Ján Drgoňa

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Richland, WA 99352

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⌂ https://drgona.github.io/
⌾ https://github.com/drgona
in https://www.linkedin.com/in/drgona/
▶ https://www.youtube.com/@neuromancer_SciML
⚷ https://scholar.google.com/citations?user=A-EA2KsAAAAJ

Summary

I am a Principal Investigator (PI) and Staff-level Research Scientist at the Pacific Northwest National Laboratory (PNNL). My current project portfolio is focused on *differentiable programming* and *scientific machine learning* (SciML) for dynamical systems, optimization, and control.

○ I have developed technology roadmaps that contributed to the acquisition of a $20M project portfolio sponsored by the U.S. Department of Energy (DOE).

○ I serve as PI and co-PI on 5 projects, under which I have built and mentor a team of 12 multi-disciplinary researchers and engineers.

○ I am a lead software developer of NeuroMANCER SciML library in PyTorch. Within two years, I made this library the most popular open-source repository released by PNNL.

○ I have 10+ years of experience in the deployment of machine learning and advanced control methods in real-world applications, including building energy systems, power systems, robotics, and industrial process control.

○ I am a generalist with experience integrating methods and tools from various engineering domains in coherent algorithmic and software frameworks.

○ I am broadly recognized as an innovative leader, demonstrated by numerous invited talks, committee memberships, best paper awards, and media reports, including New Scientist.

Professional Experience

Pacific Northwest National Laboratory
Physics and Computational Sciences Division

Richland, WA, USA

Data Scientist 4	*July 2023 – Present*
Data Scientist 3	*January 2022 – July 2023*
Data Scientist 2	*May 2020 – December 2021*
Postdoctoral Researcher	*July 2019 – April 2020*

I have developed technology roadmaps in a portfolio of DOE projects focused on SciML, differentiable programming, and data-driven control. I have built and am currently leading a team of 12 research scientists and engineers. I have pioneered novel simulation and data-driven predictive control methods that are actively being used in a portfolio of DOE-sponsored projects. I led a multi-institutional team of 11 researchers, resulting in the most cited paper in the domain of advanced building control.

KU Leuven
Department of Mechanical Engineering

Leuven, Belgium

Postdoctoral Researcher — *September 2017 – June 2019*

I have designed and deployed a high-fidelity model predictive control (MPC) algorithm in a real-world office building, achieving over 50% energy savings.

Education

Slovak University of Technology   **Bratislava, Slovakia**
PhD   *2012 – 2017*
Institute of Information Engineering, Automation, and Mathematics

KU Leuven   **Leuven, Belgium**
Visiting PhD   *2016 – 2017*
Thermal Systems Simulation Group, Department of Mechanical Engineering

Linköping University   **Linköping, Sweden**
Visiting MSc   *Spring 2012*
Automatic Control, Department of Electrical Engineering

Slovak University of Technology   **Bratislava, Slovakia**
MSc   *2007 – 2012*
Institute of Information Engineering, Automation, and Mathematics

Awards

Pathway to Excellence Performance Award at PNNL	*2023*
Best Paper Award Building and Environment Journal	*2023*
Most cited article in Annual Reviews in Control published since 2018	*2022*
Pathway to Excellence Performance Award at PNNL	*2021*
Best paper award Journal of Building Performance Simulation	*2021*
Pathway to Excellence Performance Award at PNNL	*2020*
Best Paper Award at Dynamic Systems and Control Conference (DSCC)	*2020*
Summa cum laude, PhD, Slovak University of Technology in Bratislava	*2017*
The National Scholarship Programme of the Slovak Republic	*2017*
European Union's Erasmus Mundus Scholarship	*2016*
European Union's Erasmus Mundus Scholarship	*2012*

Media Appearance

- **New Scientist:** DeepMind's AI cuts energy costs for cooling buildings
- **inbuildingtech.com:** PNNL highlights use of deep learning to reduce energy use in buildings
- **pnnl.gov:** Deep Learning Cuts Costs in Building Control
- **pnnl.gov:** New Method for Automated Control Leverages Advances in AI

