

Andrew Weng
Curriculum Vitae

e-mail: asweng@umich.edu | *tel:* +1-734-358-1894 | *website:* wengandrew.github.io

(a) Professional Preparation

Ph.D. Mechanical Engineering, University of Michigan	2024
M.S. Computer Science, Georgia Institute of Technology	2020
B.A.Sc. Nanotechnology Engineering (Physics Option), University of Waterloo, <i>Dean's List</i>	2013

(b) Professional and Research Positions

2024–present: **EV Center Postdoctoral Research Fellow**, University of Michigan, Ann Arbor, MI
2024–present: **Project Engineer**, University of South Carolina, Columbia, SC (*remote*)
2021–2024: **Staff Cell Engineer**, Tesla, Palo Alto, CA (*remote*)
2017–2021: **Senior Cell Research Engineer**, Tesla, Palo Alto, CA
2014–2017: **Cell Test Engineer**, Tesla, Palo Alto, CA
2013: **Battery Technology Intern**, Tesla, Palo Alto, CA
2013: **Nanotechnology Technician** US Nano LLC, South Bend, IN
2012: **Research Assistant**, Harvard-MIT Health Sciences and Technology, Cambridge, MA
2012: **Research Assistant**, University of Waterloo, Chemistry, Waterloo, ON, Canada
2012: **Technical Consultant Co-Op**, Blake, Cassels, & Graydon LLP, Toronto, ON, Canada
2011: **Research Assistant**, University of Waterloo, Mechanical Engineering, Waterloo, ON, Canada
2010: **Mechanical Quality Engineer Co-Op**, Applied Kinetics Inc, Ancaster, ON, Canada
2009: **Research Assistant**, University of Waterloo, Chemical Engineering, Waterloo, ON, Canada

(c) Awards and Recognition

2024: Top Poster, Technology Barriers to Electric Vehicle Implementation, Cell Press, Ann Arbor, MI
2023: S.M. and Benjamin Wu Fellowship in Manufacturing, University of Michigan
2020: Benton, Dwight F. Fellowship, University of Michigan
2020: Forrest Student Fellowship, University of Michigan
2013: Best Student Poster, Division of Theoretical Physics, CAP Congress, Montreal, Canada
2013: *NSERC Alexander Graham Bell Graduate Scholarship, University of Waterloo, Canada
2013: President's Graduate Scholarship, University of Waterloo, Canada
2011: *NSERC Undergraduate Student Research Award, University of Waterloo, Canada
2010: *NSERC Undergraduate Student Research Award, University of Waterloo, Canada
**national awards*

(d) Journal Papers

8. C. Wong, **A. Weng**, H. Movahedi, J. Choi, S. Y. Yang, H. Jin, J.B. Siegel, A. Stefanopoulou, "In-Situ Methodology for Quantifying Imbalanced Aging in Parallel-Connected Cells from Noisy Data," **2024** (in preparation)
7. **A. Weng**, O. Y. Ahmed, G. Ehrlich, A. Stefanopoulou, "Higher labor intensity in US automotive assembly plants after transitioning to electric vehicles," *Nature Communications* **2024** (provisionally accepted)
6. **A. Weng**, H. Movahedi, C. Wong, J. B. Siegel, A. Stefanopoulou, "Current imbalance in dissimilar parallel-connected batteries and the fate of degradation convergence," *Journal of Dynamic Systems, Measurements, and Control*, Jan **2024**, 1-22

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5. **A. Weng**, E. Olide, I. Kovalchuk, J.B. Siegel, A. Stefanopoulou, “Modeling battery formation: boosted SEI growth, multi-species reactions, and irreversible expansion,” *Journal of the Electrochemical Society*, Sep **2023**, 170 090523
 4. **A. Weng**, Eric J. Dufek, A. Stefanopoulou. “Battery passports for electric vehicle resale and repurposing,” *Joule*, Vol. 7, Issue 5, 17 May **2023**, pp.837-842 (*Commentary*)
 3. **A. Weng**, J.B. Siegel, A. Stefanopoulou. “Differential voltage analysis for battery manufacturing process control,” *Frontiers in Energy Research*, Vol. 11, 22 March **2023**.
 2. **A. Weng**, P. Mohtat, P.M. Attia, V. Sulzer, S. Lee, G. Less, A. Stefanopoulou. “Predicting the impact of formation protocols on battery lifetime immediately after manufacturing,” *Joule*, Vol. 5, Issue 11, 17 November **2021**, pp.2971-2992.
 1. P. Chen, Z. Luo, S. Güven, S. Tasoglu, A.V. Ganesan, **A. Weng**, U. Demirci. “Microscale assembly directed by liquid-based template,” *Advanced Materials*, vol. 26, no. 34, pp. 5936–5941, **2014**.

