Cyril Picard

Born on March 26, 1990 | AIAA, ACM, ASME, Design Society and IEEE member
Native French and Swiss-German speaker | Proficient in English and German
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EDUCATION

Doctor of Science | Energy | EPFL, Switzerland 06.2016–06.2021
Thesis: *Automated Design: A Journey Across Modelling, Optimization, and Education* (with Prof. Jürg Schiffmann)

Master of Science | Mechanical Engineering | EPFL, Switzerland 09.2013–09.2015
Thesis: *Non-destructive testing imaging system with real-time probe position acquisition* (with Dr. Christophe Salzmann)

Bachelor of Science | Mechanical Engineering | EPFL, Switzerland 09.2010–07.2013
Bachelor project: Automated Foosball system to outperform a human player (youtu.be/QQS0415YYW4, in French).

Primary, secondary, and high-school education in Geneva, Switzerland, and one semester abroad at the French American International School, San Francisco, CA, USA.

RESEARCH & PROFESSIONAL EXPERIENCE

Research Scientist | DeCoDE (Prof. Faez Ahmed), MIT, USA 02.2024–present
Leading the design effort of a multidisciplinary team from MIT, Lehigh, and CMU within the DARPA Multiobjective Engineering and Testing of Alloy Structures program. Coordinating a team of two PhD students and three postdocs to develop a design tool for multi-material turbines for propulsion applications, connecting simulated material properties to finite element analysis (FEA) to generative AI models. Development of a new surrogate modeling approach and guided diffusion models to suggest material distributions considering multiple objectives. Working with suppliers and the MIT Office of Research Computing and Data to coordinate and negotiate the purchase of high-power computing machines with H100 GPUs (more than $500,000). Organization of the workshop "From Data to Design" at the International Design Engineering Technical Conferences 2024 in Washington, D.C., for more than 50 participants. Guest Editor for the special issue, "Design By Data," for the ASME Journal of Mechanical Design. Mentoring graduate students and supervising undergraduate students.

Postdoctoral Fellow | DeCoDE (Prof. Faez Ahmed), MIT, USA 09.2022–02.2024
Swiss National Science Foundation fellowship: "AIDO: AI-enhanced design optimization" to work on enabling fast and accessible engineering tools by bridging machine learning and optimization. Development and evaluation of foundation models—generic models trained once, applicable to any task—to speed up optimization. Assessment of the readiness of vision language models to support the design process. Coordinating the lab meetings and the IT purchases for the lab. Organization of the workshop "From Data to Design" for more than 100 participants at the International Design Engineering Technical Conferences 2023 in Boston, MA. Mentoring graduate students and supervising undergraduate students.

Postdoctoral Researcher | EDAC (Prof. Kristina Shea), ETH Zürich, Switzerland 08.2021–08.2022
One-year project to transform the CAD & Technical Drawing course into a refreshed Engineering Design and Material Selection course to provide the students with a more consistent learning experience. Development of a 3D visualization tool for Moodle. Development of hands-on labs in design and material selection, including a low-cost 3-point bending machine (40 units produced). A special focus was given to ensure that the course is attractive to female student. Setting up a longitudinal study (RoADS) with the department of psychology to observe the sense of belonging and academic outcome in first-year students (data acquisition ongoing). Following the work and advising of doctoral and Master students.

Doctoral Assistant | LAMD (Prof. Jürg Schiffmann), EPFL, Switzerland 06.2016–06.2021
Investigation of system-level modeling methods and multiobjective optimization algorithms to automate the design of automotive actuators (InnoSuisse in collaboration with Johnson Electric). Evaluation of the learning of professional skills by students and their use of optimization tools with the Teaching Support Center (CAPE, Dr. Tormey and Dr. Hardebolle). Preparation of the application for the Ethical Committee for that study (HREC 046-2018). Purchasing computers and managing a lab cluster. Multiple teaching duties, including student supervision, and creation and grading of projects.

Board Member | President (2017-2019) | «terragir, énergie solidaire», Meyrin, Switzerland 06.2012–06.2019
Supervised the operations and strategy of the nonprofit organization focused on creating awareness among children about sustainable development (terragir.ch, yearly turnover of about CHF 500'000). Close collaboration with employees and other board members. In charge of the recruitment of a new executive director in 2016. In 2019, initiated and led the transition to horizontal management to become more centered around projects and to better support its needs in general.

Research Assistant | iHomeLab, Lucerne, Switzerland 12.2015–05.2016

Active on research projects in the field of energy efficiency and building intelligence: Design of control strategies to reduce energy consumption and promote load shifting (network stabilization) in service buildings and individual homes. Development of an optimal control strategy coupling a heuristic search algorithm and a Simulink model.