Open-Source Code - Lead Developer

- **NeuroMANCER: Neural Modules with Adaptive Nonlinear Constraints and Efficient Regularizations:** Scientific Machine Learning Library in Pytorch. `https://github.com/pnnl/neuromancer`
- **SLiM: Structured Linear Maps -** Stable learning and structured inductive priors in physics-informed machine learning applications in PyTorch. `https://github.com/pnnl/slim`

Publications

Summary

☞ 16 journal articles   ☞ 32 conference papers   ☞ 5 workshop papers   ☞ 4 preprints
☞ 1498 citations   ☞ 16 h-index   ☞ Google Scholar

Journals

1. Hari Prasanna Das, Yu-Wen Lin, Utkarsha Agwan, Lucas Spangher, Alex Devonport, Yu Yang, **Ján Drgoňa**, Adrian Chong, Stefano Schiavon, Costas J Spanos,
   Machine Learning for Smart and Energy-Efficient Buildings,
   arXiv:2211.14889, accepted for *Journal of Environmental Data Science*, to appear in 2024.

2. Zoltan Nagy, Gregor Henze, Sourav Dey, Javier Arroyo, Lieve Helsen, Xiangyu Zhang, Bingqing Chen, Kadir Amasyali, Kuldeep Kurte, Ahmed Zamzam, Helia Zandi, **Ján Drgoňa**, et al.,
   Ten questions concerning reinforcement learning for building energy management,
   Building and Environment, Volume 241, 2023, 110435, ISSN 0360-1323.

3. Christian Møldrup Legaard, Thomas Schranz, Gerald Schweiger, **Ján Drgoňa**, et al.,
   Constructing Neural Network-Based Models for Simulating Dynamical Systems,
   ACM Computing Surveys, 55, 11, Article 236, 2023.

4. James Koch, Zhao Chen, Aaron Tuor, **Ján Drgoňa**, Draguna Vrabie,
   Structural inference of networked dynamical systems with universal differential equations,
   Chaos: An Interdisciplinary Journal of Nonlinear Science, 1 February 2023; 33 (2): 023103.

5. **Ján Drgoňa**, Aaron Tuor, Soumya Vasisht and Draguna Vrabie,
   Dissipative Deep Neural Dynamical Systems,
   IEEE Open Journal of Control Systems, vol. 1, pp. 100-112, 2022.

6. **Ján Drgoňa**, Karol Kiš, Aaron Tuor, Draguna Vrabie, Martin Klaučo,
   Differentiable predictive control: Deep learning alternative to explicit model predictive control for unknown nonlinear systems,
   Journal of Process Control, Volume 116, 2022, Pages 80-92.

7. ★ Bing Dong, Romana Markovic, Salvatore Carlucci, Yapan Liu, Andreas Wagner, Antonio Liguori, Christoph van Treeck, Dmitry Oleynikov, Elie Azar, Gianmarco Fajilla, **Ján Drgoňa**, et al.,
   A guideline to document occupant behavior models for advanced building controls,
   Building and Environment, Volume 219, 2022, 109195, ISSN 0360-1323. **best paper award**

8. ★ David Blum, Javier Arroyo, Sen Huang, **Ján Drgoňa**, et al.
   Building optimization testing framework (BOPTEST) for simulation-based benchmarking of control strategies in buildings,
   Journal of Building Performance Simulation, 14:5, 586-610, 2021. **best paper award**

9. **Ján Drgoňa**, Aaron R Tuor, Vikas Chandan, Draguna L Vrabie,
   Physics-constrained deep learning of multi-zone building thermal dynamics,
   Energy and Buildings, Volume 243, 2021, 110992, ISSN 0378-7788.

10. I Cupeiro Figueroa, M Cimmino, **Ján Drgoňa**, L Helsen,
    Fluid temperature predictions of geothermal borefields using load estimations via state observers,
    Journal of Building Performance Simulation, 14 (1), 1-19, 2021.