(e) Conference Papers

5. H. Movahedi, **A. Weng**, S. Pannala, J.B. Siegel, A. Stefanopoulou. “The Case for DeepSOH: Addressing Path Dependency for Remaining Useful Life,” *Modeling, Estimation, and Control Conference, May 27 – 30, Chicago, IL, 2024*
4. C. Wong, **A. Weng**, S. Pannala, J. Choi, J.B., Siegel, A. Stefanopoulou. “Differential voltage analysis and patterns in parallel-connected pairs of imbalanced cells,” *American Control Conference, July 10 – 12, Toronto, Canada, 2024*
3. **A. Weng**, S. Pannala J.B. Siegel, A. Stefanopoulou. “Parallel-Connected Battery Current Imbalance Dynamics,” *Modeling, Estimation and Controls Conference, New Jersey, IFAC-PapersOnLine*, Vol. 55, Issue 37, **2022**, pp.37-43.
2. S. Pannala, **A. Weng**, I. Fischer, J.B. Siegel, A.G. Stefanopoulou, “Low-Cost Inductive Sensor and Fixture Kit for Measuring Battery Cell Thickness Under Constant Pressure,” *Modeling, Estimation and Controls Conference, New Jersey, IFAC-PapersOnLine*, Vol. 55, Issue 37, **2022**, pp. 712-717.
1. O.Y. Ahmed, R.J. Middleton, V. Tran, **A. Weng**, A.G. Stefanopoulou, “Model Predictive Control of Diesel Combustion Phasing by Coordinating Fuel Injection Timing and Ignition Assist,” *10th IFAC International Symposium on Advances in Automotive Control, 2022, IFAC-PapersOnline*, Vol. 55, Issue 24, **2022** pp. 90-96.

(f) Conference Abstracts

9. **A. Weng**, S. Pannala, J.B. Sigel, A. Stefanopoulou. “Towards Battery Formation Protocol Optimization via Pressure, Temperature, and Current Control: New Experimental and Modeling Insights,” *Modeling, Estimation, and Control Conference, Oct 27 – 30, Chicago, IL, 2024* (poster presentation)
8. **A. Weng**, H. Movahedi, C. Wong, J.B. Siegel, A. Stefanopoulou. “On Using "OCV-R" to Describe Parallel-Connected Battery System Dynamics: Deeper Insights from Simpler Models,” *Modeling, Estimation, and Control Conference, Oct 27 – 30, Chicago, IL, 2024* (oral presentation)
7. **A. Weng**, G. Less, J.B. Siegel, A. Stefanopoulou. “Formation Model for Physics-Based End-of-Line Diagnostics: Towards Closed-Loop Battery Manufacturing Process Control,” *Cell Symposia: Technology barriers to electric vehicle implementation, May 20 – May 22, Ann Arbor, MI, 2024* (poster presentation)
6. **A. Weng**, I. Kovalchuk, J.B. Siegel, A. Stefanopoulou. “Towards Rational Design of Battery Formation Protocols: From Electrochemical Modeling to Factory Deployment,” *Electrochemical Society Spring Meeting, May 26 – May 30, San Francisco, CA, 2024* (oral presentation)
5. **A. Weng**, E. Olide, V. Tran, I. Kovalchuk, J. B. Siegel, A. Stefanopoulou. “Phenomenological model of solid electrolyte interphase formation and growth leveraging real-time expansion measurements,” *ECS Fall Meeting, May 28 – June 2, Boston, MA, 2023* (oral presentation)

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4. **A. Weng**, P. Mohtat, P.M. Attia, V. Sulzer, S. Lee, G. Less, A. Stefanopoulou. “Voltage-based battery manufacturing diagnostics: opportunities and challenges” *Gordon Research Conference, Ventura, CA, 2022* (poster presentation)
 3. **A. Weng**, P. Mohtat, P.M. Attia, V. Sulzer, S. Lee, G. Less, A. Stefanopoulou. “Using Resistance as a Surrogate for Lithium Consumed During Formation for Cell Life Prediction,” *MRS Spring Meeting, Hawaii 2022* (oral presentation)
 2. **A. Weng**, P. Mohtat, S. Lee, G. Less, A. Stefanopoulou. “Degradation diagnostics in graphite-NMC cells under fast SEI formation,” *ECSS Meeting Abstracts, May 30 – June 3, 2021* (oral presentation)
 1. **A. Weng**, M. Karttunen. “Spatio-temporal pattern formation in the Gray-Scott Model,” *Congress of the Canadian Association of Physicists, Montréal, Canada (First Prize, Best Student Poster, Division of Theoretical Physics), 2013* (poster presentation)