R&D Engineer (Master thesis) | Sensima Inspection, Gland, Switzerland 02.2015–10.2015

Design of an innovative product to simplify the detection of defects in metal parts by delivering real-time 3D views of eddy-current measurements. Integration of a positioning system into existing company hardware and software to collect. Product demonstration and discussion with potential clients at the ASNT Annual Conference (Salt Lake City, UT).

Initiator and Project Leader | Startup project: CushEar 02.2013–12.2013

Development of a prototype of smart earplugs and of the associated business cases. Management of a team of five.

Project Manager (during civil service) | «terragir, énergie solidaire», Meyrin, Switzerland 10.2009–03.2010

Manager of the *Robin des Watts* project: awareness lessons for children on energy savings and sustainable development. Design of specific training tools for teachers. Close collaboration with public administration in Geneva.

Intern | Swiss Institute of Bioinformatics (SIB), Lausanne, Switzerland 05.2007–06.2007

Development of a web app to store, analyze and visualize genomic data, in collaboration with the University of Basel.

TEACHING ACTIVITIES

Mentor | Artificial Intelligence and Machine Learning for Engineering Design (Prof. Ahmed) **| MIT** 2021–2023

Answering questions from students and coaching groups of students working on machine learning approaches for mechanical design problems as part of their assignments for the class (2.s997 and 2.155/2.156). Grading posters.

Substitute Lecturer | Product Development and Engineering Design (Prof. Shea) **| ETH Zürich** Spring 2022

Substitute lecturer for one lecture of Product Development and Engineering Design (~80 students) about the concept selection phase of the design process.

Substitute Lecturer | CAD and Technical Drawing (CAD&TZ, Prof. Shea) **| ETH Zürich** Fall 2021

Substitute lecturer for one lecture of CAD&TZ (~550 students). Preparing and coordinating exercise sessions throughout the semester. Participating in teaching this course allowed me to understand the challenges, providing insights into changes as the course transitioned to Engineering Design and Material Selection.

Lead Teaching Assistant | Applied Mechanical Design (Prof. Schiffmann) **| EPFL** Fall 2016–2020

Yearly selection of a design topic for the class and preparation of the material for students (~30). Lecturing modules on project management and design optimization. Mentoring groups (two per year) of students and grading their reports. Coordinating the work of the other teaching assistants.

Lead teaching assistant | Mechanical Systems (Prof. Schiffmann) **| EPFL** Spring 2017–2019

Creating exercises and mentoring students during exercise sessions (~200 students). Creating a new in-course project, including material for students, the grading sheets and a semi-automated grading script. Occasional lecturing. Grading of projects and exams.

SUPERVISION OF JUNIOR RESEARCHERS

Mentoring of graduate students at ETH Zürich (Joël Chappuis and Andreas Walker) and MIT (Noah Bagazinski, Kristen M. Edwards, Rosen Yu, Lyle Regenwetter and Janet Qian).

UROPS Undergraduate Research Opportunities Program at MIT

- Kailey Epstein, Building a Python Benchmark Library for Engineering Bayesian Optimization (09.2024–01.2025)
- Samiksha Singh, Building a Live Demo Website for Engineering Bayesian Optimization (09.2024–12.2024)
- Nicholas Cerone, *Design and Fabrication of a Small Jet Pump System to Test AI-Generated Hulls* (02.2023–08.2023)

Master theses at EPFL

- Eugène Lemaitre, *Actuator Synthesis and Optimization: Evaluation of Graph-Based Approaches* (02.2020–07.2020)
- Guillaume Spaeth, *Automated Design Tools for Electro-mechanical Actuators* (09.2019–01.2020)
- Soheyl Massoudi, *Integrated Robust Design of High-Speed Compressor Mounted on Herringbone Grooved Journal Bearings* (09.2019–01.2020)

AWARDS AND FELLOWSHIPS

- Swiss National Science Foundation Postdoc.mobility Fellowship (P500PT_206937, 2022-2024)
- 2018 ASME Turbo Expo Best Paper Award (GT2018-76349)
- 2017 SIEGVO Summer School Best Assignment Award

- Bombardier Award given to the highest-performing student during M.Sc. in Mechanical Engineering (10.2015)
- venture kick: Stage 1 kick-off funding for potential entrepreneurs (10.2013)
- EPFL Excellence Fellowship for outstanding academic records during B.Sc. (2013–2015)
- Prix Marc Birkigt for best grades in mathematics and physics in high-school (06.2009)

SERVICE TO THE COMMUNITY

Conferences

- Session coordinator at the International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (October 2023 – present)
- Session chair at the International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, August 2023, Boston, MA, USA.