11. **Ján Drgoňa**, Damien Picard, Lieve Helsen,
    Cloud-based implementation of white-box model predictive control for a GEOTABS office building: A field test demonstration,
    Journal of Process Control, Volume 88, April 2020, Pages 63-77.

12. ★ **Ján Drgoňa**, Javier Arroyo, Iago Cupeiro Figueroa, David Blum, Krzysztof Arendt, Donghun Kim, Enric Perarnau Ollé, Juraj Oravec, Michael Wetter, Draguna L Vrabie, Lieve Helsen,
    All you need to know about model predictive control for buildings,
    Annual Reviews in Control, Volume 50, 2020, Pages 190-232. **highly cited paper award**

13. **Ján Drgoňa**, Damien Picard, Michal Kvasnica, Lieve Helsen,
    Approximate model predictive building control via machine learning,
    Applied Energy, Volume 218, 15 May 2018, Pages 199-216.

14. **Ján Drgoňa**, Martin Klaučo, Filip Janeček, Michal Kvasnica,
    Optimal control of a laboratory binary distillation column via regionless explicit MPC,
    Computers & Chemical Engineering, Volume 96, 4 January 2017, Pages 139-148.

15. Damien Picard, **Ján Drgoňa**, Michal Kvasnica, Lieve Helsen,
    Impact of the controller model complexity on model predictive control performance for buildings,
    Energy and Buildings, Volume 152, 1 October 2017, Pages 739-751.

16. M Klaučo, R Valo, **Ján Drgoňa**,
    Reflux control of a laboratory distillation column via MPC-based reference governor,
    Acta Chimica Slovaca, 10 (2), 139, 2017.

Conferences

1. Truong X. Nghiem, **Ján Drgoňa**, Colin Jones, Zoltan Nagy, Roland Schwan, Biswadip Dey, Ankush Chakrabarty, Stefano Di Cairano, Joel A. Paulson, Andrea Carron, Melanie N. Zeilinger, Wenceslao Shaw Cortez, Draguna Vrabie,
   Physics-Informed Machine Learning for Modeling and Control of Dynamical Systems,
   American Control Conference (*ACC*), San Diego, CA, USA, 2023, pp. 3735-3750.

2. D. Soudbakhsh. A. M. Annaswamy, Y. Wang, S. L. Brunton, J. Gaudio, H. Hussain, D. Vrabie, **Ján Drgoňa**, D. Filev,
   Data-Driven Control: Theory and Applications,
   American Control Conference (*ACC*), San Diego, CA, USA, 2023, pp. 1922-1939.

3. S. Abhyankar, **Ján Drgoňa**, A. Tuor and A. August,
   Neuro-physical dynamic load modeling using differentiable parametric optimization,
   IEEE Power & Energy Society General Meeting (*PESGM*), Orlando, FL, USA, 2023, pp. 1-5.

4. Yu Wang, **Ján Drgoňa**, Jiaxin Zhang, Karthik Somayaji NS, Frank Y Liu, Malachi Schram, Peng Li,
   AutoNF: automated architecture optimization of normalizing flows with unconstrained continuous relaxation admitting optimal discrete solution,
   Proceedings of the AAAI Conference on Artificial Intelligence, 37(8), 10244-10252, 2023.

5. Shimiao Li, **Ján Drgoňa**, Shrirang Abhyankar, and Larry Pileggi,
   Power Grid Behavioral Patterns and Risks of Generalization in Applied Machine Learning,
   14th ACM International Conference on Future Energy Systems (*e-Energy '23 Companion*), Association for Computing Machinery, New York, NY, USA, 106–114.

6. Sayak Mukherjee, **Ján Drgoňa**, Aaron Tuor, Mahantesh Halappanavar, Draguna Vrabie,
   Neural Lyapunov Differentiable Predictive Control,
   IEEE 61st Conference on Decision and Control (*CDC*), Cancun, Mexico, 2022, pp. 2097-2104.

