Matthias Preindl
Curriculum Vitae

Associate Professor of Electrical Engineering
Director, Columbia Center of Advanced Electrification
Columbia University in the City of New York
Department of Electrical Engineering
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April 9, 2026

1 Field of Specialization

Design and control of power electronic systems, motor drives, and energy storage, for transportation electrification and a sustainable power system.

2 Education

Habilitation*
Ministry of Education, Universities and Research (MIUR), Italy
Full Professor level, scientific sector 09/E2: electrical energy engineering, awarded 11.2018
Associate Professor level, scientific sector 09/E2: electrical energy engineering, awarded 03.2017

Post doctoral research associate, 05.2014 - 12.2015
McMaster University, McMaster Institute for Automotive Research and Technology (MacAUTO)

Doctor of Philosophy (PhD), 01.2011 - 03.2014
University of Padua, Doctoral School of Industrial Engineering, Specialization in Energy Engineering
Thesis: *"Novel Model Predictive Control of a PM Synchronous Motor Drive; Design of the Innovative Structure, Feasibility and Stability Analysis, Efficient Implementation, Experimental Validation,"* adviser: S. Bolognani

Visiting Scholar - PhD Thesis Research, 02.2012 - 11.2012
University of California Berkeley, Department of Mechanical Engineering

Master of Science (MSc), 09.2008 - 03.2010
Swiss Federal Institute of Technology (ETH) Zurich, Master Program in Electrical Engineering and Information Technology, Specialization in Electrical Energy Systems and Mechatronics
Thesis: *"Switching Frequency Reduction Using Sensorless Model Predictive Direct Current Control for High Power Voltage Source Inverters,"* adviser: E. Schaltz and J. W. Kolar

Visiting Student - MSc Thesis Research, 07.2009 - 12.2009
Aalborg University (Denmark), Department of Energy Technology

Bachelor of Science (BSc), *summa cum laude*, 09.2005 - 07.2008
University of Padua, Bachelor Program in Electrical Engineering
Thesis: *"Development of a Simulation Tool for the Halo Current Patterns on the First Wall of a Fusion Reactor,"* adviser: F. Gnesotto and G. Chitarin

Research Period - BSc Thesis Research, 03.2008 - 06.2008
National Research Council (Padua, Italy), Consortium Reverse Field Pinch Experiment

⋆ Habilitation defines the qualification to conduct independent university research and teaching and is the key for access to a professorship in many European countries, including Italy. It is the highest national qualification level issued through the process of a university examination. The Italian *national scientific habilitation* (called "abilitazione scientifica nazionale", asn) according to art.16, law n.240/10 can be achieved for associate and/or full professorships. For stem fields (called "bibliometric fields"), the habilitation consists of a two-steps evaluation: a quantitative assessment, where each candidate must have at least 2 out of these 3 requirements: having published more papers, having received more citations, and having an h-index higher than most associate professors and/or full professors in Italian universities; then, a specific committee (one for each scientific sub-field) will qualitatively evaluate the scientific cv of the candidates, considering funding, mobility, autonomy of the research, awards won, etc. See also: en.wikipedia.org/wiki/Habilitation.

3 Professional Appointments

3.1 Employment

Columbia University, US, since 01.2016
Associate Professor (with tenure), Department of Electrical Engineering (EE), since 07.2024
Associate Professor, Department of Electrical Engineering (EE), 07.2020 - 06.2024
Assistant Professor, Department of Electrical Engineering (EE), 01.2016 - 06.2020

Founding Director, Columbia Center of Advanced Electrification, since 11.2024
Principal Investigator (PI), Motor Drives and Power Electronics Laboratory (MPlab)
Founding Coordinator, EE Smart Electric Energy research and teaching area, since 12.2017
Core Faculty, Columbia Electrochemical Energy Center (CEEC), since 01.2019
Affiliated Faculty, Data Science Institute, Sense, Collect and Move Data Center, since 09.2017
Adviser, Columbia University Formula Racting (CUFR) team, since 09.2018

CentraleSupélec, University Paris-Saclay, France, since 12.2025
Professeur

Tau Motors, since 09.2025
Distinguished Engineer

École Polytechnique, IP Paris, France, 09.2025 - 11.2026
Alliance Visiting Professor

McMaster University, Canada, 01.2015 - 06.2015
Sessional Professor, Department of Electrical and Computer Engineering (ECE)

Leitwind AG, Italy, 03.2010 - 09.2012
R&D Engineer, Electrical Engineering Group
Co-development of a next generation power electronic converter for MW wind turbines
Project lead *"Minitandem,"* the design and installation of a scaled wind turbine test bench and *"Adaptive Optimization Algorithm,"* the design and evaluation of an adaptive control and maximum power point tracking strategy

3.2 Editorial Board

IEEE Transactions on Vehicular Technology
Area editor (co-eic) for vehicular electronics and transportation systems, 07.2020 - 02.2025
Editor, 10.2017 - 02.2025

Automotive Innovation (Springer Nature and China SAE)
Associate editor in chief, since 01.2022

IEEE Transactions on Transportation Electrification
Associate editor, 11.2016 - 08.2020

Journal of Applied Energy (Elsevier)
Guest editor, special issue on "Intelligent Energy Storage Systems for Electrified Transportation and Smart Grid," 09.2021 - 09.2023

IEEE Transactions on Energy Conversion
Guest editor, special issue on "Model Predictive Control in Energy Conversion Systems," 06.2019 - 05.2021

3.3 Advisory Board and Project Support

Tau Motors
Chief scientist and chair, advisory board, since 08.2021
Advisory board, since 10.2018
Note: Tau Motors maintains a portfolio license on a subset of M. Preindl's work, since 07.2022.

Owntech Foundation
Board member, since 03.2023

Energy One Solutions International
Industry Advisory Panel member, since 01.2026

Electra
Advisory board, 08.2023 - 01.2025

NEXTracker
Project adviser, 09.2021 - 03.2022

Sinewatts Inc.
Advisor, 03.2019 - 05.2020

3.4 Professional Societies and Conferences (selection)

IEEE Technical Activities Board (TAB)
TEC corresponding member, Finance Committee (FinCom), since 2025

IEEE Transportation Electrification Council (TEC)
Inaugural Treasurer, since 2024
Founding Chair of the Technical Committee on Battery Systems, since 2023

IEEE/AIAA Transportation Electrification Conference and Electric Aircraft Technologies Symposium (ITEC+EATS)
General Chair, 2022

4 Honors, Distinctions, Memberships

4.1 Awards and Honors

Date	Award or honor
2026	*Choose France For Science Laureate*
2025	First prize best paper award, IEEE Transactions on Power Electronics
2024	AutoTech Breakthrough Awards Vehicle-to-Infrastructure (V2I) Innovation of the Year *Co-recipient for Tau Motors technology based in part on licensed MPlab technology*
2024	Fast Company Best Workplaces for Innovators *Co-recipient for the Tau Motors strategic partnership*
2024	The first prize best paper award, MDPI Energies *All papers (over 9,000) published in 2022 in Energies were considered for the award and evaluated for the originality and significance of the papers, citations, and downloads.*
2024	Mercator fellow, German Research Foundation (DFG)
2023	AutoTech Breakthrough Awards Vehicle-to-Everything (V2X) Innovation of the Year *Co-recipient for Tau Motors technology based in part on licensed MPlab technology*
2023	Fast Company Best Workplaces for Innovators *Co-recipient for the Tau Motors strategic partnership that supports the work of graduate students leading to peer-reviewed journal publications and providing a career pipeline*
2023	Distinguished lecturer, class 2023, IEEE Vehicular Technology Society (VTS)
2022	Best paper award, ICAE Applied Energy Symposium: MIT A+B (MITAB)
2022	Best demo runner-up award, ACM Sensys
2022	IET fellow elevation, The Institution of Engineering and Technology (IET)
2022	Fast Company World Changing Ideas Awards (energy category) *Co-recipient for Tau Motors' Gamma eDrive based in part on licensed MPlab technology*
2021	Best student paper award, IEEE Transportation Electrification Conference (ITEC)
2019	Masao Horiba Awards honorable mention, Horiba Ltd., Horiba Group
2019	Best paper award, IEEE Transactions on Industrial Electronics
2019	Second paper award, IECON
2018	IEEE senior member elevation, Institute of Electrical and Electronics Engineers (IEEE)
2017	NSF Career award, National Science Foundation (NSF)
2016	South Tyrolean of the day, 28.12.2016, Südtirol 1 Radio, Italy *Media recognition for "outstanding contributions in electric and energy technology research."*
2016	Futura award, Futura Foundation, South Tyrol, Italy *Award is issued every two years to select young South Tyroleans who have established an international profile in economy, science, or culture.*
2015	Best presentation recognition, IECON
2012-13	PhD fellowship (borsa di ateneo), University of Padua, Italy
2011	Postgraduate fellowship, Province Bozen, Italy
2011	Award for outstanding achievements during academic studies, Province Bozen, Italy
2009	Best presentation award, Conference for MSc Energy Students (CES), Aalborg University, Denmark

