MORTEZA TAIEBAT

PhD Candidate
Center for Sustainable Systems
University of Michigan, Ann Arbor

440 Church St., 3012 Dana Bldg.
Ann Arbor, MI, 48109-1041
Phone: (734) 383-3671
Email: *taiebat@umich.edu*
Web: *taiebat.github.io*

EDUCATION

University of Michigan (Ann Arbor, MI)
School for Environment & Sustainability, Department of Civil & Environmental Engineering
Doctor of Philosophy - joint degree | GPA: 4.08/4.00 Apr 2021
- Research: *"Energy and environmental implications of connected and automated vehicles"*

Graduate Data Science Certificate Dec 2019
- Concentrations: *Statistical Modeling, Data Mining, Machine Learning, Optimization*

University of British Columbia (UBC) (Vancouver, BC, Canada)
Department of Mechanical Engineering, Control & Mechatronics Group
Master of Applied Science | GPA: 92/100 Aug 2015
- Thesis Title: *"Distinguishing sensor and system faults for diagnostics and monitoring"*

Iran University of Science and Technology (IUST) (Tehran, Iran)
Department of Mechanical & Automotive Engineering
Bachelor of Science | GPA: 17.09/20 Mar 2013
- Thesis Title: *"Economic & environmental life-cycle assessment of hybrid urban bus"*

PUBLICATIONS & WORK-IN-PROGRESS

- Song, K.; Qu, S.; **Taiebat, M.**; Liang, S.; Xu, M. "Scale, Distribution and Variations of Global Greenhouse Gas Emissions Driven by U.S. Households" *Environment International* **2019**, 133, 105137.
- **Taiebat, M**.; Stolper, S.; Xu, M. "Forecasting the Impact of Connected and Automated Vehicles on Energy Use: A Microeconomic Study of Induced Travel and Energy Rebound" *Applied Energy* **2019**, 247, 297−308.
- **Taiebat, M**.; Xu, M. "Synergies of Four Emerging Technologies for Accelerated Adoption of Electric Vehicles: Shared Mobility, Wireless Charging, Vehicle-to-Grid, and Vehicle Automation" *Journal of Cleaner Production* **2019**, 230, 794-797.
- Zhang, S.; **Taiebat, M.**; Liu, Y.; Qu, S.; Liang, S.; Xu, M. "Regional Water Footprint and Interregional Virtual Water Transfer in China" *Journal of Cleaner Production* **2019**, 228, 1401-1412.
- **Taiebat, M**.; Brown, A.; Safford, H.; Qu, S.; Xu, M. "A Review on Energy, Environmental, and Sustainability Implications of Connected and Automated Vehicles" *Environmental Science & Technology* **2018**, 52, 11449−11465.
- Lu, M.; **Taiebat, M.**; Xu, M.; Hsu, S. "Multi-Agent Spatial Simulation of Autonomous Taxis for Urban Commute: Travel Economics & Environmental Impacts" *Journal of Urban Planning & Development* **2018**, 144 (4), 04018033.
- Hou, P.; Xu, Y.; **Taiebat, M.**; Lastoskie, C.; Miller, S. A.; Xu, M. "Life Cycle Assessment of End-of-Life Treatments for Plastic Film Waste" *Journal of Cleaner Production* **2018**, 201, 1052-1060.
- Heard, B. R.; **Taiebat, M.**; Xu, M.; Miller, S. A. "Sustainability Implications of Connected and Autonomous Vehicles for the Food Supply Chain", *Resources, Conservation and Recycling* **2018**, 128, 22–24.
- **Taiebat, M**.; Sassani, F. "Distinguishing Sensor and System Faults by Utilizing Minimum Sensor Redundancy", *Transactions of the Canadian Society for Mechanical Engineering* **2017**, 41(3), 469-487.
- Abroshan M.; **Taiebat, M.**; Goodarzi, A.; Khajepour A. "Automatic Steering Control in Tractor Semi-Trailer Vehicles for Low-Speed Maneuverability Enhancement", *Proc. IMechE Part K: Journal of Multi-body Dynamics* **2017**, 231(1), 83–102.

INVITED TALKS

- "Connected and Automated Vehicles: Energy Boon or Bane?", *The American Council for an Energy-Efficient Economy (ACEEE)*, Forum on Connected and Automated Vehicles: Energy Impacts, Washington D.C., 5/6/2019. (Speaker and Panelist): https://aceee.org/conferences/2019/av
- "Energy and environmental implications of emerging mobility systems", *Ford Motor Company*, Research & Innovation Center, Division of Environmental Sciences, Dearborn, MI, 5/10/2018.