Guest Editor

- Special Issue: "Design by Data: Cultivating Datasets for Engineering Design," at the ASME Journal of Mechanical Design (Call ended in July 2024, coordinated the review of four articles)

Reviewer for

- ASME Journal of Mechanical Design
- ASME IDETC Conference
- IEEE Transactions on Evolutionary Computing
- European Journal of Engineering Education
- International Conference on Engineering Design
- Applied Energy
- Journal of Heuristics
- Evolutionary Computation Journal
- IEEE CEC Conference

WHEN OFF-DUTY

- Former volunteer at Verein VoCHabular, Zürich, Switzerland for the development of an App to learn Swiss-German
- Walking, climbing, sledging, or skiing in the mountains
- Convinced bicycle rider for transportation or vacations
- Amateur violin and viola player (symphony orchestra or chamber music)

PUBLICATIONS

In Preparation

- **C. Picard**, L. Regenwetter, A. Heyrani Nobari, G. Giannone, A. Srivastava, and F. Ahmed "Generative Optimization: A Perspective on AI-Enhanced Problem Solving in Engineering." To be submitted by end of December 2024.
- A. Heyrani Nobari, L. Regenwetter, Q. Chen, **C. Picard**, and F. Ahmed "TOP-EDGE: Topology Optimization in Python for Efficient Dataset Generation of Single and Multimaterial 3D Structures." To be submitted by end of December 2024.

Preprints Articles

- **C. Picard***, K. M. Edwards*, A. C. Doris, B. Man, G. Giannone, Md F. Alam, and F. Ahmed (2024) "From Concept to Manufacturing: Evaluating Vision-Language Models for Engineering Design," arXiv:2311.12668. Under review at Artificial Intelligence Review.
- R. Yu, **C. Picard** and F. Ahmed (2024) "Fast and Accurate Bayesian Optimization with Pre-trained Transformers for Constrained Engineering Problems," arXiv:2404.04495. Under review at Structural and Multidisciplinary Optimization.

Journal Articles

- S. Massoudi, **C. Picard**, and J. Schiffmann, (2024). "An Integrated Approach to Designing Robust Gas-Bearing Supported Turbocompressors Through Surrogate Modeling and Constrained All-At-Once Multi-Objective Optimization." ASME Journal of Mechanical Design. doi: 10.1115/1.4065823
- **C. Picard** and F. Ahmed (2024) "Untrained and Unmatched: Fast and Accurate Zero-Training Classification for Tabular Engineering Data," ASME Journal of Mechanical Design. doi: 10.1115/1.4064811
- S. Massoudi, **C. Picard**, and J. Schiffmann (2022) "Robust Design Using Multi-Objective Optimisation and Artificial Neural Networks with Application to a Heat Pump Radial Compressor," *Design Science*, doi: 10.1017/dsj.2021.25.
- **C. Picard***, C. Hardebolle*, R. Tormey, and J. Schiffmann (2022) "Which professional skills do students learn in engineering team-based projects?," *European Journal of Engineering Education*, doi: 10.1080/03043797.2021.1920890.
- **C. Picard** and J. Schiffmann (2021) "Realistic Constrained Multiobjective Optimization Benchmark Problems From Design," *IEEE Transactions on Evolutionary Computation*, doi: 10.1109/TEVC.2020.3020046.
- V. Mounier, **C. Picard**, and J. Schiffmann (2018) "Data-Driven Predesign Tool for Small-Scale Centrifugal Compressor in

Refrigeration," *Journal of Engineering for Gas Turbines and Power*, doi: 10.1115/1.4040845.

- E. Birrer, **C. Picard**, P. Huber, D. Bolliger, and A. Klapproth (2017) "Demand response optimized heat pump control for service sector buildings," *Computer Science - Research and Development*, doi: 10.1007/s00450-016-0320-9.
- N. Mathimaran, L. Falquet, K. Ineichen, **C. Picard**, D. Redecker, T. Boller, and A. Wiemken (2008) "Microsatellites for disentangling underground networks: Strain-specific identification of Glomus intraradices, an arbuscular mycorrhizal fungus," *Fungal Genetics and Biology*, doi: 10.1016/j.fgb.2008.02.009.
- N. Mathimaran, L. Falquet, K. Ineichen, **C. Picard**, D. Redecker, A. Wiemken, and T. Boller (2008) "Unexpected Vagaries of Microsatellite Loci in Glomus Intraradices: Length Polymorphisms Are Rarely Caused by Variation in Repeat Number Only," *New Phytologist*, doi: 10.2307/25150607.
- **C. Picard** and D. Picard (2004) "A web application to manage a database for liquid nitrogen tanks," *Immunology and Cell Biology*, doi: 10.1046/j.1440-1711.2004.01232.x.