4.2 Student Awards and Honors During Period of Supervision

Date	Name	Award or honor
2025	Noah H. Silverman	Teaching Fellow, CU SEAS
2025	Jingping Nie	Morton B. Friedman Memorial Prize for Excellence, CU SEAS

Date	Name	Award or honor
2025	Jingping Nie	CPS Rising Star
2025	Jingping Nie	Eli Jury Award, Columbia EE
2025	Youssef A. Fahmy	Collaborative Research Award, Columbia EE
2025	Bernard W. Steyaert	Department Service Award, Columbia EE
2024	Elliott K. Fix	Best Presentation Recognition, IEEE IECON
2024	Electric FSAE team	Joint Council Finance Committee (JCFC) Award
2024	Kamil M. Zajkowski	Dean's fellowship, Columbia SEAS
2024	Zong-Han (Mark) Lin	Dean's fellowship, Columbia SEAS
2024	Jingping Nie	Best Paper Award, ACM MobiSys
2024	Jingping Nie	People's Choice Demo Award, ACM MobiSys
2024	Matthew H. Jahnes	Eli Jury Award, Columbia EE
2024	Oliver W. MacGregor	MS Research Award, Columbia EE
2024	Mustafa Mert Saygi	Armstrong Memorial Award, Columbia EE
2023	Jingping Nie	EECS Rising Star
2023	Liwei Zhou	Chinese Govt. Award for Outstanding Self-financed Students
2023	Liwei Zhou	IEEE Industry Applications Society PhD Thesis Award First Prize
2023	Manfredi Gangi	Presidential fellowship, Columbia SEAS
2023	Haoyu Wang	Wei fellowship, Columbia SEAS
2023/24	Jingping Nie	Apple scholar AI/ML PhD fellowship
2023	Matthew H. Jahnes	Collaborative Research award, Columbia EE
2023	Youssef A. Fahmy	Jacob Millman award, Columbia EE
2023	Jingping Nie	Jacob Millman award, Columbia EE
2023	Boya Wang	Chiang Chen industrial fellowship, Columbia SEAS
2022	Alexandre Msellati	Byron fellowship, Columbia SEAS
2022	Benjamin Drillings	Dean's MS Academic Excellence award, Columbia SEAS
2022	Electric FSAE team	GM Everybody In Award (for commitment to inclusion and safety)
2022	Electric FSAE team	Zvi Galil award (for contributions to student life), Columbia SEAS
2022/23	Alan G. Li	Chateaubriand fellowship, Embassy of France in the United States
2022/23	Alan G. Li	Belgian American Educational Foundation (BAEF) fellowship The Belgian American Educational Foundation Inc.
2022	Alan G. Li	NSF Advanced Studies Institute (ASI) student
2022	Electric FSAE team	Tesla formula student battery sponsorship
2021	Tyler P. Riddle	Department service award, Columbia EE
2020	Jingping Nie	Best Demo Award, ACM/IEEE IPSN
2020	Electric FSAE team	Robert D. Lilley award, Columbia SEAS
2018	Liwei Zhou	Student travel grant, IEEE ECCE
2018	William M. Eull	Preceptor, Columbia MechE
2018	S. Nalakath	Nomination for the governor general's academic medal
2018	Paul Young	MS Armstrong memorial award, Columbia EE
2017	Bharat Agrawal	Student travel grant, IEEE APEC
2017	Xiaoqing Yong	Jacob Millman Award, Columbia EE
2017	Bharat Agrawal	Certificate of excellence for outstanding thesis, McMaster U.
2017	Paul Young	MS honors program, Columbia EE
2016	William M. Eull	Presidential fellowship, Columbia SEAS
2015	Yingguang Sun	Best presentation recognition, IECON

4.3 Society Memberships

Institute of Electrical and Electronics Engineers (IEEE)
Senior member, since 2018; Member, 2014 - 2018; Student member, 2012 - 2013
Societies and technical councils: Power Electronics Society (PELS), Industry Applications Society (IAS), Industrial Electronics Society (IES), Vehicular Technology Society (VTS), and Transportation Electrification Council (TEC)

The Institution of Engineering and Technology (IET)
Fellow, since 2022; Member, 2019 - 2022

Society of Automobile Engineers (SAE)
Member, since 2019

Italian Scientists and Scholars in North America Foundation (ISSNAF)
Member, since 2023

Südstern, since 2016
Member and member planet science

5 Publications

5.1 Overview

Research profile	ID	Listed publ.	Citations	H-index
Orcid	0000-0002-6713-2978			
IEEEXplore	37393812300	157	4,700	
Google Scholar	5yQsBEMAAAAJ	239	8,219	37
Scopus Author ID	36025772200	179	6,357	31
Web of Science ResearcherID	R-5223-2016	173	5,066	28

Retrieved Apr. 9, 2026

Notes: advisee names are underlined; the papers typically follow the author order convention: authors are listed in descending order of contribution grouped by students, researchers, and faculty. Authors are typically listed by contribution in descending order. Alternatively, researchers and faculty are sometimes listed by seniority in reverse order.

5.2 Books

ii. A. R. Peters and **M. Preindl**, *Space-Based Power Electronic Systems: Systems, Science, and Solutions* (Power Electronics and Power Systems). Springer Nature, 2025, in preparation

i. L. Zhou and **M. Preindl**, *Software-Defined Power Electronics - Converter Configurations, Control, and Optimization* (Power Electronics and Power Systems). Springer Nature, 2024. doi: 10.1007/978-3-031-59401-4

5.3 Journal Papers (Peer Reviewed)

vi. Z.-H. Lin, M. Gangi, N. Rahbariasr, B. Wang, W. W. Pennington, B. Pierquet, and **M. Preindl**, "Model predictive control for pmsm drives using piecewise affine magnetic modelling," *IEEE Transactions on Industry Applications*, vol. 1-1, PP, 2026, in review

v. M. Gangi, Y. A. Fahmy, B. Pierquet, W. W. Pennington, and **M. Preindl**, "Modular non-isolated on-board ev charger with reconfigurable pfc stage for multi-grid compatibility," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. PP, pp. 1–1, 2025, in review

iv. B. W. Steyaert, M. A. Parson-Scherban, and **M. Preindl**, "Optimal pwa flux maps for synchronous machines satisfying conservation of energy," *IEEE Transactions on Power Electronics*, vol. 1-1, PP, 2025, in review

iii. Y. A. Fahmy, M. Modi, and **M. Preindl**, "Optimization-based variable frequency soft-switching for 3-phase inverters using space vector modulation," *IEEE Transactions on Power Electronics*, vol. PP, pp. 1–1, 2025, in review

ii. N. Silverman and **M. Preindl**, "Variable-frequency soft-switching 3-phase inverter leveraging coupled inductors," *IEEE Transactions on Transportation Electrification*, vol. PP, pp. 1–1, 2025, in review

i. A. R. Peters, **M. Preindl**, and V. M. Fthenakis, "Orbital and rf power beaming analysis for space based solar power systems," *Springer Energy Systems*, vol. PP, pp. 1–1, 2025, in review

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73. Y. A. Fahmy, E. Fix, and **M. Preindl**, "Triaxial air-core inductors for variable frequency soft-switching in three-phase inverters," *IEEE Transactions on Industry Applications*, vol. PP, pp. 1–1, 2025.
doi: 10.1109/TIA.2025.3620312

72. L. Zhou, B. Wang, Z.-H. Lin, and **M. Preindl**, "Software-defined power electronics: Interconnection and coordination of the power modules," *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. PP, pp. 1–1, 2025.
doi: 10.1109/JESTPE.2025.3643864

71. J. Nie, Y. Fan, Z. Xuan, M. Zhao, R. Wan, **M. Preindl**, and X. Jiang, "Soundtrack: A contactless mobile solution for real-time running metric estimation for treadmill running in the wild," *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, vol. PP, pp. 1–1, 2025.
doi: 10.1145/3729486

70. A. R. Peters, **M. Preindl**, and V. M. Fthenakis, "Wide band gap semiconductor material damage mechanisms due to non-ionizing energy loss and displacement damage dose in space based solar systems," *MDPI Energies*, vol. 18, p. 509, 2025.
doi: 10.3390/en18030509

69. L. Zhou, N. H. Silverman, and **M. Preindl**, "Second harmonic injection with model predictive control: Attenuation of dc-link pulsations in single-phase inverters," *IEEE Transactions on Power Electronics*, vol. 40, pp. 6529–6538, 2025.
doi: 10.1109/TPEL.2024.3525390

68. L. Zhou and **M. Preindl**, "Single-phase transformerless onboard charger with reduced dc capacitance and leakage current," *IEEE Transactions on Vehicular Technology*, vol. 74, pp. 7497–7507, 2025.
doi: 10.1109/TVT.2024.3525386