7. Wenceslao Shaw Cortez, **Ján Drgoňa**, Aaron Tuor, Mahantesh Halappanavar, Draguna Vrabie,
   Differentiable Predictive Control with Safety Guarantees: A Control Barrier Function Approach,
   IEEE 61st Conference on Decision and Control (*CDC*), Cancun, Mexico, 2022, pp. 932-938.

8. Wenceslao Shaw Cortez, Soumya Vasisht, Aaron Tuor, **Ján Drgoňa**, Draguna Vrabie,
   Domain-aware Control-oriented Neural Models for Autonomous Underwater Vehicles,

12th IFAC Symposium on Nonlinear Control Systems, IFAC-PapersOnLine, Volume 56, Issue 1, 2023, Pages 228-233.

9. S Sinha, SP Nandanoori, **Ján Drgoňa**, and D. Vrabie,
    Data-driven Stabilization of Discrete-time Control-affine Nonlinear Systems: A Koopman Operator Approach,
    European Control Conference (*ECC*), London, United Kingdom, 2022, pp. 552-559.

10. **Ján Drgoňa**, Sayak Mukherjee, Aaron Tuor, Mahantesh Halappanavar, Draguna Vrabie,
    Learning Stochastic Parametric Differentiable Predictive Control Policies,
    IFAC Symposium on Robust Control Design (*ROCOND*), Volume 55, Issue 25, Pages 121-126, ISSN 2405-8963, 2022.

11. Ethan King, **Ján Drgoňa**, Aaron Tuor, Shrirang Abhyankar, Craig Bakker, Arnab Bhattacharya, Draguna Vrabie,
    Koopman-based Differentiable Predictive Control for the Dynamics-Aware Economic Dispatch Problem,
    American Control Conference (*ACC*), Atlanta, GA, USA, 2022.

12. Aowabin Rahman, **Ján Drgoňa**, Aaron Tuor, Jan Strube,
    Neural Ordinary Differential Equations for Nonlinear System Identification,
    American Control Conference (*ACC*), Atlanta, GA, USA, 2022, pp. 2194-2201.

13. **Ján Drgoňa**, Sayak Mukherjee, Jiaxin Zhang, Frank Liu, Mahantesh Halappanavar,
    On the Stochastic Stability of Deep Markov Models,
    Advances in Neural Information Processing Systems (*NeurIPS*), 2021.

14. Thomas Schranz, Johannes Exenberger, Christian Møldrup Legaard, **Ján Drgoňa**, Gerald Schweiger,
    Energy Prediction under Changed Demand Conditions: Robust Machine Learning Models and Input Feature Combinations,
    Proceedings of Building Simulation (*BS*), 17th International Conference of the International Building Performance Simulation Association, 2021.

15. Elliott Skomski, **Ján Drgoňa**, Aaron Tuor,
    Automating Discovery of Physics-Informed Neural State Space Models via Learning and Evolution,
    3rd Learning for Dynamics and Control (*L4DC*), PMLR 144:980-991, 2021.

16. Elliott Skomski, Soumya Vasisht, Colby Wight, Aaron Tuor, **Ján Drgoňa**, Draguna Vrabie,
    Constrained block nonlinear neural dynamical models,
    American Control Conference (*ACC*), New Orleans, LA, USA, 2021, pp. 3993-4000.

17. **Ján Drgoňa**, Aaron Tuor, Elliott Skomski, Soumya Vasisht, Draguna Vrabie,
    Deep learning explicit differentiable predictive control laws for buildings,
    IFAC Nonlinear Model Predictive Control (*NMPC*) *Conference*, IFAC-PapersOnLine, Volume 54, Issue 6, 2021, Pages 14-19, ISSN 2405-8963.

18. ★ **Ján Drgoňa**, L. Helsen, D. L. Vrabie,
    Cutting the Deployment Costs of Physics-Based MPC in Buildings by Simulation-Based Imitation Learning,
    Dynamic Systems and Control Conference, 84270, V001T09A001, 2020. **best paper award**

19. I. C. Figueroa, **Ján Drgoňa**, L Helsen,
    State estimators applied to a linear white-box geothermal borefield controller model
    Proceedings of Building Simulation (*BS*), 16th Conference of IBPSA, 2019.

