energy carbon consumption.
- Automating microclimate, wind and datacenter analyses, using CAD (Rhino) and computational fluid dynamics (CFX).

**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**

*Deep Learning and Computer Vision Research Intern*                                                      *Paris, France*

- Designed and tested deep learning models on a prototype production line equipped with cameras to enhance autonomous system cohesiveness, performance and latency.
- Improved the ROC-AUC performance in anomaly detection on images from the production line by 5%, using generative modeling, transfer learning and data augmentation.

## 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. *In Production at:* Journal of Biomechanical Engineering.

[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.