# Aaron I. Rabinowitz, Ph.D.

**Postdoctoral Researcher**


Electric Vehicle Research Center
Institute of Transportation Studies
University of California, Davis
1590 Tilia Street, Davis, CA 95616
arabinowitz@ucdavis.edu
(216) 644-6044
https://www.linkedin.com/in/aaron-rabinowitz-9594321bb/
https://github.com/airabino


## Summary


I am a passionate pragmatic environmentalist working to contribute to the body of knowledge necessary to enable an economically viable, equitable, and sustainable future. I am seeking a tenure-track research faculty appointment in order to develop a cutting-edge externally funded research program in furtherance of that goal.

The transportation sector is fundamental to the modern economy and a major contributor to global emissions. Because the transition to a green future must be accomplished in limited time and with limited capital, informed planning and coordination of efforts are required. My approach is both holistic and specific. I have extensively studied vehicular efficiency from a systems perspective encompassing the individual contributions of and interactions between vehicular design, controls, and infrastructure. My vehicular research has also encompassed consumer experience where I have developed novel metrics and methods of analysis for user inconvenience due to charging for both routine travel and long trips which relate user preferences, vehicular parameters, and infrastructure availability. Recently I have been focused on the interactions between electrified transportation and enabling networks focusing on how these may be intelligently co-developed to best meet demands in the future from both an economic and a resilience perspective. Humans are part of the system, as such, my research has become increasingly interdisciplinary and policy focused and will continue to be in the future.

To date I have published 13 papers as a primary author with 72 citations in literature on the mentioned subjects. I have contributed to several small grants and one large federal grant awards with and I am continuing to pursue funding with more of both categories submitted and in preparation. I believe in the importance of education and outreach and have advised several graduate students and have provided open-source papers and data and code repositories to disseminate my findings.


## Education

Jun 2021 – Aug 2023
Ph.D. in Systems Engineering, Colorado State University, Fort Collins, CO
Advisor: Dr. Thomas Bradley
Dissertation: Systems and Operational Modeling and Simulation to Address Research Gaps in Transportation Electrification

Jan 2019 – Jun 2021
M.S. in Mechanical Engineering, Colorado State University, Fort Collins, CO
Advisor: Dr. Thomas Bradley
Thesis: Toward Enabling Predictive Optimal Energy Management Systems for Hybrid Electric Vehicles with Real World Considerations

Aug 2013 – Dec 2017
B.S. in Mechanical Engineering, The Ohio State University, Columbus, OH

## Research Interests

Methodology — Graph theory, information theory, optimization, optimal control theory, modeling and simulation, experimental design and analysis, data analytics, machine learning, logistics and operations, model predictive control, GIS mapping, distributed control, internet of things, sensor fusion, networking and communication protocols, systems analysis, systems engineering, resilience engineering

Applications — Transportation systems, intelligent transportation systems (ITS), smart cities, energy systems, connected and autonomous vehicles (CAV), electric vehicles (EV), hybrid electric vehicles (HEV/PHEV), electric vehicle supply equipment (EVSE) networks

## Publications

### Journal Articles

1. Aaron Rabinowitz et al. "Real Time Implementation Comparison of Urban Eco-Driving Controls". In: IEEE Transactions on Control Systems Technology (2022). (In Review). DOI: 10.3390/en14185713.
2. Aaron I. Rabinowitz et al. "Assessment of Factors in the Reduction of BEV Operational Inconvenience". In: IEEE Access 11 (2023), pp. 30486–30497. DOI: 10.1109/ACCESS.2023.3255103.
3. Aaron Rabinowitz et al. "Development and evaluation of Velocity Predictive Optimal Energy Management Strategies in intelligent and connected Hybrid Electric Vehicles". In: Energies 14.18 (2021), p. 5713. DOI: 10.3390/en14185713.
4. Aaron I. Rabinowitz et al. "A Geo-Spatial Method for Calculating BEV Charging Inconvenience using Publicly Available Data". In: INSIGHT 27.1 (2024), pp. 27–38. DOI: https://doi.org/10.1002/inst.12473.

### Conference Proceedings

1. Aaron I Rabinowitz et al. "Infrastructure Data Streams for Automotive Machine Learning Algorithms Research". In: SAE WCX Conference Paper. 2020. DOI: 10.4271/2020-01-0736.
2. Farhang Motallebiaraghi et al. "High-Fidelity Modeling of Light-Duty Vehicle Emission and Fuel Economy Using Deep Neural Networks". In: SAE WCX Conference Paper. 2021. DOI: 10.4271/2021-01-0181.
3. Aaron I Rabinowitz, Gil Tal, and Thomas H Bradley. "Quantifying the Costs of Charger Availability Uncertainty for Residents of Multi-Unit Dwellings". In: SAE WCX Conference Paper. 2024. URL: https://www.sae.org/publications/technical-papers/content/2024-01-2034/.
4. Farhang Motallebiaraghi et al. "Autonomous Eco-Driving Evaluation of an Electric Vehicle on a Chassis Dynamometer". In: WCX SAE World Congress Experience. SAE International, 2023. DOI: https://doi.org/10.4271/2023-01-0715.
5. Farhang Motallebiaraghi et al. "Mobility Energy Productivity Evaluation of Prediction-Based Vehicle Powertrain Control Combined with Optimal Traffic Management". In: WCX SAE World Congress Experience. SAE International, 2022. DOI: https://doi.org/10.4271/2022-01-0141.

