Ilia Shilov

Postdoctoral Researcher · Automatic Control Laboratory (IfA), ETH Zürich

Zürich, Switzerland

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Experience

ETH Zürich, Automatic Control Laboratory (IfA) & NCCR Automation — *Zürich, Switzerland*

Postdoctoral Researcher — *2024 - Present*

- Lead of the **welfarist control** research direction (group of Prof. Saverio Bolognani): social choice theory for multi-agent control, coordinating PhD students and collaborators at ETH, MIT and UZH.
- **Autonomous-vehicle policy, City of Zürich (Dec 2025 - present):** initiated the collaboration with the city's Head of Road Safety; led a preliminary study and now a team of four researchers using the city's digital twin and traffic simulations.
- **Fair PV curtailment, Walenstadt pilot (2025 - present):** lead author of the two underlying papers; lead an interdisciplinary team (Grid2050, University of Basel) running surveys and stakeholder interviews on fair curtailment rules, in a pilot with Swiss DSOs.
- Teaching assistant for *Linear System Theory*, *Game Theory*, and *Advanced Topics in Control*; supervision of master projects and a bachelor thesis.
- Service: co-organizer of CLOCK 2025, organizer of the NCCR Automation Theme 2.1 workshop, member of the ETH Postdoc Sounding Board.

École Normale Supérieure (PSL) / Inria Paris / VITO — *Paris, France & Genk, Belgium*

Doctoral Researcher — *November 2019 - October 2023*

- Developed game-theoretic models for decentralized electricity markets with prosumers: generalized Nash equilibria under grid constraints, risk aversion and financial hedging, privacy and information structures, and forecast markets coupled with peer-to-peer trading.
- **Consultancy for the EU H2020 EUniversal project (Task 5.3, VITO), Oct 2021 - Nov 2022:** designed and implemented a peer-to-peer electricity-trading model with coupling constraints, part of a project deliverable.

EDF (Électricité de France) & Université Paris-Dauphine — *Paris, France*

Research Intern, R&D Department — *April 2019 - October 2019*

- Designed an energy-matching platform between renewable producers and consumers with a truthful auction mechanism, tested on EDF data. Supervisors: **C. Alasseur, R. Laraki, L. Gourvès, O. Beaude**.

Saint Petersburg State University, Department of Probability and Statistics — *Saint Petersburg, Russia*

Research Intern — *November 2017 - June 2018*

- Designed and implemented statistical normality tests.

Education

École Normale Supérieure (Université Paris Sciences et Lettres) — *Paris, France*

Ph.D. in Computer Science — *January 2020 - September 2023*

- Thesis: **Game-Theoretic Approaches for Peer-to-Peer Energy Trading**; joint Ph.D. between ENS Paris, Inria Paris, and VITO (Mol, Belgium)
- Supervised by **Ana Bušić, Hélène Le Cadre, Anibal Sanjab**

Université Paris-Saclay (Paris-Sud) — *Paris, France*

M.Sc. in Optimization — *September 2018 - September 2019*

- Thesis: **Designing Contracts and Matching Platforms for Green Energy**; Excellence Scholarship of the Fondation Mathématiques Jacques Hadamard

Saint Petersburg State University — *Saint Petersburg, Russia*

M.Sc. in Probability and Statistics — *September 2016 - July 2018*

Saint Petersburg State University — *Saint Petersburg, Russia*

B.Sc. in Mechanics and Mathematical Modelling — *September 2012 - July 2016*

Publications and Preprints

2026	**I. Shilov**, E. Elokda, S. Hall, H. H. Nax, S. Bolognani, **"Welfare and Cost Aggregation for Multi-Agent Control: When to Choose Which Social Cost Function, and Why?"**, *IEEE Open Journal of Control Systems*, 2026, doi:10.1109/OJCSYS.2026.3653649	*[P15]*
2026	**I. Shilov**, H. H. Nax, S. Bolognani, **"Invariant Price of Anarchy and Multiplicative Smoothness"**, *Proceedings of the IEEE Conference on Decision and Control (CDC) 2026*, arXiv:2606.11397	*[P14]*
2026	**I. Shilov**, M. He, H. H. Nax, E. Frazzoli, G. Zardini, S. Bolognani, **"Invariant Price of Anarchy: a Metric for Welfarist Traffic Control"**, *Proceedings of the IFAC World Congress 2026*, arXiv:2512.05843	*[P13]*
2026	S. Ionescu, **I. Shilov**, F. Dörfler, **"Comparability for Recommendation Model Evaluation and Selection from a Multi-Stakeholder Perspective"**, *Proceedings of the 20th ACM Conference on Recommender Systems (RecSys 2026)*, pp. 664–669	*[P12]*

