

Gabriel Arpino

CONTACT INFORMATION garpino@student.ethz.ch Zürich, Switzerland
<https://gabrielarpino.github.io>

EDUCATION **ETH Zürich, Switzerland**
M.Sc. in Electrical Engineering and Information Technology, 2019 — present

- M.Sc. Thesis on the computational hardness of sparse estimation — advised by Prof. Afonso Bandeira (start: February 2021)

University of Toronto, Canada
B.A.Sc. in Engineering Science (with Honours), 2014 — 2019

- B.A.Sc. Thesis: “*Tightening PAC-Bayes Bounds using Data-Dependent Priors*” — advised by Prof. Daniel Roy

RESEARCH INTERESTS High-dimensional statistics, signal processing, information theory, mathematical optimization, machine learning theory, statistical physics.

PUBLICATIONS ¹ ***Gabriel Arpino**, *Nicolo Grometto, Afonso Bandeira (2020). “Group Testing in the High Dilution Regime”. *ISIT 2021*. <https://arxiv.org/abs/2102.01200>.

Gabriel Arpino, Howard Shih, Wessel Bruinsma, Eric Perim (2020). “Gaussian Processes for Probabilistic Electricity Price Forecasting”. In preparation.

Gintare Karolina Dziugaite, Kyle Hsu, Waseem Gharbieh, **Gabriel Arpino**, Daniel M. Roy (2020). “On the role of data in PAC-Bayes bounds”. *AISTATS 2021*.

Gintare Karolina Dziugaite, **Gabriel Arpino**, and Daniel Roy (2018). “Towards generalization guarantees for SGD: Data-dependent PAC-Bayes priors”. *2018 Neural Information Processing Systems (NeurIPS) Workshop on Bayesian Deep Learning*.

Gabriel Arpino, Kyle Morris, Sasanka Nagavalli, Katia Sycara (2018). “Using Information Invariants to Compare Swarm Algorithms and General Multi-Robot Algorithms”. *2018 IEEE International Conference on Robotics and Automation (ICRA)*.

Kyle Morris, **Gabriel Arpino**, Sasanka Nagavalli, Katia Sycara (2017). “Full Stack Swarm Architecture”. *RISS Working Papers Journal 2017* 5, pp.118-125.

Johnathon N. Caguiat, **Gabriel Arpino**, Sally G. Krigstin, Donald W. Kirk, Charles Q. Jia (2018). “Dependence of supercapacitor performance on macro-structure of monolithic biochar electrodes”. *Biomass and Bioenergy* 118, pp.126-132. ISSN: 0961-9534. DOI: <https://doi.org/10.1016/j.biombioe.2018.08.017>.

AWARDS

- Scholarship to join the Intelligent Co-ordination and Logistics Lab as part of the Robotics Institute Summer Scholars (RISS) program
- Engineering Science 2017 Exceptional Opportunities Fellowship to conduct research at Carnegie Mellon University
- University of Toronto 2017 Scholar Award for academic performance
- Technion International 2016 Summer Research Bursary to conduct research at the Technion - Israel Institute of Technology
- Engineering Science 2015 ESROP Fellowship to conduct undergraduate summer research at the Green Technology Laboratory - University of Toronto

¹* denotes equal contribution

RESEARCH
EXPERIENCE

Math and Data Zürich, ETH Zürich

Researcher, January 2020 — present

- Completed a collaborative semester project on the topic of *noisy group testing* under the supervision of Prof. Afonso Bandeira
- Formulated novel research questions as part of working groups on deep learning and graph optimization, as well as attended regular group meetings including the MAD+ seminar on topics related to data science

Invenia Labs

Junior Researcher, September 2017 — September 2018

- Led the development of gaussian process models for performing statistical inference on over 10 gigabytes of electricity market data, offering a training speedup of over 50% over previous models
- Composed statistical kernels for gaussian process forecasting in the electricity market, resulting in forecast accuracies beating the state of the art

Robotics Institute, Carnegie Mellon University

RISS Researcher, May 2017 — September 2017

- Led a team of researchers through the development of a paper on information invariants in multi-agent robotic systems, accepted as a conference paper to ICRA 2018, supervised by Prof. Katia Sycara
- Developed a novel full-stack swarm robot control architecture implemented and tested on ROS, leading to the publication of a paper at the RISS 2017 Working Papers Journal and achieving over 95% reproduction accuracy on real-world simulations

CEAR Lab, Technion - Israel Institute of Technology

Researcher, May 2016 — September 2016

- Implemented 3D SLAM localization algorithms in C++ onto Clearpath Field Robots, resulting in the creation of accurate point cloud representations of 100m² orchards, supervised by Prof. Amir Degani
- Refined robotic vision algorithms in C++ and Python using ROS and PCL for orchard tree identification, resulting in robust code that identified 90% of orchard tree clusters

Green Technology Laboratory, University of Toronto

Researcher, March 2015 — September 2015

- Developed procedures for the performance testing of biochar supercapacitors, leading to a Biomass and Bioenergy Journal publication supervised by Prof. Charles Q. Jia

INVITED TALKS

- *Dilution Group Testing: Novel Bounds via Practical Decoders*, Professor Helmut Bölcskei's lab seminar, ETH Zürich. June 2020.
- *Noisy Group Testing: Achievable Rates*, Professor Afonso Bandeira's lab seminar, ETH Zürich. April 2020.
- *Information Invariants in Multi-Agent Robotics*, Invenia Labs internal conference in Winnipeg, Canada. October 2018.

GRADUATE
COURSES

Fundamentals of Mathematical Statistics, Information Theory I, Functional Analysis I, Advanced Machine Learning, Computational Complexity and Computability, Random Processes, Measure and Integration, Linear Control Theory, Mathematics of Information, Empirical Process Theory, Mathematical Optimization, Probability Theory, Neural Network Theory

LANGUAGES

- Portuguese, English, Italian, French, Spanish
- C++, Python, Julia, MATLAB, Verilog

EXTRA
CURRICULAR

Jazz Musician and leader, having performed and led bands at the professional level on upright and electric bass in venues such as *The Rex* in Toronto, *Hot Numbers* in Cambridge, UK, *Moods* and *Lebewohlfabrik* in Zürich