67. J. Nie, H. Shao, Y. Fan, Q. Shao, H. You, **M. Preindl**, and X. Jiang, "Llm-based conversational ai therapist for daily functioning screening and psychotherapeutic intervention via everyday smart devices," *ACM Transactions on Computing for Healthcare*, 2025.
doi: 10.1145/3712299

66. Y. A. Fahmy, M. H. Jahnes, and **M. Preindl**, "Optimal variable frequency soft switching for interleaved grid tied inverters in electric vehicle charging applications," *MDPI Energies*, vol. 17, p. 6077, 2024.
doi: 10.3390/en17236077

65. M. H. Jahnes and **M. Preindl**, "A three-phase partial power processing soft-switched inverter," *IEEE Transactions on Power Electronics*, vol. 39, pp. 16 242–16 255, 2024.
doi: 10.1109/TPEL.2024.3452036

64. L. Zhou, M. Eull, and **M. Preindl**, "Derivation and review of optimization-based estimation for motor drives and power electronics," *IEEE Transactions on Industry Applications*, vol. 60, pp. 6593–6611, 2024.
doi: 10.1109/TIA.2024.3382639

63. L. Zhou and **M. Preindl**, "Analytical co-design of receding horizon estimation and control for power converters," *IEEE Transactions on Control Systems Technology*, vol. 32, pp. 1520–1527, 2024.
doi: 10.1109/TCST.2024.3374156

62. A. G. Li, M. Berecibar, and **M. Preindl**, "Nonlinear characterisation of lithium-ion batteries with bipolar pulsing," *IEEE Transactions on Industrial Electronics*, vol. 71, pp. 12 983–12 990, 2024.
doi: 10.1109/TIE.2024.3352159

61. M. Jahnes, L. Zhou, Y. Fahmy, and **M. Preindl**, "A peak 1.2mhz, >99.5% efficiency, and >10kw/l power density soft-switched inverter for ev fast charging applications," *IEEE Transactions on Transportation Electrification*, vol. 10, pp. 5520–5532, 2024.
doi: 10.1109/TTE.2023.3330997

60. L. Zhou and **M. Preindl**, "Variable switching frequency techniques for power converters: Review and future trends," *IEEE Transactions on Power Electronics*, vol. 38, pp. 15 603–15 619, 2023.
doi: 10.1109/TPEL.2023.3317232

59. L. Zhou and **M. Preindl**, "Reconfigurable hybrid micro-grid with standardized power module for high performance energy conversion," *Elsevier Journal of Applied Energy*, vol. 351, p. 121 708, 2023.
doi: 10.1016/j.apenergy.2023.121708

58. J. Jaworski, N. Zheng, **M. Preindl**, and B. Xu, "Vehicle-to-grid fleet service provision considering nonlinear battery behaviors," *IEEE Transactions on Transportation Electrification*, vol. 10, pp. 2945–2955, 2023.
doi: 10.1109/TTE.2023.3305235

57. A. G. Li, A. C. West, and **M. Preindl**, "Characterizing degradation in lithium-ion batteries with pulsing," *Elsevier Journal of Power Sources*, vol. 580, p. 233 328, 2023.
doi: 10.1016/j.jpowsour.2023.233328

56. L. Zhou and **M. Preindl**, "A multi-layer software-defined system for high performance electric vehicle energy conversion," *IEEE Transactions on Transportation Electrification*, vol. 9, pp. 3867–3879, 2023.
doi: 10.1109/TTE.2023.3243559

55. A. G. Li and **M. Preindl**, "Interpretable real-time modelling of the diffusion overpotential in lithium batteries," *IEEE Transactions on Transportation Electrification*, vol. 9, pp. 4605–4612, 2023.
doi: 10.1109/TTE.2023.3238282

54. Z. Hui, K. Mayilvahanan, A. Kingan, D. Bock, X. Tong, A. Li, T. Jin, **M. Preindl**, Y. Yang, K. Takeuchi, A. Marschilok, E. Takeuchi, and A. West, "Electrochemical characterization of degradation modes of high-voltage lixnio.33mno.33co0.3302 electrodes," *American Chemical Society (ACS) Energy Letters*, vol. 8, pp. 917–926, 2023.
doi: 10.1021/acsenergylett.2c02669

53. W. Wang, Y. A. Fahmy, and **M. Preindl**, "A low cost battery-balancing auxiliary power module with dual active half bridge links and coreless transformers," *IEEE Transactions on Transportation Electrification*, vol. 9, pp. 3801–3809, 2023.
doi: 10.1109/TTE.2023.3236610

52. B. W. Steyaert, E. B. Swint, W. W. Pennington, and **M. Preindl**, "Piecewise affine maximum torque per ampere for the wound rotor synchronous machine," *IEEE Transactions on Transportation Electrification*, vol. 9, pp. 4004–4013, 2023.
doi: 10.1109/TTE.2023.3236526

51. B. W. Steyaert, E. B. Swint, W. W. Pennington, and **M. Preindl**, "Piecewise affine magnetic modelling of permanent magnet synchronous machines for virtual-flux control," *MDPI Energies*, vol. 15, p. 7259, 2022.
doi: 10.3390/en15197259

50. J. Nie, L. Zhou, M. F. Kaye, C. C. Silveira, A. Nwokolo, X. Jiang, and **M. Preindl**, "High-performance optimal power flow estimation for ev-interfaced microgrids with standardized grid services," *IEEE Transactions on Industry Applications*, vol. 59, pp. 1199–1211, 2023.
doi: 10.1109/TIA.2022.3206734

49. L. Zhou and **M. Preindl**, "Hierarchical software-defined control architecture with mpc-based power module for grid-friendly renewable energy conversion and high performance electric motor drives," *IEEE Transactions on Sustainable Energy*, vol. 14, pp. 83–96, 2023.
doi: 10.1109/TSTE.2022.3202957

48. L. Zhou, M. Eull, and **M. Preindl**, "Optimization-based estimation and model predictive control for high performance, low cost software-defined power electronics," *IEEE Transactions on Power Electronics*, vol. 38, pp. 1022–1035, 2023.
doi: 10.1109/TPEL.2022.3202863

47. B. W. Steyaert, E. B. Swint, W. W. Pennington, and **M. Preindl**, "Piecewise affine modelling of wound-rotor synchronous machines for real-time motor control," *IEEE Transactions on Industrial Electronics*, vol. 70, pp. 5571–5580, 2023.
doi: 10.1109/TIE.2022.3196352

46. L. Zhou, M. Eull, W. Wang, and **M. Preindl**, "Modular model predictive control with regulated third harmonic injection for zero-sequence stabilized LCL inverter," *IEEE Transactions on Industry Applications*, vol. 58, pp. 7634–7647, 2022.
doi: 10.1109/TIA.2022.3193988

45. M. Jahnes, L. Zhou, M. Eull, W. Wang, and **M. Preindl**, "Design of a 22kw transformerless ev charger with v2g capabilities and peak 99.5% efficiency," *IEEE Transactions on Industrial Electronics*, vol. 70, pp. 5862–5871, 2023.
doi: 10.1109/TIE.2022.3192697

44. L. Zhou and **M. Preindl**, "Decentralized circulating current attenuation with model predictive control for distributed/shunted single/three-phase grid-tied inverters," *IEEE Transactions on Power Electronics*, vol. 37, pp. 11 534–11 539, 2022.
doi: 10.1109/TPEL.2022.3178931

43. L. Zhou, M. Jahnes, and **M. Preindl**, "Modular model predictive control of a 15kw, kilo-to-mega-hertz variable-frequency critical-soft-switching non-isolated grid-tied inverter with high efficiency," *IEEE Transactions on Power Electronics*, vol. 37, pp. 12 591–12 605, 2022. doi: 10.1109/TPEL.2022.3178417

42. A. G. Li, A. C. West, and **M. Preindl**, "Towards unified machine learning characterization of lithium-ion battery degradation across multiple levels: A critical review," *Elsevier Journal of Applied Energy*, vol. 316, p. 119 030, 2022. doi: 10.1016/j.apenergy.2022.119030

41. A. G. Li, W. Wang, A. C. West, and **M. Preindl**, "Health and performance diagnostics in li-ion batteries with pulse-injection-aided machine learning," *Elsevier Journal of Applied Energy*, vol. 315, p. 119 005, 2022. doi: 10.1016/j.apenergy.2022.119005

40. L. Zhou, M. Jahnes, M. Eull, W. Wang, G. Cen, and **M. Preindl**, "Robust control design for ride-through/trip of transformerless onboard bidirectional EV charger with variable-frequency critical-soft-switching," *IEEE Transactions on Industry Applications*, vol. 58, pp. 4825–4837, 2022. doi: 10.1109/TIA.2022.3165143

39. L. Zhou and **M. Preindl**, "Optimal tracking and resonance damping design of cascaded modular model predictive control for common-mode stabilized grid-tied LCL inverter," *IEEE Transactions on Power Electronics*, vol. 37, pp. 9226–9240, 2022. doi: 10.1109/TPEL.2022.3159599

