Cyril Picard

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EDUCATION

Doctor of Science (Dr sc.) | Energy | EPFL, Switzerland — 06.2016–06.2021

Thesis: *Automated Design: A Journey Across Modelling, Optimization, and Education* (2021-06-25)
Supervisor: Prof. Jürg Schiffmann

Master of Science (M.Sc.) | Mechanical Engineering (Focus: Controls) | EPFL, Switzerland — 09.2013–09.2015

Thesis*: Non-destructive testing imaging system with real-time probe position acquisition*
Supervisor: Dr. Christophe Salzmann

Bachelor of Science (B.Sc.) | Mechanical Engineering | EPFL, Switzerland — 09.2010–07.2013

Bachelor project: Automated Foosball system to outperform a human player (youtu.be/QQS0415YYW4).

Primary, secondary, and high-school education in Geneva, Switzerland
One semester abroad during 9th grade at the French American International School, San Francisco, CA, USA

RESEARCH & PROFESSIONAL EXPERIENCE

Postdoctoral fellow | DeCoDE (Prof. Faez Ahmed), **MIT**, USA — 09.2022–present

Research funded by my own grant from the Swiss National Science Foundation: "AIDO: AI-enhanced design optimization". The work focuses on enabling fast and accessible engineering by bridging two different fields: machine learning and optimization. Development and evaluation of foundation models applicable across many engineering domains. Evaluation of the readiness of multi-modal language models to support the design process. Organization of the workshop "From Data to Design" at IDETC 2023 for more than 100 participants. Guest Editor for a special issue on datasets for the ASME Journal of Mechanical Design. Mentoring and supervision of graduate and undergraduate students.

Postdoctoral researcher | EDAC (Prof. Kristina Shea), **ETH Zürich**, Switzerland — 08.2021–08.2022

One-year project to add hands-on labs in design and material selection to an existing first-semester course, and to provide the students with a more consistent learning experience. Development of a 3D visualization tool for Moodle and a low-cost 3-point-bending machine. A special focus was given to ensure that the course is attractive to female students. 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 Ph.D. 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 (collaboration with Johnson Electric). Evaluation of the learning of professional skills by students and their use of optimization tools. Preparation of the application for the Ethical Committee for that study (HREC 046-2018). Diverse 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 the 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 (during civil service) | 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 Fall 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).

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. This allowed me to understand the current course and helped me redesign it (becoming 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

Master theses at EPFL, Switzerland

- 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)

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

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. (10.2015)
- venture kick: Stage 1 kick-off funding for potential entrepreneurs (10.2013)
- *EPFL Excellence Fellowship* (2013–2015) for outstanding academic records during B.Sc.
- Prix Marc Birkigt for best grades in mathematics and physics in high-school (06.2009)

PUBLICATIONS

Journal articles

- **C. Picard***, K. M. Edwards*, A. C. Doris, B. Man, G. Giannone, F. Alam, and F. Ahmed (2023) "From Concept to Manufacturing: Evaluating Vision-Language Models for Engineering Design," Submitted to the *ASME Journal of Mechanical Design*, and available on arXiv: 2311.12668. Dataset: https://decode.mit.edu/projects/vlms4design/.
- **C. Picard** and F. Ahmed (2023) "Untrained and Unmatched: Fast and Accurate Zero-Training Classification for Tabular Engineering Data," Submitted to the *ASME Journal of Mechanical Design* and available on arXiv.
- 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. Dataset: 10.5281/zenodo.3824302.
- 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

- **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*, doi: 10.1115/DETC2023-111609. Dataset: 10.5281/zenodo.8200792.
- 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*, doi: 10.1115/DETC2023-115201.
- **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.

Oral presentations at conferences and Invited Talks

- "How Can Students Use ChatGPT and GitHub Copilot to Solve MATLAB Exercises?," MIT LLM-MechE Tutorial, December 2023.
- "(GPT-4)Vision for Mechanical Engineering," MIT Graphics Seminar (CSAIL), November 2023.
- "SEFI@Work: The Social Dimension of Engineering: Outcomes, Skills, and Resistance," Webinar, 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.

Technical Reports

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

SERVICE TO THE PROFESSION

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 opening in January 2024)

Reviewer for

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

REFERENCES

- Prof. Faez Ahmed | DeCoDE, MIT, Cambridge, MA, USA | faez@mit.edu
- Dr. Akash Srivastava | MIT-IBM Lab, IBM, Cambridge, MA, USA | akash.srivastava@ibm.com
- Prof. Kristina Shea | EDAC laboratory, ETH Zürich, Switzerland | kshea@ethz.ch
- Prof. Jürg Schiffmann | LAMD, EPFL, Switzerland | jurg.schiffmann@epfl.ch
- Prof. Carlos A. Coello Coello | CINVESTAV IPN, Mexico, Mexico | carlos.coellocoello@cinvestav.mx