(g) Patents

3. **A. Weng**, J. B. Siegel, G. Less, A. Stefanopoulou. “Closed-loop battery manufacturing process control via end-of-line diagnostic features,” *U.S. Patent App. 18/673,707, 2024/06/14*
2. A. Stefanopoulou, I. Kovalchuk, V. Tran, J. B. Siegel, E. Olide, **A. Weng**. “Battery Formation Diagnostics Using Real-Time Expansion,” *US Patent App. 63/469,269, 2023/05/09*
1. A. Stefanopoulou, **A. Weng**, P. Mohtat, P. M. Attia, V. Sulzer, S. Lee, G. Less. “Early-Life Diagnostics For Fast Battery Formation Protocols And Their Impacts To Long-Term Aging,” *US Patent App. 17/859,390, 2023/01/26*

(h) Invited Talks

5. Battery Modeling Webinar Series, “Battery formation modeling and diagnostics: toward closed-loop battery manufacturing process control” (Feb 2024)
4. Battery Modeling Webinar Series, “Battery passports: renewing the case for advanced BMS diagnostics” (August 2023)
3. Tsinghua University (Webinar), 9th Seminar in Series of Transportation Electrification, eTransportation, “Predicting the impact of formation protocols on battery lifetime immediately after manufacturing” (April 2022)
2. Carnegie Mellon University, Battery Modeling Webinar Series, “Predicting the impact of formation protocols on battery lifetime immediately after manufacturing” (November 2021)
1. The Battery Show (Novi, MI) “Speeding up Battery Formation” (September 2021)

(i) Teaching and Education

6. **Lead Developer and Instructor, Battery Manufacturing Process Fundamentals**, Ann Arbor, MI (Fall 2024)
 - (i) Leading course content development to realize an online course in battery manufacturing process fundamentals; responsibilities include syllabus conceptualization, learner profile interviews, course content development, evaluation material development, video lecture production, online course implementation, and course delivery facilitation.
5. **Guest Lecturer, ME481/599: Manufacturing Processes**, Ann Arbor, MI (Fall 2023)
4. **Assistant Course Developer, ME499/599: Battery Eng. & Lifetime Mgmt.**, Ann Arbor, MI (Fall 2023)
 - (i) Assisted in graduate course content development for a new introductory course on lithium-ion battery physics, lifetime management, and sustainability, led by Dr. Stefanopoulou; the course was launched in Fall 2023 with 47 students enrolled. (ii) Delivered two guest lectures on modern lithium-ion battery manufacturing technology.
3. **Course Instructor for Battery Boot Camp**, Ann Arbor, MI (Summer 2023)
 - (i) Prepared and delivered 3 hours of course content for a ‘train the trainers’ workshop; topics covered battery

materials, mining, manufacturing, and recycling; workshop was attended by local UAW leaders, community college instructors, and members from the local automotive industry.

2. **Graduate Student Instructor for ME565: Battery Systems and Control**, Ann Arbor, MI (Winter **2022**)
 - (i) Organized extra tutorials on Matlab/Simulink to help students without a mechanical engineering background catch up on course prerequisites
 - (ii) Volunteered to update course homework, lecture material, and quizzes, to improve accessibility of course materials for students without a background in controls engineering
1. **Workshop Developer for American Control Conference**, Atlanta, GA (Summer **2022**)
 - (i) Developed and presented workshop tutorials on battery manufacturing, battery degradation mechanisms, and physics-based models for battery lifetime, to an audience of controls engineers

(j) Grants Co-Written

3. “Formation-Free Battery Manufacturing,” *DOE-FOA-0003383, AOI3: Battery Electrode, Cell, and Pack Manufacturing Cost Reduction, U.S. Department of Energy (DOE) Vehicle Technologies Office (VTO)*, Co-PIs: **A. Weng**, A. Stefanopoulou (concept paper in preparation)
2. “Smart Battery Formation,” *DOE-FOA-0003236 Platform Technologies for Transformative Battery Manufacturing, U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE)*, Co-PIs: **A. Weng**, Anna Stefanopoulou, Jason B. Siegel, Greg Less, Neil Dasgupta (full application in review)
1. “NSF-24-559: Mathematical Foundations of Digital Twins,” *U.S. National Science Foundation*, PI: Kristen Booth, University of South Carolina (in review)