20. **Ján Drgoňa**, L. Helsen,
    Different Problem Classes And Solution Techniques For Model Predictive Building Control,
    Proceedings of the REHVA Annual Meeting Conference, Low Carbon Technologies in HVAC, 2018.

21. Iago Cupeiro Figueroa, **Ján Drgoňa**, Mohammad Abdollahpouri, Damien Picard, Lieve Helsen,
    State Observer for Optimal Control using White-box Building Models,
    International High Performance Buildings Conference, 2018.

22. D Ingole, **Ján Drgoňa**, M Kalúz, M Klaučo, M Bakošová, M Kvasnica,
    Model predictive control of a combined electrolyzer-fuel cell educational pilot plant,
    21st International Conference on Process Control (PC), 149-154, 2017.

23. D Ingole, **Ján Drgoňa**, M Kvasnica,
    Offset-free hybrid model predictive control of bispectral index in anesthesia,
    21st International Conference on Process Control (PC), 422-427, 2017.

24. **Ján Drgoňa**, Z Takáč, M Hornák, R Valo, M Kvasnica,
    Fuzzy control of a laboratory binary distillation column,
    21st International Conference on Process Control (PC), 120-125, 2017.

25. **Ján Drgoňa**, F Janeček, M Klaučo, M Kvasnica,
    Regionless explicit MPC of a distillation column,
    European Control Conference (ECC), Aalborg, Denmark, pp. 1568-1573, 2016.

26. A Sharma, **Ján Drgoňa**, D Ingole, J Holaza, R Valo, S Koniar, M Kvasnica,
    Teaching classical and advanced control of binary distillation Column,
    11th IFAC Symposium on Advances in Control Education ACE, pp. 348-353, 2016.

27. **Ján Drgoňa**, Martin Klaučo, Michal Kvasnica,
    MPC-based reference governors for thermostatically controlled residential buildings,
    54th IEEE conference on decision and control (CDC), Osaka, Japan, 2015, pp. 1334-1339.

28. **Ján Drgoňa**, M Klaučo, R Valo, J Bendžala, M Fikar,
    Model Identification and Predictive Control of a Laboratory Binary Distillation Column,
    20th International Conference on Process Control (PC), pp. 357-362, 2015.

29. M. Klaučo, **Ján Drgoňa**, M. Kvasnica, S. Di Cairano,
    Building Temperature Control by Simple MPC-like Feedback Laws Learned from Closed-Loop Data,
    19th IFAC World Congress, Cape Town (South Africa), 581–586, 2014.

30. M Kvasnica, A Szűcs, M Fikar, **Ján Drgoňa**,
    Explicit MPC of LPV Systems in the Controllable Canonical Form,
    European Control Conference (ECC), 1035–1040, 2013

31. **Ján Drgoňa**, Michal Kvasnica, Martin Klaučo, Miroslav Fikar,
    Explicit Stochastic MPC Approach to Building Temperature Control,
    IEEE Conference on Decision and Control (CDC), Firenze, Italy, 2013, pp. 6440-6445.

32. **Ján Drgoňa**, M Kvasnica,
    Comparison of MPC Strategies for Building Control,
    19th International Conference on Process Control (PC), 401–406, 2013.

Workshops

1. Jiaxin Zhang, Frank Liu, **Ján Drgoňa**, Sayak Mukherjee, Mahantesh Halappanavar,
   Variational Generative Flows for Reconstruction Uncertainty Estimation,
   ICML workshop on Uncertainty and Robustness in Deep Learning, 2021.

2. Aaron Tuor, **Ján Drgoňa**, Draguna Vrabie,
   Constrained neural ordinary differential equations with stability guarantees,
   Integration of Deep Neural Models and Differential Equations, ICLR, arXiv:2004.10883, 2020.