38. E. Chemali, P. J. Kollmeyer, **M. Preindl**, Y. Fahmy, and A. Emadi, "A deep learning approach for state-of-health estimation of li-ion batteries," *MDPI Energies*, vol. 15, p. 1185, 2022. doi: 10.3390/en15031185

37. L. Zhou, M. Jahnes, M. Eull, W. Wang, and **M. Preindl**, "Control design of a 99% efficiency transformerless ev charger providing standardized grid services," *IEEE Transactions on Power Electronics*, vol. 37, pp. 4022–4038, 2022. doi: 10.1109/TPEL.2021.3124987

36. M. Eull, L. Zhou, M. Jahnes, and **M. Preindl**, "Bidirectional non-isolated fast charger integrated in the electric vehicle traction drivetrain," *IEEE Transactions on Transportation Electrification*, vol. 8, pp. 180–195, 2022. doi: 10.1109/TTE.2021.3124936

35. L. Zhou and **M. Preindl**, "High-frequency high-efficiency inductor design for non-isolated critical soft switching converters using solid and litz pcb and wire windings," *IEEE Transactions on Power Electronics*, vol. 37, pp. 3357–3373, 2022. doi: 10.1109/TPEL.2021.3113171

34. Y. A. Fahmy, W. Wang, A. C. West, and **M. Preindl**, "Snapshot soc identification with pulse injection aided machine learning," *Elsevier Journal of Energy Storage*, vol. 41, p. 102 891, 2021. doi: 10.1016/j.est.2021.102891

33. W. Wang and **M. Preindl**, "Maximum-power-per-ampere variable frequency modulation for dual active bridge converters in battery balancing application," *IEEE Transactions on Industrial Electronics*, vol. 69, pp. 5900–5910, 2022. doi: 10.1109/TIE.2021.3090709

32. J. Nie, Y. Liu, Y. Hu, Y. Wang, S. Xia, **M. Preindl**, and X. Jiang, "Spiders+: A light-weight, wireless, and low-cost glasses-based wearable platform for emotion sensing and bio-signal acquisition," *Elsevier Pervasive and Mobile Computing*, vol. 75, p. 101 424, 2021.
doi: 10.1016/j.pmcj.2021.101424

31. T. Dragicevic, A. Parisio, J. Rodriguez, C. Jones, D. Quevedo, L. Ferrarini, **M. Preindl**, Q. Shafiee, and T. Morstyn, "Guest editorial model predictive control in energy conversion systems," *IEEE Transactions on Energy Conversion*, vol. 36, pp. 1311–1312, 2021.
doi: 10.1109/tec.2021.3076279

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6 Patents and Inventions

6.1 Overview

Patents	WO	EP	US	CA	AU	JP	KR	CN	Total
Patent families	27	15	24	18	8	9	10	7	50
Patent applications	43	27	39	19	14	10	12	9	167
Granted patents		1	21	2	5	1	2	2	34

Retrieved Apr. 9, 2026

Notes: advisee names are underlined; patents are grouped by family; undisclosed patent applications and licenses are excluded; non-latin script patents are reported as known.

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3. E. Chemali and **M. Preindl**, "Neural network state-of-charge estimation," US11171498B2, US12372583B2 US20220271549A1, 2018.
url: https://patents.google.com/patent/US11171498

2. **M. Preindl** and A. Emadi, "Energy storage balancing system," US10581253B2, CA2955152C, 2017.
url: https://patents.google.com/patent/US10581253

1. M. Casazza, F. Oberbichler, and **M. Preindl**, "Wind power turbine for generating electric energy," WO2013093855A2, US9217414B2, EP2795114B1, ITMI20112323A1, 2012.
url: https://patents.google.com/patent/WO2013093855

6.4 Expired Patents

3. **M. Preindl** and D. Bagnara, "Wind turbine for generating electric energy," WO2013001496A2, US9200617B2, EP2727207A2, ITMI20111180A1, 2012.
url: https://patents.google.com/patent/WO2013001496

2. A. Fasolo, **M. Preindl**, M. Scuotto, and T. Kaessner, "Wind power turbine and wind power turbine control method," WO2013093894A1, US20140356162A1, EP2795111A1, ITMI20112385A1, 2012.
url: https://patents.google.com/patent/WO2013093894

1. **D. Bagnara** and M. Preindl, "Wind turbine for generating electric energy," WO2013093856A3, ITMI20112322A1, 2012.
url: https://patents.google.com/patent/WO2013093856

6.5 Licenses

3. Tau Motors Inc exclusive portfolio license of The Trustees Of Columbia University In The City Of New York intellectual property CU23078, CU22386, CU22309, CU22308, CU22163, CU22338, CU22337, CU22332, CU22331, CU22312, CU22245, CU22029, CU22014, CU22006, CU19310, CU19106, CU18100

2. Longmax Corp Ltd exclusive license (confidential value) of Trustees Of Columbia University In The City Of New York intellectual property CU20115, CU20116, CU20117

1. Enedym Inc exclusive license (undisclosed value) of McMaster University intellectual property US10581253B2, CA2955152C

6.6 Product Announcements

Listed products are based, in part. on the listed IP.

3. Tau Motors, "Tau redefines power electronics to accelerate electrification and smart energy applications," 2026.
url: https://www.prnewswire.com/news-releases/tau-redefines-power-electronics-to-accelerate-electrification-and-smart-energy-applications-302656862.html

2. Forvia Hella, "Forvia hella and tau motors partner to develop advanced charging solutions," 2025.
url: https://www.hella.com/en/Newsroom/Press-Releases/2025-09-02-FORVIA-HELLA-and-Tau-Motors-partner-to-develop-advanced-charging-solutions-6586/

1. Tau Motors, "Tau showcases gamma emachine at climate week 2025: Validation of rare-earth-free electric motor platform highlighted at columbia center of advanced electrification," 2025.
url: https://www.prnewswire.com/news-releases/tau-showcases-gamma-emachine-at-climate-week-2025-validation-of-rare-earth-free-electric-motor-platform-highlighted-at-columbia-center-of-advanced-electrification-302572071.html

7 Teaching Experience

7.1 Curriculum Innovations

Columbia EE Smart Electric Energy research and teaching area since 12.2017
Founding coordinator of the EE department *Smart Electric Energy* research area (established 02.2018) and the EE Master Program *Smart Electric Energy* concentration (established 12.2017)

Columbia EE master thesis 12.2018
Coordinated the introduction of a *master thesis* option for the EE master program

Columbia electric Formula SAE student team since 09.2018
Inaugural faculty adviser of the Columbia electric Formula SAE (eFSAE) team

7.2 Courses, Main Instructor

Date	Number	Course Title	Enrollment	Course Quality	Instructor Quality
25/26 F	ELEN E4361	Power Electronics (N. Silverman*)	15	[redacted]	[redacted]
24/25 S	ELEN E4361	Power Electronics	17	[redacted]	[redacted]
23/24 S	ELEN E4906	Electric Drivetrain Lab	25	[redacted]	[redacted]
23/24 F	ELEN E4361	Power Electronics	33	[redacted]	[redacted]
22/23 S	ELEN E9301	Advanced Power Electronics	8	[redacted]	[redacted]
22/23 F	ELEN E4361	Power Electronics	50	[redacted]	[redacted]
21/22 S	ELEN E6909	Motor Drive Systems	19	[redacted]	[redacted]
21/22 F	ELEN E4361	Power Electronics	41	[redacted]	[redacted]
20/21 S	ELEN E4361	Power Electronics	28	[redacted]	[redacted]
19/20 S	ELEN E4906	Electric Drivetrain Lab	17	[redacted]	[redacted]
19/20 F	ELEN E4361	Power Electronics	24	[redacted]	[redacted]
18/19 S	ELEN E4906	Electric Drivetrain Lab	14	[redacted]	[redacted]
18/19 F	ELEN E4361	Power Electronics	21	[redacted]	[redacted]
17/18 S	ELEN E6902	Renewable Power Systems	14	[redacted]	[redacted]
17/18 F	ELEN E9501	Advanced Power Electronics	5	[redacted]	[redacted]
17/18 F	ELEN E4361	Power Electronics	19	[redacted]	[redacted]
16/17 S	ELEN E6904	Motor Drive Systems	9	[redacted]	[redacted]
16/17 F	ELEN E4361	Power Electronics	20	[redacted]	[redacted]
16/17 F	ELEN E1102	Art of Engineering	5	[redacted]	[redacted]
15/16 S	ELEN E4361	Power Electronics	16	[redacted]	[redacted]
14/15 S	MAC 4PK4	Power Electronics	71	[redacted]	[redacted]

Student evaluations, overall course and instructor quality (mean value): 1 - poor, 2 - fair, 3 - good, 4 - very good, 5 - excellent
ELEN: Department of Electrical Engineering, Columbia University; MAC: Department of Electrical and Computer Engineering, McMaster University
* Teaching fellow, classroom instructor.
+ Information subject to change, e.g. midterm evaluation or early enrollment.