6 Aaron I. Rabinowitz et al. “An Ultra-Light Heuristic Algorithm for Autonomous Optimal Eco-Driving”. In: WCX SAE World Congress Experience. SAE International, 2023. DOI: https://doi.org/10.4271/2023-01-0679.

### Books and Chapters

1 Samantha White et al. Machine Learning and Optimization Techniques for Automotive Cyber-Physical Systems: Predictive Control During Acceleration Events to Improve Fuel Economy. Ed. by Vipin Kumar Kukkala and Sudeep Pasricha. Cham: Springer International Publishing, 2023, pp. 649–670. DOI: 10.1007/978-3-031-28016-0_23.

## Research Experience

2023 – ... **Postdoctoral Researcher, University of California Davis**

- Developed novel supply-reliability and range-risk sensitive optimal routing algorithm for road vehicles.
- Developed novel quantitative method for quantification of time loss value-of-information for charger reservation systems.
- Developed novel entropy-centrality metric for EVSE networks.

2019 – 2023 **Graduate Research Assistant, Colorado State University**

- Developed novel metric and methods of calculation for data-based and quantitative assessment of Electric Vehicle (EV) charging inconvenience based on itinerary data and vehicular and Electric Vehicle Support Equipment (EVSE) infrastructure parameters.
- Developed novel stochastic routing based method for assessing true electrification potential for medium duty vehicle fleets.
- Developed predictive optimal energy management strategy for hybrid electric vehicles enabled by ANN future velocity predictions with real world connected vehicle data.

2021 – 2021 **Research Internship, Idaho National Laboratory**

- Developed itinerary and infrastructure based method of estimating electric vehicle charging inconvenience gain for individual vehicle owners.

2017 – 2017 **Metrology Co-op, Goodyear Tire and Rubber Corporation**

- Audited and improved Strebler adhesion test methods for predictive model use.

2016 – 2016 **Tire-Vehicle Mechanics Co-Op, Goodyear Tire and Rubber Corporation**

- Performed validation study for tire modal vibration model
- Developed MATLAB pass-by noise simulation based on previous FORTRAN model

## Teaching Experience

2021 – 2021 — Teaching Assistant, ENGR 532, Colorado State University

- Conducted weekly office hours and exam review sessions
- Graded assignemnts and exams
- Contributed to lecture materials

2019 – 2020 — Project Manager / Engineering Manager / Controls Lead, EcoCAR Mobility Challenge, Colorado State University

- Managed project from technical, organizational, financial, and stakeholder perspectives
- Developed and implemented team structure and constitution
- Led ADAS and hybrid supervisory controls development effort in software and hardware domains

## Awards

2021 — Transportation Research Fellowship, Colorado State University
Student of the Month, Department of Systems Engineering, Colorado State University

## Service

2019 – ... — Peer Reviewer SAE WCX, IFAC, Energies, IEEE Access
2021 – ... — Technical Advisor Colorado State University FSAE Team

## Society Membership

2021 – ... — Member International Council on Systems Engineering (INCOSE)
Member Institute of Electrical and Electronics Engineers (IEEE)
2016 – ... — Member Society of Automotive Engineers (SAE)

## Skills

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|---|---|
| Coding | Python, MATLAB, LaTeX, FORTRAN, C, C++, .NET Languages, HTML/CSS |
| Development | Application development, web development, version control and collaboration |
| Automotive | Automotive communications, sensing, processing, and control systems |
| Operating Systems | Linux, Windows |
| Misc. | Academic research, modeling and simulation, teaching, training, proposal writing, and publishing. |
| Fabrication | Low voltage wiring, manual machining, composite layups |

## References


Dr. Gil Tal
Professor of Environmental Science and Policy, STEPS+ Director, Electric Vehicle Research Center Director
University of California Davis
1590 Tilia St., Davis, CA 95616
530-754-9230
gtal@ucdavis.edu

Dr. Thomas H Bradley
Department Head and Woodward Professor of Systems Engineering
Department of Systems Engineering
Colorado State University
A202 Engineering Building, 6029 Campus Delivery, Fort Collins, C0 80523
970-491-3539
thomas.bradley@colostate.edu

Dr. Zachary D. Asher
Assistant Professor and Director, Energy Efficient and Autonomous Vehicles Lab
Department of Mechanical and Aerospace Engineering
Western Michigan University
F-234 Floyd Hall, Mail Stop 5343, 1903 W Michigan Ave, Kalamazoo MI 49008
(269) 276-3437
zach.asher@wmich.edu

Dr. Ilya Kolmanovsky
Professor and Acting Graduate Program Chair
Department of Aerospace Engineering
Western Michigan University
3038 François-Xavier Bagnoud Aerospace Building 1320 Beal Avenue Ann Arbor, MI 48109
(734) 615-9655
ilya@umich.edu

John Smart
Mobility Systems & Analytics Group Lead, Business Development Lead - Advanced Vehicles
Idaho National Laboratory
2525 Fremont Ave. Idaho Falls, ID 83415
john.smart@inl.gov