3. **Ján Drgoňa**, I Cupeiro Figueroa, L Helsen,

State estimation of control-oriented white-box models for buildings,
Intelligent Building Operations Workshop (IBO), Location: Colorado, Boulder, USA

4. **Ján Drgoňa**, L Helsen, D Vrabie,
Deep Learning-based Model Predictive Building Control,
Intelligent Building Operations Workshop (IBO)), Location: Colorado, Boulder, USA

5. **Ján Drgoňa**, Lieve Helsen, Draguna Vrabie,
Stripping off the implementation complexity of physics-based model predictive control for buildings via deep learning,
NeurIPS workshop on Tackling Climate Change with Machine Learning, 2019

Preprints

1. Wenceslao Shaw Cortez, **Ján Drgoňa**, Draguna Vrabie, Mahantesh Halappanavar,
Robust Differentiable Predictive Control with Safety Guarantees: A Predictive Safety Filter Approach
arXiv:2311.08496, 2023.

2. Yu Wang, Yuxuan Yin, Karthik Somayaji Nanjangud Suryanarayana, **Ján Drgoňa**, Malachi Schram, Mahantesh Halappanavar, Frank Liu, Peng Li,
Semi-Supervised Learning of Dynamical Systems with Neural Ordinary Differential Equations: A Teacher-Student Model Approach,
arXiv:2310.13110, 2023.

3. Karthik Somayaji NS, Yu Wang, Malachi Schram, **Ján Drgoňa**, Mahantesh Halappanavar, Frank Liu, Peng Li,
Extreme Risk Mitigation in Reinforcement Learning using Extreme Value Theory,
arXiv:2308.13011, 2023

4. **Ján Drgoňa**, Aaron Tuor, Draguna Vrabie,
Learning Constrained Adaptive Differentiable Predictive Control Policies With Guarantees,
arXiv:2004.11184, 2022

Invited Talks

2023

1. CRUNCH seminar at the Brown University, online
2. RTX Physics Informed Machine Learning (PIML) Workshop, online
3. INFORMS Annual meeting, Phoenix, Arizona
4. DataLearning at Imperial College London, online
5. EDGE Symposium at GE Research in Niskayuna, NY
6. Intelligent Buildings Operations (IBO) Workshop, Boulder, Colorado
7. Sixth Workshop on Autonomous Energy Systems, Golden, Coloraro
8. Workshop on Online Optimization Methods for Data-driven Feedback Control, American Control Conference, San Diego, California
9. USNCCM, Albequerque, New Mexico
10. AIRES 4: Machine Learning For Robust Digital Twins, Oak Ridge National Laboratory, Tennesse
11. 2023 Grid Science Winter School and Conference, Santa Fe, New Mexico,

2022

1. IEEE 8th World Forum on Internet of Things (WFIoT), online
2. University of Arizona, Tucson
3. Third Symposium on Machine Learning and Dynamical Systems at Fields Institute, Toronto

4. Data-driven Physical Simulations (DDPS) seminar at Lawrence Livermore National Laboratory, online
5. Workshop on Scientific Machine Learning: Foundations and Applications, Iowa State University, Ames, Iowa
6. The Sixth Annual Sandia Machine Learning and Deep Learning (MLDL) Workshop, online
7. SIAM Conference on Mathematics of Data Science (MDS22), online
8. The Fifth Autonomous Energy Systems Workshop NREL, Golden, Colorado
9. PARC XEROX company, online
10. Pennsylvania State University
11. Duke University, online

Teaching and Mentoring

Slovak University of Technology in Bratislava, Slovakia
Teaching assistant   *September 2012 – June 2017*

Undergraduate and graduate courses:
- Automatic control theory
- Modelling in process industry
- Model predictive control
- Python programming
- Distributed version control system

KU Leuven, Belgium
Mentoring PhD students   *September 2017 – June 2019*

- Javier Arroyo
- Iago Cupeiro Figueroa
- Anke Uytterhoeven
- Deepak Ingole

Pacific Northwest National Laboratory, USA
Mentoring students and junior staff   *July 2019 – present*