7.3 Courses, Coordinated

Date	Number	Course Title	Enrollment	Course Quality	Instructor
26/27 F	ELEN E6594	High Frequency Magnetics Design	tbd+	[redacted]	J. Pollock
26/27 F	ELEN E6590	Battery Systems	tbd+	[redacted]	N. Rahbariasr
26/27 F	ELEN E6591	Energy Storage for the Electric Grid	tbd+	[redacted]	M. Kamaludeen
26/27 F	ELEN E4511	Power Systems Analysis	tbd+	[redacted]	A. Mousa

25/26 S	EEME E6912	Model Predictive Control	tbd[+]	[redacted]	N. Rahbariasr
25/26 S	ELEN E6593	DERs and Smart Grid Systems	tbd[+]	[redacted]	M. Kamaludeen
25/26 S	ELEN E4510	Grid Modernization & Clean Tech	tbd[+]	[redacted]	S. Surresh
25/26 F	ELEN E6590	Battery Systems	25	[redacted]	N. Rahbariasr
25/26 F	ELEN E6591	Energy Storage for the Electric Grid	8	[redacted]	M. Kamaludeen
25/26 F	ELEN E4551	Electric Machines	4	n/r	S. Surresh
25/26 F	ELEN E4511	Power Systems Analysis	16	[redacted]	A. Mousa
24/25 S	ELEN E6907	Model Predictive Control	18	[redacted]	N. Rahbariasr
24/25 S	ELEN E6905	Smart Grid Technologies	10	[redacted]	S. Surresh
24/25 S	ELEN E4510	Solar Energy and the Smart Grid	25	[redacted]	M. Kamaludeen
24/25 S	ELEN E4901	Photovolt. Sys. Eng. & Sustainability	12	[redacted]	V. Fthenakis
24/25 F	ELEN E6909	Motor Drive Systems	20	[redacted]	S. Bolognani
24/25 F	ELEN E6901	Energy Storage for the Electric Grid	14	[redacted]	M. Kamaludeen
24/25 F	ELEN E4511	Power Systems Analysis	36	[redacted]	D. Sciano
23/24 S	ELEN E6905	Smart Grid Technologies	20	[redacted]	S. Surresh
23/24 S	ELEN E4510	Solar Energy and the Smart Grid	23	[redacted]	M. Kamaludeen
23/24 F	ELEN E6901	Energy Storage for the Electric Grid	17	[redacted]	M. Kamaludeen
23/24 F	ELEN E4511	Power Systems Analysis	46	[redacted]	D. Sciano
22/23 S	ELEN E6901	Smart Grid Technologies	33	[redacted]	S. Surresh
22/23 S	ELEN E4902	Electric Machines	9	[redacted]	M. Omidiora
22/23 F	ELEN E4511	Power Systems Analysis	28	[redacted]	D. Sciano
21/22 S	ELEN E6901	Smart Grid Technologies	50	[redacted]	S. Surresh
21/22 S	ELEN E4902	Electric Machines	22	[redacted]	M. Omidiora
21/22 F	ELEN E4511	Power Systems Analysis	30	[redacted]	D. Sciano
18/19 S	ELEN E4511	Power Systems Analysis	25	[redacted]	D. Sciano
17/18 S	ELEN E4511	Power Systems Analysis	19	[redacted]	D. Sciano

Notes: Courses are taught by adjunct faculty (underlined) with mentorship by M. Preindl.
Student evaluations, overall course quality (mean value): 1 - poor, 2 - fair, 3 - good, 4 - very good, 5 - excellent
[+] Information subject to change, e.g. midterm evaluation or early enrollment.

7.4 Advising and Mentorship

Associate Research Scientist

Date	Name	Research Topic
Since 2025	N. Rahbariasr	Power electronic systems for transportation electrification

Postdoctoral Research Scientist

Date	Name	Research Topic
Start 12.2025	Dehao Kong	Advanced control of power electronic systems
07.2022 - 06.2023	Liwei Zhou	Software-defined power electronics First job: Assistant professor, Department of Electrical Engineering, University of Texas at Arlington

PhD Thesis Supervision

Date	Name	Thesis
Start 09.2024	Zhuoxuan Li	Research direction: grid-firming inverters
Start 09.2024	Kamil M. Zajkowski	Research direction: smart electric energy conversion

Date	Name	Thesis
Start 09.2024	Ariana Haghighi	Research direction: smart electric energy conversion
Start 09.2024	Martha Gao	Research direction: smart electric energy conversion
Start 09.2024	Federico Coppo	Research direction: smart electric energy conversion
Start 09.2024	Zong-Han (Mark) Lin	Research direction: smart electric energy conversion
Start 09.2023	Manfredi Gangi	Research direction: Power electronics and energy storage
Since 01.2023	Elliott K. Fix	Research direction: EMC of software-defined power electronics
Since 09.2022	Reanna A. Orzechowski	Research direction: isolated DC/DC converters for electric vehicle supply equipment
Since 09.2022	Boya Wang	Research direction: distributed control of software-defined power electronics
Since 01.2022	Noah H. Silverman	"Soft-Switching Traction Inverter for Transportation Electrification" Expected graduation: 2026
Since 09.2021	Bernard W. Steyaert	"Piecewise Affine Model Predictive Control of Traction Motor Drives" Expected graduation: 2025
09.2020 - 05.2025	Youssef A. Fahmy	"Optimal Modulation and Air-core Inductor Design for High-Ripple Soft-Switching Inverters" https://doi.org/10.7916/20qt-sm15 First job: Senior Engineer, Tau Motors
09.2023 - 05.2025	Anthony Rafael Peters	"Orbital Analysis, Microwave Power Beaming and Semiconductor Material Damage Assessment for Space-Based-Solar Systems," Doctor of Engineering Science (DES) program, https://doi.org/10.7916/jbmc-kz40 [redacted]
09.2019 - 05.2025	Jingping Nie	"Embedded AI and Sensing for Wellness, Health, and Sustainability: Intelligent, Privacy-Aware Wearable Devices and AIoT Systems" https://doi.org/10.7916/mysc-zj31 First job: Assistant professor, School of Data Science and Society, University of North Carolina at Chapel Hill
09.2019 - 09.2024	Matthew H. Jahnes	"Software Defined Multilevel Power Electronics: Topologies with High Efficiency, High Power Density, and Linear Scaling" https://doi.org/10.7916/pe03-yw20 First job: Senior engineer, Analog Devices
09.2019 - 04.2024	Alan G. Li	"Pulse Perturbation for Battery Management" https://doi.org/10.7916/ttrn-5110 First job: Postdoc (start July 2024), Collège de France

Date	Name	Thesis
09.2017 - 06.2022	Liwei Zhou	"Model Predictive Critical Soft-Switching Enabling High-Performance Software-Defined Power Electronics: Converter Configuration, Efficiency, and Redundancy" https://doi.org/10.7916/s71k-qs53 First job: Postdoc, MPlab, Columbia University
09.2016 - 06.2021	W. Michael Eull	"Bidirectional Non-Isolated Smart Fast Charger Integrated in the Traction Drive Train" https://doi.org/10.7916/d8-jygn-fh02 First job: Research engineer, Power Networks Demonstration Centre, University of Strathclyde Glasgow
09.2016 - 09.2020	Weizhong Wang	"Wired and Wireless Dual Cell Links for Battery Balancing Auxiliary Power Modules" https://doi.org/10.7916/d8-hx3f-c914 First job: Senior engineer, Lucid Motors
01.2015 - 03.2018	Ephrem Chemali	"Intelligent State-of-Charge and State-of-Health Estimation Framework for Li-ion Batteries in Electrified Vehicles using Deep Learning Techniques," McMaster University (co-supervision), main adviser: A. Emadi http://hdl.handle.net/11375/23021 First job: Senior Engineer, Huawei Technologies
09.2014 - 03.2018	Shamsuddeen Nalakath	"Robust Position Sensorless Model Predictive Control for Interior Permanent Magnet Synchronous Motor Drive," McMaster University (co-supervision), main adviser: A. Emadi http://hdl.handle.net/11375/22850 First job: Principal Research Engineer, McMaster University
09.2014 - 12.2016	Yingguang Sun	"Unified Position Sensorless Solution with Wide Speed Range Capabilities for IPMSM Drives," McMaster University (co-supervision), main adviser: A. Emadi http://hdl.handle.net/11375/20894 First job: Engineer, Rockwell Automation

MS Thesis Supervision

Date	Name	Thesis
09.2020 - 04.2022	Bernard W. Steyaert	"Control of vertically stacked autoconverter modules"
09.2020 - 12.2021	Youssef A. Fahmy	"Snapshot SoC Identification with Pulse Injection Aided Machine Learning"
09.2019 - 08.2020	Alan G. Li	"State Estimation in Lithium-ionBatteries Using Pulse Perturbationand Feedforward Neural Networks" https://doi.org/10.7916/d8-7qd7-bg33
09.2019 - 05.2020	Max P. Moeller	"High-Frequency Magnetics Design for Highly Efficient Power Conversion for Vehicle to Vehicle, Vehicle to Grid,and Grid to Vehicle Applications"