2026	J. G. Matt, **I. Shilov**, S. Bolognani, **"A Welfarist Perspective on Fair Generation Curtailment"**, *IEEE PowerUp 2026*, arXiv:2605.03860; journal extension in preparation for *IEEE Transactions on Smart Grid*	*[P11]*
2026	S. Hall, K. Zhang, **I. Shilov**, H. H. Nax, S. Bolognani, **"Welfarist Control Design: How to Fulfill the Societal Mandate in Multi-Agent Control?"**, submitted to *IEEE Control Systems Magazine*, arXiv:2606.23931	*[P10]*
2026	**I. Shilov**, S. Bolognani et al., **"Fair With Respect to Whose Utility? Consistency of Welfare Proxies in Welfarist Control"**, in preparation	*[P9]*
2026	**I. Shilov**, H. H. Nax, S. Bolognani, **"Invariant Price of Anarchy and Multiplicative Smoothness"** (journal version), in preparation for *IEEE Transactions on Automatic Control*	*[P8]*
2024	**I. Shilov**, H. Le Cadre, A. Bušić, A. Sanjab, P. Pinson, **"Forecast Trading as a Means to Reach Social Optimum on a Peer-to-Peer Market"**, *Network Games, Artificial Intelligence, Control and Optimization (NETGCOOP 2024)*, Lecture Notes in Computer Science, vol. 15185, Springer, doi:10.1007/978-3-031-78600-6_11	*[P7]*
2023	**I. Shilov**, **"Game-Theoretic Approaches for Peer-to-Peer Energy Trading"**, Ph.D. thesis, École Normale Supérieure, PSL University, theses.hal.science/tel-04371365	*[P6]*
2023	**I. Shilov**, H. Le Cadre, A. Bušić, A. Sanjab, P. Pinson, **"Towards Forecast Markets For Enhanced Peer-to-Peer Electricity Trading"**, *Proceedings of IEEE SmartGridComm 2023*, Glasgow, UK, doi:10.1109/SmartGridComm57358.2023.10333930	*[P5]*
2022	**I. Shilov**, H. Le Cadre, A. Bušić, A. Sanjab, **"A Stackelberg Game Analysis of Risk-Hedging Strategies in Decentralized Electricity Markets"**, preprint, HAL hal-03674562	*[P4]*
2021	**I. Shilov**, H. Le Cadre, A. Bušić, **"A Generalized Nash Equilibrium Analysis of the Interaction Between a Peer-to-Peer Financial Market and the Distribution Grid"**, *Proceedings of IEEE SmartGridComm 2021*, Aachen, Germany, IEEE Xplore 9632331	*[P3]*
2021	**I. Shilov**, H. Le Cadre, A. Bušić, **"Privacy Impact on Generalized Nash Equilibrium in Peer-to-Peer Electricity Market"**, *Operations Research Letters*, Elsevier, 49(5), pp. 759–766, 2021, arXiv:2101.06922	*[P2]*
2020	**I. Shilov**, H. Le Cadre, A. Bušić, **"Risk-Averse Equilibrium Analysis and Computation"**, preprint, arXiv:2004.02470	*[P1]*

Invited Talks, Panels and Presentations

2025 - 2026	Invited panels, IEA Wind Task 43 / WeDoWind International Symposium, *"Ethics of Digitalisation and AI"*, Rapperswil (2026); UZH Digital Society Initiative, *"Perspectives on Autonomous Driving"* (2025); ETH Debate Club & NCCR Automation, *"Should Autonomous Vehicles Be Widely Adopted?"* (2025)
2021 - 2025	Invited talks, *"Welfarist Control"*, IfA Seminar, ETH Zürich (2025); *"Privacy Impact on Generalized Nash Equilibrium in Peer-to-Peer Electricity Markets"*, MIT LIDS Energy Analytics Group (2022); *"Risk-Hedging Strategies in Decentralized Electricity Markets"*, Institut Henri Poincaré, Paris (2022); *"A Generalized Nash Equilibrium Analysis of a Peer-to-Peer Financial Market and the Distribution Grid"*, INOCS Seminar, Inria Lille (2021)
2021 - 2024	Conference talks, NETGCOOP 2024; IEEE SmartGridComm 2023, Glasgow; INFORMS Annual Meeting, invited sessions (2021, 2022); PGMO Days, EDF Saclay (2022); ROADEF 2022, Lyon; ENS Computer Science Department Convention (2022); IEEE SmartGridComm 2021, Aachen

Teaching, Service, Awards and Skills

Teaching	Teaching assistant, ETH Zürich (2024 - present): *Linear System Theory*, *Game Theory*, *Advanced Topics in Control*
Supervision	Two master projects and one bachelor thesis at ETH Zürich on energy markets, multi-agent control and social choice
Service	Co-organizer, CLOCK 2025; organizer, NCCR Automation Theme 2.1 workshop; member, ETH Postdoc Sounding Board (2024 - present)
Reviewing	IEEE Transactions on Automatic Control, IEEE Transactions on Smart Grid, IEEE Transactions on Power Systems, IEEE Transactions on Energy Markets, Policy and Regulation, European Journal of Operational Research
Awards	Best Poster Award, NCCR Automation retreat (2026); Excellence Scholarship, Fondation Mathématiques Jacques Hadamard (2018 - 2019); Scholarship for Academic Achievements, Saint Petersburg State University (2012 - 2013)
Programming	Python (NumPy, SciPy, Pandas, PyTorch, Scikit-learn, CVXPY), Gurobi, Matlab, Git, LaTeX, React
Languages	Russian (native), English (fluent), French (advanced), German (basic)