Students
- Rafsan Rabbi, Utah State University
- Christian Møldrup Legaard, Aarhus University
- Filip Tolovski, Fraunhofer Heinrich Hertz Institute
- Marco Bornstein, University of Maryland
- Ethan Herron, Iowa State University
- Shimiao Li, Carnegie Mellon University
- Juye Kim, Carnegie Mellon University (Master student)
- James Kotary, University of Virginia
- Bo Tang, University of Toronto
- Nandan Tumu, University of Pennsylvania
- John Viljoen, UC Berkeley
- Seth Britneh, Western Washington University (Master student)
- Lyric Otto, Western Washington University (Master student)
- Harry Quiang, Western Washington University (Master student)
- Diego Llanes, Western Washington University (Master student)
- Jaap Neven, KU Leuven
- Mohammad Reza Zavvar Sabegh, KU Leuven

PNNL junior staff
- Wenceslao Shaw Cortez
- Soumya Vasisht
- James Koch
- Madelyn Shapiro
- Stefan Dernbach
- Rahul Birmiwal
- Cary Faulkner
- Ethan King
- Nawaf Nazir
- Sayak Mukherjee
- Zhao Chen

Community Service

Climate Change AI
Core team member   *December 2020 – August 2023*

Global non-profit organization that catalyzes impactful work at the intersection of climate change and machine learning. I served as a data lea, and co-organized two workshops on *Tackling Climate Change with Machine Learning* at NeurIPS 2021, and 2022, repsectively.

Member of Professional Organisations
- Institute of Electrical and Electronics Engineers (IEEE)
- Association for Computing Machinery (ACM)

Event Organization
- NeurIPS 2021 Workshop Tackling Climate Change with Machine Learning
- 2nd ACM Workshop on Reinforcement Learning for energy management in buildings and cities (RLEM'21) at ACM BuildSys 2021
- 1st ACM International Workshop on Big Data and Machine Learning for Smart Buildings and Cities (ACM BALANCES) 2021
- NeurIPS 2022 Workshop Tackling Climate Change with Machine Learning
- 3rd ACM Workshop on Reinforcement Learning for energy management in buildings and cities (RLEM'22) at ACM BuildSys 2022
- NeurIPS 2022 Competition Track, The CityLearn Challenge 2022
- Proceedings of AAAI 2022 Fall Symposium: The Role of AI in Responding to Climate Challenges
- Workshop on Differentiable Programming for Modeling and Control of Dynamical Systems, American Control Conference (ACC) 2023
- Workshop on Differentiable Programming for Modeling and Control of Dynamical Systems at the Modeling, Estimation, and Control Conference (MECC) 2023
- Publicity chair at the BuildSys '23 - The 10th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation
- AAAI Workshop on Learnable Optimization (LEANOPT) 2024

Journals Reviews
- Automatica
- IEEE Control Systems Letters
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Industrial Informatics
- Control Engineering Practice

- Journal of Process Control
- Energy and Buildings
- Applied Energy
- Journal of Control Automation and Electrical Systems
- Electric Power Systems Research

Technical Program Committee Member
- International Conference on Learning Representations (ICLR)
- Neural Information Processing Systems (NeurIPS)
- The Annual AAAI Conference on Artificial Intelligence
- Conference on Decision and Control (CDC)
- American Control Conference (ACC)
- European Control Conference (ECC)
- IFAC World Congress
- Modeling, Estimation, and Control Conference (MECC)
- IEEE Conference on Control Technology and Applications (CCTA)
- International Conference on Process Control (PC)
- International Conference on Control and Fault-Tolerant Systems (SYSTOL)
- International Conference on Control, Decision and Information Technologies (CoDIT)
- Mediterranean Conference on Control and Automation (MED)
- Building Simulation Conference (BS)

Projects and Funding

Energy Earthshot$^{\text{TM}}$ Research Center *2023 - 2026*
- Description: Applied research in Enhanced Geothermal and Offshore Wind Energy.
- Funding agency: U.S. DOE
- Role: key staff