Date	Name	Thesis
01.2019 - 12.2019	Chenyao Liao	"Battery State-of-Charge Estimation Using Neural Networks" http://dx.doi.org/10.7916/d8-v0vk-g014
01.2015 - 06.2017	Bharat Agrawal	"Loss Minimization using Linear Soft-Switching with Wide Bandgap Devices in Efficient High-Frequency DC-DC Converters," McMaster University (co-supervision), main adviser: A. Emadi http://hdl.handle.net/11375/22129 First job: Engineer, Texas Instruments
04.2014 - 08.2016	William M. Eull	"Three-Phase Inverter Design Using Wide-Bandgap Semiconductors to Achieve High Power Density," McMaster University (co-supervision), main adviser: A. Emadi http://hdl.handle.net/11375/20411 First job: PhD Student, Columbia University
06.2014 - 08.2016	Lucas McCurlie	"Redistributive Non-Dissipative Battery Balancing Systems with Isolated DC/DC Converters: Theory, Design, Control and Implementation," McMaster University (co-supervision), main adviser: A. Emadi http://hdl.handle.net/11375/20272 First job: Research Engineer, McMaster University

MS Project Supervision

Date	Name	Project
Since 01.2025	Yousef AlQattan	Grid-forming inverters
09.2023 - 12.2024	Oliver W. McGregor	Sensor design of motor drive systems
09.2023 - 04.2024	Haoyu Wang	Isolated AC to DC converters
01.2023 - 12.2023	Ananda T. Adisurja	PMSM motor control with dSpace
09.2022 - 12.2023	Etornam K. Ahorsu	Control of a PMSM drive
09.2022 - 04.2023	Benjamin Drillings	Modeling and measurement of parasitic capacitances in power FET heat sinks
01.2022 - 12.2022	Daniel Delgado	Power electronic PCB design
01.2022 - 12.2022	Steven Corcoran	Power electronic PCB design
09.2022 - 12.2022	Musaed Albaghdadi	Power electronic PCB design
01.2022 - 04.2023	Alexandre Msellati	Magnetic design for soft-switching power converters
07.2021 - 12.2022	Po Lin	SiC FET double pulse testing
01.2021 - 12.2021	Cyril Darku	PMSM motor control with dSpace
09.2019 - 04.2021	Margaret F. Kaye, Afam Nwokolo, C. Silveira, P. L. Malinverni	Data-driven state and parameter estimation for a smart distribution grid
01.2019 - 05.2019	Max P. Moeller	Battery Pack optimization for an eFSAE vehicle drivetrain
09.2017 - 05.2019	Jack Bott	Design and implementation of a smart motor control interface
01.2018 - 05.2018	Nico Hoernle	Battery Pack for an eFSAE vehicle drivetrain

Date	Name	Project
09.2016 - 05.2018	Paul Young	Design and experimental validation of a soft-switching non-isolated dc-dc converter
06.2016 - 08.2016	Yao Song	

Undergraduate Project Supervision

Date	Name	Project
09.2023 - 04.2024	Mustafa M. Saygi	Electric Formula SAE: Club President
09.2023 - 04.2024	Matthew E. Modi	Electric Formula SAE: Chief Electrical Engineer
09.2022 - 04.2023	Ourania Stouraiti	Electric Formula SAE: Chief Electrical Engineer
09.2020 - 04.2021	Tyler P. Riddle	Electric Formula SAE: Chief Electrical Engineer
09.2019 - 04.2020	B. W. Steyaert	Electric Formula SAE: Chief Electrical Engineer
06.2019 - 12.2021	Youssef A. Fahmy	SoC estimation of Li-Ion batteries using machine learning
01.2019 - 05.2019	Max Moeller	Battery Pack for an eFSAE vehicle drivetrain
01.2018 - 05.2018	D. Ren, I. Niang, A. Gao, X. Wei	Electric Motor Drive for an eFSAE vehicle drivetrain, senior project co-supervision
09.2016 - 12.2016	A. S. Musipatla	

Visiting Professors

Date	Name	Home institution
08.2024 - 12.2024	Silverio Bolognani	University of Padua, Italy

Visiting Scholars

Date	Name	Home institution
08.2025 - 11.2025	Luca DiCristo	University of Naples Federico II, Italy
02.2025 - 08.2025	Steyn Guelen	Eindhoven University of Technology, Netherlands
10.2023 - 03.2024	Andrea Zilio	University of Padua, Italy
04.2018 - 11.2018	Francesco Toso	University of Padua, Italy

7.5 Reader and Examiner

PhD Thesis Defense Committee

Date	Name	Adviser	Department	Notes
01.2025	Sadra Tavakolian	B. Nahid-Mobarakeh	McMaster ECE	
05.2025	Youssef A. Fahmy	Matthias Preindl	Columbia EE	Adviser
05.2025	Anthony Peters	Matthias Preindl	Columbia EE	Adviser
05.2025	Jingping Nie	Matthias Preindl	Columbia EE	Adviser
12.2024	Zhaoqing Wang	Mingoo Seok	Columbia EE	
08.2024	Matthew H. Jahnes	Matthias Preindl	Columbia EE	Adviser
04.2024	Alan G. Li	Matthias Preindl	Columbia EE	Adviser
09.2022	Ashish Shukla	Mingoo Seok	Columbia EE	
09.2022	K. Mayilvahanan	Alan C. West	Columbia CHEME	
05.2022	Liwei Zhou	Matthias Preindl	Columbia EE	Adviser
12.2021	Dongkwun Kim	Mingoo Seok	Columbia EE	
07.2021	W. Michael Eull	Matthias Preindl	Columbia EE	Adviser
07.2021	Peter Wei	Xiaofan (Fred) Jiang	Columbia EE	Chair
12.2020	Sung Justin Kim	Mingoo Seok	Columbia EE	

Date	Name	Adviser	Department	Notes
09.2020	Weizhong Wang	Matthias Preindl	Columbia EE	Adviser
07.2020	Fengqi Zhang	Kenneth Shepard	Columbia EE	
01.2020	Chengrui Le	Peter Kinget	Columbia EE	
10.2018	Doyun Kim	Mingoo Seok	Columbia EE	
09.2018	Kevin Tien	Kenneth Shepard	Columbia EE	
06.2017	Saleh Soltan	Gil Zussman	Columbia EE	
11.2016	Sharvil Patil	Yannis Tsividis	Columbia EE	
09.2016	Thomas Nikolakakis	Vasilis Fthenakis	Columbia EEE	

PhD Thesis Proposal Exam Committee

Date	Name	Adviser	Department	Notes
09.2025	Elliott Fix	Matthias Preindl	Columbia EE	Adviser
09.2025	Reanna A. Orzechowski	Matthias Preindl	Columbia EE	Adviser
08.2025	Boya Wang	Matthias Preindl	Columbia EE	Adviser
08.2025	Noah H. Silverman	Matthias Preindl	Columbia EE	Adviser
05.2025	Yinbo Hu	Vijay Modi	Columbia ME	
05.2024	Yiqian Wu	James Anderson	Columbia EE	Chair
04.2024	Bernard W. Steyaert	Matthias Preindl	Columbia EE	Adviser
04.2024	Youssef A. Fahmy	Matthias Preindl	Columbia EE	Adviser
04.2024	Zhaoqing Wang	Mingoo Seok	Columbia EE	
07.2023	Anthony R. Peters	Vasilis Fthenakis	Columbia EEE	
10.2022	Jingping Nie	Matthias Preindl	Columbia EE	Adviser
05.2022	Matthew H. Jahnes	Matthias Preindl	Columbia EE	Adviser
12.2021	Alan G. Li	Matthias Preindl	Columbia EE	Adviser
05.2021	Eric Loscalzo	Kenneth Shepard	Columbia EE	
07.2020	Dongkwun Kim	Mingoo Seok	Columbia EE	
02.2020	Sung Justin Kim	Mingoo Seok	Columbia EE	
02.2020	Fengqi Zhang	Kenneth Shepard	Columbia EE	
01.2019	Liwei Zhou	Matthias Preindl	Columbia EE	Adviser
12.2019	Peter Wei	Xiaofan (Fred) Jiang	Columbia EE	Chair
12.2018	John Barth	Kenneth Shepard	Columbia EE	
04.2018	Doyun Kim	Mingoo Seok	Columbia EE	
01.2018	W. Michael Eull	Matthias Preindl	Columbia EE	Adviser
01.2018	Weizhong Wang	Matthias Preindl	Columbia EE	Adviser