Peer-Reviewed Conference Proceedings

- R. Yu, **C. Picard**, and F. Ahmed (2024) "High-Dimensional Bayesian Optimization with Pre-trained Transformers and Least Volume Autoencoders," *Proceedings of the 2024 International and National Conference on Multidisciplinary Design, Analysis, and Optimization*.
- **C. Picard**, J. Schiffmann, and F. Ahmed (2023) "DATED: Guidelines for Creating Synthetic Datasets for Engineering Design Applications," *Proceedings of the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference.*
- S. Massoudi, **C. Picard**, and J. Schiffmann (2023) "An Integrated Approach to Designing Robust Turbocompressors on Gas Bearings Through Surrogate Modeling and Constrained Multi-Objective Optimization," *Proceedings of the ASME 2023 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference.*
- **C. Picard** and J. Schiffmann (2020) "Automated Design Tool for Automotive Control Actuators," *Proceedings of the ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Volume 11B: 46th Design Automation Conference (DAC), doi: 10.1115/DETC2020-22390.
- **C. Picard** and J. Schiffmann (2018) "Impacts of Constraints and Constraint Handling Strategies for Multi-objective Mechanical Design Problems," *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO '18)*, doi: 10.1145/3205455.3205526.
- V. Mounier, **C. Picard**, and J. Schiffmann (2018) "Data-Driven Pre-Design Tool for Small Scale Centrifugal Compressors in Refrigeration," *Proceedings of the ASME Turbo Expo 2018: Turbomachinery Technical Conference and Exposition*, Volume 8: Microturbines, Turbochargers, and Small Turbomachines; Steam Turbines, doi: 10.1115/GT2018-76349.

Invited Talks and Oral Presentations at Conferences

- "Generative AI Design of Multi-Material Rotos for High-Performance Propulsion Applications," at the World Congress on Computational Mechanics, July 2024, Vancouver, Canada.
- "From Concept to Manufacturing: Evaluating Vision-Language Models For Engineering Design," at the AutoDesk Research Connections Speaker Series, February 2024, online.
- "How Can Students Use ChatGPT and GitHub Copilot to Solve MATLAB Exercises?," at the *MIT LLM-MechE Tutorial*, December 2023, Cambridge, MA, USA.
- "(GPT-4)Vision for Mechanical Engineering," at the *MIT Graphics Seminar (CSAIL)*, November 2023, Cambridge, MA, USA.
- "SEFI@Work: The Social Dimension of Engineering: Outcomes, Skills, and Resistance," *Webinar of the European Society of Engineering Education*, June 2023, online.
- "Realistic Constrained Multiobjective Optimization Benchmark Problems From Design," Hot-off-the-press, at *the Genetic and Evolutionary Computation Conference (GECCO '21)*, July 2021, online.
- "Which professional skills do students learn in engineering team-based projects?," *EPFL coffee&learn*, May 2021, online.
- "Assessing Student Learning of Design and Project Management Skills in a Project-Based Course," at *the Swiss Faculty Development Network Conference*, Feb. 2019, Zürich, Switzerland.

Datasets

- **C. Picard** and F. Ahmed (2024), "Engineering Design Benchmark Problems for Classification Algorithms." Harvard Dataverse. doi: 10.7910/DVN/ZRHXNY
- **C. Picard**, K. M. Edwards, A. C. Doris, B. Man, G. Giannone, Md F. Alam, and F. Ahmed (2024), "Data for Evaluating Vision-Language Models for Engineering Design." Harvard Dataverse. doi: 10.7910/DVN/FLHZQE
- **C. Picard** (2023), "MechE Rotation Test." ETH Zurich. doi: 10.3929/ethz-b-000642773.

- **C. Picard**, J. Schiffmann, and F. Ahmed (2023), "DATED: A Dataset of Centrifugal Compressors". Zenodo. doi: 10.5281/zenodo.8200792.
- **C. Picard** and J. Schiffmann (2020), "Multi-Objective Design of Actuators: Pareto fronts". Zenodo. doi: 10.5281/zenodo.3824302.

Technical Reports

- **C. Picard** (2016) "Unobtrusive Energy Use Feedback: Review and Design Rules," iHomeLab, Hochschule Luzern T&A, SCCER Report, available upon request.