Uncertainty Quantification for Multifidelity Operator Learning *2023 - 2026*
- Description: Basic applied mathematics research in the area of scientific machine learning.
- Funding agency: advanced scientific computing research (ASCR) U.S. DOE
- Funded amount: 1,800k $
- Role: task lead

Autonomous Intelligent Assistant (AutonomIA):
Resilient and Energy-Efficient City-wide Transportation Operations *2022 - 2025*
- Description: Collaboration with four traffic modeling companies on the development of new scientific machine learning methods for large-scale traffic optimization.
- Funded amount: 5,891k $
- Funding agency: U.S. ARPA-e agency
- Role: advisor

Advancing Market-Ready Building Energy Management by
Cost-Effective Differentiable Predictive Control *2022 - 2025*
- Description: Collaboration with four building automation companies on development and deployment of differentiable predictive control (DPC) technology for market-ready energy-efficient building control.
- Funded amount: 5,440k $
- Funding agency: U.S. DOE Buildings Technology Office (BTO)
- Role: co-PI

Dynamic Decarbonization Through Autonomous Physics-centric
Deep Learning and Optimization of Building Operations *2022 - 2024*

- Description: Collaboration with building automation company on development of next-generation differentiable programming-based control methods.
- Funded amount: 800k $
- Funding agency: U.S. DOE Buildings Technology Office (BTO)
- Role: co-PI

Domain Aware Deep-learning Algorithms Integrated with Scientific-computing Technologies (DADAIST)
2020 - 2023

- Description: Development of differentiable programming methods and software tools to modernize current convergent scientific computing and machine learning algorithms
- Funded amount: 1.320k $
- Funding agency: PNNL laboratory directed research and development (LDRD)
- Role: PI

Decision and Control of Complex Systems: a Data-Driven Framework
2020 - 2023

- Description: Multi-institutional project focused on physics-constrained probabilistic graphical models (PGM) for modeling and control of complex cyber-physical systems
- Funded amount: 1.800k $
- Funding agency: advanced scientific computing research (ASCR) U.S. DOE
- Role: task lead

Mathematics for Artificial Reasoning in Science (MARS) Initiative
2019 - 2021

- Description: development of Deep Learning Control with Embedded Physical Structure
- Funded amount: 240k $
- Funding agency: PNNL LDRD
- Role: PI

Physics-informed Neurosearch for Control-oriented System Identification
2019 - 2020

- Description: physics-informed deep learning of physical systems described by ODEs
- Funded amount: 60k $
- Funding agency: PNNL LDRD
- Role: PI

IBPSA Project 1
2017 - 2022

- Description: Modelica Framework for building and community energy system design and operation
- Funding agency: U.S. DOE

Adaptive Control
2019 - 2020

- Description: Developing technology to help ensure that building systems automatically adapt and operate in an optimal manner
- Funding agency: U.S. DOE Buildings Technology Office (BTO)

Geothermal Technology for €conomic Cooling and Heating
2017 - 2019

- Description: The optimisation of geothermal system operation
- Funding agency: European Union, Horizon 2020 initiative

Robust Model Predictive Control Meets Robotics
2016 - 2017

- Description: Robust MPC design for uncertain dynamic systems
- Funding agency: The Slovak Research and Development Agency

Verifiably Safe Optimal Control
2015 - 2017

- Description: Design of optimal control methods with safety guarantees and economical operation
- Funding agency: Scientific Grant Agency of the Slovak Republic

Complexity, Sensitivity and Robustness in Explicit Model Predictive Control
2014 - 2015

- Description: Model predictive control with a specific emphasis on explicit solutions
- Funding agency: The Slovak Research and Development Agency

Model Predictive Control on Platforms with Limited Computational Resources
2012 - 2014

- Description: Real-time implementation of MPC using HW platforms with limited CPU power
- Funding agency: Scientific Grant Agency of the Slovak Republic