8 Invited Talks and Contributions

8.1 Invited Seminars and Lectures

50. **M. Preindl**, "Grid-interactive ev charging systems," TEC Distinguished Lecture, IEEE Nigeria Section, 2025
49. **M. Preindl**, "Software-defined power electronics in ev charging and battery management systems," Seminar, École Polytechnique, 2025
48. **M. Preindl**, "Power electronic systems for transportation electrification," Invited Talk, Université de technologie de Belfort Montbéliard (UTBM), 2025
47. **M. Preindl**, "Power electronic systems for transportation electrification," Invited Talk, RWTH Aachen, 2025
46. **M. Preindl**, "Power electronic systems for transportation electrification," Invited Talk, Paris-Saclay University, CentraleSupélec, 2025
45. **M. Preindl**, "Software-defined power electronics applied to transportation electrification," Invited Talk, Power & Energy Systems Seminar, University of Illinois Urbana-Champaign, 2024
44. **M. Preindl**, "Software-defined power electronics applied to transportation electrification," Invited Talk, Northeast Power Electronics Symposium (NEPES), University of Connecticut, 2024
43. **M. Preindl**, "Software-defined ev chargers: Implementation and opportunities of vehicle to grid services," Invited Talk, Workshop on Methods and Practices in Urban Mobility Management, Alliance Program, Columbia University, 2024
42. **M. Preindl**, "Software-defined power electronics," Invited Talk, The Future of the Electric Grid Workshop, Climate School, Columbia University, 2024
41. **M. Preindl**, "Design and control of power electronic systems for batteries," Invited Seminar, Stanford University, Department of Energy Science and Engineering, 2024
40. **M. Preindl**, "Software-defined inverters," Keynote, IEEE Power Electronics and Motion Control Conference (PEMC), 2024
39. **M. Preindl**, "Pulse injection aided battery modeling and estimation," Plenary Session, IEEE Electric Vehicles International Symposium (EVIS), 2024
38. **M. Preindl**, "Pulse injection aided machine learning for battery pack state estimation," Invited Talk, Advanced Automotive Battery Conference (AABC), 2023
37. **M. Preindl**, "Software-defined power electronics," Invited Talk, Fraunhofer monthly colloquium, 2023
36. **M. Preindl**, "Motor drive systems without rare-earth permanent magnets," Invited Speaker, Internationales Forum Mechatronik (IFM), 2023
35. **M. Preindl**, "Model predictive control and estimation for motor drive systems," Invited Talk, Paris-Saclay University, CentraleSupélec, 2023

34. **M. Preindl**, "Model predictive control and estimation for motor drive systems," Invited Lecture, RWTH Aachen, 2023

33. **M. Preindl**, "Software-defined power electronics," Invited Lecture, ETH, Department of Information Technology and Electrical Engineering, 2023

32. **M. Preindl**, "Software-defined power electronics," Keynote, International Meet on Power Electronics and Applications (PEAMEET), 2023

31. **M. Preindl**, "Software-defined power electronics," Seminar, Georgia Institute of Technology, School of Electrical and Computer Engineering, 2023

30. **M. Preindl**, "Software-defined power electronics," Keynote, Global Summit on Power and Energy Engineering (GSPEE), 2023

29. **M. Preindl**, "Software-defined power electronics," Webminar, IEEE Industrial Electronics Society (IES), 2023

28. **M. Preindl**, "Software-defined power electronics," Invited Seminar, Stanford University, Department of Electrical Engineering, 2023

27. **M. Preindl**, "Software-defined power electronics," Keynote, International Meet on Renewable and Sustainable Energy (RENEWABLEMEET), 2023

26. **M. Preindl**, "Software-defined power electronics," Invited Lecture, Naval Postgraduate School, 2023

25. **M. Preindl**, "Software-defined power electronics," Invited Talk, ECE Colloquia, North Carolina State University, 2023

24. **M. Preindl**, "Software-defined power electronics," Webminar, IEEE Power Electronic Society (PELS) and Transportation Electrification Community (TEC), 2023

23. **M. Preindl**, "Towards high performance battery pack management using pulse injection aided machine learning," Invited Talk, University of Maryland, College Park, 2022

22. **M. Preindl**, "Software-defined power electronics," Invited Talk, Brookhaven National Laboratory (BNL), 2022

21. **M. Preindl**, "Transformerless ev charging," Invited Talk, PSMA Vehicle Electrification Workshop: The Latest Trends and Technologies, 2022

20. A. G. Li and **M. Preindl**, "Machine learning characterization of lithium-ion battery degradation," Invited presentation, Electra Vehicles education platform (Electra University), 2022

19. L. Zhou and **M. Preindl**, "A multi-layer software-defined architecture with mpc-vfcss-based power module for high performance electric vehicle energy conversion," ICAE Applied Energy Symposium: MIT A+B (MITAB), 2022

18. **M. Preindl**, "Software-defined power electronics for grid-interactive electric vehicles," University of California Berkeley, IEEE Power and Energy chapter, 2022

17. **M. Preindl**, "Advanced control and software-defined inverters for next-generation ev traction motor drives," Invited Seminar, University of Connecticut, 2021

16. **M. Preindl**, "Software-defined power electronics for grid-interactive electric vehicles," Invited Guest Lecture, Stanford University, 2021

15. **M. Preindl**, "Software-defined power electronics for grid-interactive electric vehicles," Invited Talk, Paris-Saclay University, CentraleSupélec and École normale supérieure, 2021
14. **M. Preindl**, "Software-defined power electronics for grid-interactive electric vehicles," Invited Seminar, Temple University, College of Engineering, 2021
13. **M. Preindl**, "Design and control of integrated power electronic systems," Invited Talk, Technical University Graz, 2020
12. **M. Preindl**, "Machine learning for large pack state estimation," Invited Talk, Batteries Gordon Research Conference (GRC), 2020
11. **M. Preindl**, "Data-driven modeling and estimation of battery storage system properties," Invited Talk, Consortium for Battery Innovation (CBI) Technical Workshop, 2019
10. **M. Preindl**, "Advanced control of power electronic systems for next-generation electric vehicle drivetrains," Invited Talk, Oak Ridge National Laboraotry (ORNL), 2019
9. **M. Preindl**, "Advanced control of power electronic systems for next-generation electric vehicle drivetrains," Invited Talk, Guoxuan High-Tech (Gotion Inc.), 2019
8. **M. Preindl**, "Advanced control of power electronic systems for next-generation electric vehicle drivetrains," Invited Talk, Technical University Graz, Institute for Electrical Drives and Machines, 2018
7. **M. Preindl**, "Optimization-based control and estimation," Keynote, IEEE International Symposium on Predictive Control of Electrical Drives and Power Electronics (PRECEDE), 2017
6. **M. Preindl**, "The future of electric vehicles and the grid," Invited Talk, Inter-American Development Bank (IADB), Information Communication Technologies (ICT) Conference, 2017
5. **M. Preindl**, "Nondissipative balancing of battery and supercapacitor modules," Invited Talk, Oxford University, Department of Engineering Science, 2015
4. **M. Preindl**, "Power electronics: A shift to systems integration," Invited Talk, Columbia University, Department of Electrical Engineering, 2015
3. **M. Preindl**, "Model predictive control in pmsm drive systems," Invited Talk, Leuphana University of Lueneburg, Institute of Product and Process, 2012
2. **M. Preindl**, "Model predictive control of power electronics and drives," Invited Talk, University of California Berkeley, Department of Mechanical Engineering, Model Predictive Control Laboratory, 2012
1. **M. Preindl**, "Switching frequency reduction using sensorless model predictive direct current control for high power vsi," Invited Talk, Aalborg University, Department of Energy Technology and KK Electronic, 2010

8.2 Panels, Short Courses, Tutorials, Demos

9. **M. Preindl**, "Software-defined power electronics: Theory and study cases," Tutorial, IEEE International Symposium on Diagnostics for Electric Machines, Power Electronics and Drives (SDEMPED), 2023
8. **M. Preindl**, "Software-defined power electronics: Theory and study cases," Tutorial, IEEE Electric Ship Technologies Symposium (ESTS), 2023
7. L. Zhou, M. Jahnes, and **M. Preindl**, "Control and design of software-defined power electronics for electric vehicle energy conversion system," Tutorial, IEEE Transportation Electrification Conference (ITEC), 2023
6. J. Nie, L. Hu, Y. Liu, Y. Fan, **M. Preindl**, and X. Jiang, "Human-centric data-driven optimization and recommendation in ev-interfaced grid at city scale," Demo, ACM Conference on Embedded Networked Sensor Systems (BuildSys), 2022
5. J. Nie, M. Zhao, S. Xia, X. Sun, H. Shao, Y. Fan, **M. Preindl**, and X. Jiang, "Ai therapist for daily functioning assessment and intervention using smart home devices," Demo, ACM International Conference on Systems for Energy-Efficient Built Environments (SenSys), 2023
4. L. Zhou and **M. Preindl**, "High performance litz/solid pcb inductor design for high frequency and high current ripple applications," Student Demonstration, IEEE Energy Conversion Congress and Exposition (ECCE), 2022
3. L. Zhou and **M. Preindl**, "High efficiency non-isolated bidirectional ev charger integrated into traction drivetrain with variable-frequency critical-soft-switching," Student Demonstration, IEEE Energy Conversion Congress and Exposition (ECCE), 2022
2. L. Zhou, M. Jahnes, J. Alinei, L. Villa, and **M. Preindl**, "Software-defined power electronics: Theory and study cases," Short Course, IEEE/AIAA Transportation Electrification Conference and Electric Aircraft Technologies Symposium (ITEC+EATS), 2022
1. M. Ginsberg, **M. Preindl**, V. Weyl, D. Mohan, V. Gore, K. Hsu, and Y. Shi, "Building out electric vehicle charging infrastructure: Ev systems and grid impacts," Townhall Panel, IEEE/AIAA Transportation Electrification Conference and Electric Aircraft Technologies Symposium (ITEC+EATS), 2022