(k) Synergistic Activities

1. Mentorship:

- (i) Mentored students as part of the Undergraduate Research Opportunities Program (UROP)
 - (a) Iaroslav Kovalchuk (EECS/Math), **2021 - present**
“Hybrid pulse power characterization for lithium-ion battery coin cells”
 - (b) Maisha Niha (MECHENG), **2022 - 2023**
“Impact of battery formation temperature and pressure on battery lifespan”
 - (c) Roger Ho (MECHENG/CS), **2021**
“Measuring battery cell properties at the extreme end of life”
- (ii) Peer mentor for 3 mechanical engineering first-year masters students as part of the Mechanical Engineering Graduate Council (MEGC) Mentorship Program (**2020-2022**)
- (iii) Provide technical mentorship, career guidance, and leadership development for 8 undergraduate students as part of Tesla’s internship program (**2015 - 2024**)
 - (a) Yash Matharu; Rachel Zhang (now at Tesla, Process Engineer); Derek Deng (now at Berkeley, PhD Candidate); Cameron Dean (now at Waterloo, PhD Candidate, Nazar Group); Rachel Tao (now at Microsoft, Software Engineer); Jack McGrory (now at General Motors, Sr. Software Engineer); Daniel McHaffie (now at Caltech, PhD Candidate, See Group); Storm Gourley (now at McMaster, PhD Candidate)

2. Community Service:

- (i) Co-authored *The Battery Report 2022 and 2023*, the most-read report covering the battery ecosystem with readers from 100+ countries; wrote the “Talent” section, focusing on the impact of battery manufacturing on jobs and education; continuing to lead content development for the upcoming report (**2022-2024**).
- (ii) Web developer for United Way of Washtenaw County to build a website to help low-income residents save money on their tax returns (**2021-2022**).
- (iii) Foodbank volunteer with Second Harvest of Silicon Valley and San Francisco-Marin Food Bank; assisted with food packaging at a distribution site; prepared and served free food at a local food pantry (**2019**)

3. Journal Peer-Reviewer:

Joule (5); *Journal of Power Sources* (2); *Energy Technology* (1); *IEEE Transactions on Transportation Electrification* (2); *Journal of the Electrochemical Society* (2); *Journal of Energy Storage* (1)

(l) Relevant Coursework

Graduate-Level: *University of Michigan:* Teaching Engineering; Battery Systems & Controls; Electrochemistry; Climate Economics & Policy; Linear Systems Theory; Model-Predictive Control; Automatic Control; Design of Digital Control Systems; Sensors; *Georgia Institute of Technology:* Graduate Algorithms; High-Performance Computer Architecture; Graduate Operating Systems; Artificial Intelligence; Computer Vision; Computer Networks; Software Analysis & Testing; Reinforcement Learning

Undergraduate-Level: *University of Waterloo:* Numerical Methods; Molecular Dynamics Simulation Methods; Computer-Aided Design; Materials Characterization; Theoretical Mechanics; Condensed Matter Physics; Mathematical Physics; Quantum Physics

(m) Collaborators & Other Affiliations

Collaborators and Co-Editors: *University of Michigan:* Gabriel Ehrlich (F); Everardo E. Olide (G); Vivian Tran (G); Hamid Movahedi (P); Omar Ahmed (G); Clement Wong (G); Iaroslav Kovalchuk (U); Suhak Lee (G); Greg Less (S); Peyman Mohtat (G); Maisha Niha (U); Sravan Pannala (G); Anna Stefanopoulou (F); Jionghua Jin (F); Jason B. Siegel (S); *Carnegie Mellon University:* Valentin Sulzer (P); *Stanford University:* Peter M. Attia; *Idaho National Laboratory:* Eric J. Dufek; *University of South Carolina:* Paul T. Coman (F); Ralph White (F); Enrico Santi (F); Roger Douglas (F); Matthew King (U); Austin Downey (F); *Arizona State University:* Nicholas Rolston (F). (*U: undergraduate; G: graduate; P: post-doc; S: staff; F: faculty*)

Graduate Committee: Anna Stefanopoulou, *University of Michigan*; Neil Dasgupta, *University of Michigan*; Jason B. Siegel, *University of Michigan*; Jionghua (Judy) Jin, *University of Michigan*

Last Updated: August 30, 2024