8.3 Other Talks and Events

7. "Roundtable discussion on advanced energy with the French Minister for Higher Education and Research Philippe Baptiste," CentraleSupélec, 2025
6. "Roundtable discussion on environmental and energetic challenges with the Italian Minister for Environment and Energy Security Gilberto Pichetto Fratin," Consulate General of Italy in New York, Consul General Fabrizio Di Michele, 2023
5. **M. Preindl**, "Pulse injection aided machine learning for battery pack state estimation," Invited Talk, Columbia Electrochemical Energy Center (CEEC) Symposium, 2022
4. **M. Preindl**, "Impressions from academia: A story of courage, a story of interests, and a story of stubborness," Invited speaker, inauguration of the friends of the Industrial Technical Institute (Technologische Fachobserchule) association, 2022

3. **M. Preindl**, "Electrified transportation: Challenges and future trends," Columbia University, Board of Visitors, Fall Board Meeting, 2017

2. **M. Preindl**, "Electrified transportation," Columbia University, Engineering for Humanity - Smart Cities: Sustainable, Healthy, Secure, Connective, Creative, 2017

1. **M. Preindl**, "Generation, sensing/control, power electronics, building/vehicle integration," Columbia University, Engineering for Humanity - Repowering the Planet, 2017

8.4 Media, Interviews

21. "How industry-academic partnerships support bold ideas," Columbia Engineering, 2026.
url: https://www.engineering.columbia.edu/about/magazine/industry-edition/how-industry-academic-partnerships-support-bold-ideas

20. "Columbia symposium explores the future of electrification," Columbia Engineering, 2025.
url: https://www.engineering.columbia.edu/about/news/columbia-symposium-explores-future-electrification

19. "Partnering with industry to revolutionize electric energy," Columbia Engineering, 2025.
url: https://www.engineering.columbia.edu/about/news/partnering-industry-revolutionize-electric-energy

18. N. Rivero, "Ev owners are using their trucks' giant batteries to prevent blackouts," Washington Post, 2025.
url: https://www.washingtonpost.com/climate-solutions/2025/10/12/electric-vehicle-battery-blackouts/

17. "Columbia engineering launches center of advanced electrification," Columbia Engineering, 2025.
url: https://www.engineering.columbia.edu/about/news/columbia-engineering-launches-center-advanced-electrification

16. J. Ewing, "How electric car batteries might aid the grid (and win over drivers)," Interview, New York Times, USA, 2024.
url: https://www.nytimes.com/2024/06/05/business/energy-environment/electric-car-batteries-grid.html

15. "Driving the future of energy and transportation," Columbia Engineering, 2024.
url: https://www.ee.columbia.edu/news/driving-future-energy-and-transportation

14. T. Carter, "3 reasons why electric cars will soon get a lot cheaper," Interview, Business Insider, USA, 2023.
url: https://www.businessinsider.com/electric-cars-getting-cheaper-batteries-charging-ev-tesla-ford-2023-11

13. "An electrifying collaboration: From the lab to the marketplace," Feature Story, AAAS EurekAlert! 2023.
url: https://www.eurekalert.org/news-releases/997875

12. "Lithium needs for automotive," Interview, Radio KCBS, USA, 2023

11. P. Waldmeir, “Evs may become personal power plants for owners,” Interview, Financial Times, USA, 2023.
url: https://www.ft.com/content/96d7dee4-b25d-4125-bd65-9c9ed4c04e84

10. L. Galst, “Electric vehicle batteries are really good, and they’re getting even better,” Interview, Environmental Defense Fund, USA, 2023.
url: https://vitalsigns.edf.org/story/electric-vehicle-batteries-are-really-good-and-theyre-getting-even-better

9. U. Irfan, “Why is it so hard to charge electric vehicles on the road?” Interview, Vox, USA, 2023.
url: https://www.vox.com/climate/23589785/ev-dc-fast-charging-station-battery-electric-tesla-rivian

8. T. Levin, “Electric cars won’t just solve tailpipe emissions — they may even strengthen the us power grid, experts say,” Interview, Business Insider, USA, 2022.
url: https://www.businessinsider.in/thelife/news/electric-cars-wont-just-solve-tailpipe-emissions-they-may-even-strengthen-the-us-power-grid-experts-say/articleshow/95340487.cms

7. T. Levin, “Electric cars won’t overload the power grid — and they could even help modernize our aging infrastructure,” Interview, Business Insider, USA, 2022.
url: https://www.businessinsider.in/thelife/news/electric-cars-wont-overload-the-power-grid-and-they-could-even-help-modernize-our-aging-infrastructure/articleshow/94741117.cms

6. “Power electronic research for electric vehicles,” Interview, Radio Holiday, Italy, 2022

5. M. Kaufman, “What america’s epic electric vehicle charging system may look like,” Interview, Mashable, USA, 2020.
url: https://mashable.com/article/electric-vehicle-charging-network-us

4. N. Averett, “Charging ahead,” Columbia Engineering Magazine, 2018.
url: https://magazine.engineering.columbia.edu/fall-2019/charging-ahead

3. M. Harris, “Transformers,” Columbia Engineering Magazine, 2018.
url: https://magazine.engineering.columbia.edu/fall-2018/transformers

2. “Thinking outside the power box: Matthias preindl takes converters virtual,” News Release, AAAS EurekAlert! 2017.
url: https://www.eurekalert.org/news-releases/751865

1. “Power electronics for electric vehicles,” Interview, Radio Suedtirol 1, Italy, 2016

9 Service

9.1 Academic Service

Date	Role
24/25	CU SEAS, Aerospace Faculty Search Committee
22/23	CU Climate School, Academic Strategic Planning Committee - Decarbonization
Since 21/22	CU EE, Faculty Affairs - Faculty Search
Since 21/22	CU EE, Graduate Affairs - Doctoral Qualifying Exam
Since 19/20	CU EE, Academic Affairs - Curriculum (chair and committee of instruction representative since 24)
Since 19/20	CU EE, Academic Affairs - Course Scheduling
17/18 - 18/19	CU EE, Undergraduate Affairs- UG Affairs/Recruiting
Since 16/17	CU EE, Graduate Affairs - MS Advising/Monitoring/Awards
16/17 - 18/19	CU EE, Graduate Affairs - MS Program: MS Career/Development/Internships
16/17	CU EE, Graduate Affairs - PhD Program: PhD Admissions
Since 18/19	CU EE, Special Committees - EE Distinguished Lectures

9.2 Professional Service

International Conferences and Workshops

Date	Role	Venue
2024	Tutorial Chair	ESARS-ITEC
2024	Chair	Columbia Forum on Smart Electric Energy and Transportation
2023	Vice Chair, Technical Program	IEEE ECCE
2023	Chair	Columbia Forum on Smart Electric Energy and Transportation
2023	Technical program committee	ACM e-Energy
2022	General chair	IEEE/AIAA ITEC+EATS
2021	Program chair	IEEE ITEC
2020	Co-program chair	IEEE ITEC
2019	Steering committee member	IEEE PRECEDE
2019	Technical program committee	IEEE SLED
2019	Treasurer	IEEE ITEC
2018	Technical program committee	IEEE SLED
2018	Publication chair	IEEE ITEC
2017	Steering committee member	IEEE PRECEDE
2017	Technical program co-chair	IEEE ITEC
2017	Topic chair	IEEE ECCE
2017	Chair	Columbia Forum on Electrified Transportation: Challenges and Future Trends
2016	Topic chair	IEEE ECCE

Committee and Professional Society Positions (by Appointment or Election)

Date	Role	Venue
Since 2025	TEC corresponding member	IEEE Technical Activities Board (TAB), Finance Committee (FinCom)

Date	Role	Venue
Since 2024	Inaugural treasurer	IEEE TEC
Since 2023	Chair (founding)	IEEE TEC TC1: Tech. Com. on Battery Systems
2023	Steering committee, Industrial Electronics Society (IES) rep.	IEEE Transportation Electrification Council
Since 2021	Conference chair	IEEE PELS TC4: Technical Committee on Vehicle and Transportation Systems

Review Panels

Date	Role	Institution
2024	Panelist	National Science Foundation (NSF)
2023	Panelist	IEEE Admission and Advancement (A & A)
2022	Panelist	National Science Foundation (NSF)
2019	Panelist	National Science Foundation (NSF)
2016	Panelist	National Science Foundation (NSF)
2016	Reviewer	Chilean National Science and Technology Commission (CONICYT)