SELECTED CONFERENCE PROCEEDINGS, PRESENTATIONS & TECHNICAL REPORTS

- **Taiebat, M.**; Stolper, S.; Xu, M. "Remarkable Energy Use Rebound Effect of Self-Driving Vehicles", Poster Presentation, *MIT/Harvard Graduate Climate Conference*, Woods Hole, MA, 2019.
- Stolper, S.*; **Taiebat, M.**, Xu, M. "Forecasting the energy use impacts of connected and automated vehicles" *MIT Center for Energy and Environmental Policy Research*, Boston, MA, 2019.
- Heard, B. R.*; **Taiebat, M.**, Miller, S. A. "Considerations for the Use of Autonomous Vehicles and Drones in Sustainable Food Distribution", Food Forum: Innovations in the Food System: Shaping the Future of Food, *National Academies of Sciences, Engineering, and Medicine,* Washington, DC, 2019.
- **Taiebat, M.** "Energy Rebound Effect of Automated Vehicles", *Automated Vehicle Symposium*, Orlando, FL, 2019.
- **Taiebat, M.**; Stolper, S.; Xu, M. "Automated Vehicles: Induced Travel Demand & Energy Rebound Effect", Poster Presentation, *Automated Vehicle Symposium*, Orlando, FL, 2019.
- **Taiebat, M.**; Stolper, S.; Xu, M. "Remarkable Energy Use Rebound Effect of Self-Driving Vehicles", Poster Presentation, *International Symposium on Sustainable Systems & Technology (ISSST)*, Portland, OR, 2019. (Recipient of ISSST Best Poster Award)
- **Taiebat, M.**; Xu, M. "Self-driving vehicles and the environment" *Aspen Global Change Institute*, Energy Project Quarterly Research Review, March 2019, https://www.agci.org/solutions/quarterly-research/2019-03-CAVs
- **Taiebat, M.** "Critical Discussion on Energy and Environmental Implications of Connected and Automated Vehicles", *Automated Vehicle Symposium*, San Francisco, CA, 2018.
- **Taiebat, M.**; Haung, E.; Masoud, N.; Liu, H.; Xu, M. "Travel and environmental impacts of unoccupied VMT in Robotaxi fleet based on GPS trajectory data", *Automated Vehicle Symposium*, San Francisco, CA, 2017.
- **Taiebat, M.**; Xu, M. "Environmental Benefits of Robotaxi Fleet", Poster Presentation, *Joint ISIE/ISSST Conference*, Chicago, IL, 2017. (Recipient of Earth Shift Global Poster Award)
- **Taiebat, M.**; Xu, M. "Environmental Benefits of Robotaxi Fleet: Travel & environmental impacts of unoccupied VMT", *Association of Environmental Engineering & Science Professors (AEESP)*, Ann Arbor, MI, 2017.
- **Taiebat, M.**; Greenfield, J.; Perez-Green, J.; Cordero, D.; Keoleian, G. "Vehicle-to-Grid Potential: Distributed Storage for Michigan's Grid Stabilization", Poster Presentation, *MUSE Conference*, Ann Arbor, MI, 2017.
- **Taiebat, M.**; Sassani, F. "A Framework for Diagnosis and Differentiation between Sensor Faults and System Faults", *Proc. of 24th Canadian Society for Mechanical Engineering International Congress*, pp. 111-115, Kelowna, BC, Canada, 2016.
- **Taiebat, M.**; Herrera, O.; Sassani, F.; Merida, W. "Implications of Transportation Electrification in Metro Vancouver", *In Electrical and Computer Engineering (CCECE), 2016 IEEE Canadian Conference*, pp. 1-4, IEEE 2016. DOI: 10.1109/CCECE.2016.7726825
- **Taiebat, M.**; Talebian, H.; Sassani, F.; Merida, W. "Renewable Energy, Infrastructure and GHG Implication of Electrified Transportation: Metro Vancouver Case Study", *Proc. of Behavior, Energy, Climate Change, BECC'15*, Sacramento, CA, 2015. (https://escholarship.org/uc/item/8xx3z6qx)
- **Taiebat, M.** "Modeling for Fault Detection and Isolation versus Modeling for Control", Oral Presentation for UBC Advanced Control meeting, 2014.

- **Taiebat, M.**; Sassani, F. "Distinguishing between Sensor Fault and System Fault in Thermal Systems", Poster Presentation, *UBC Chemical Engineering Department*, 2014.
- Goodarzi, A.*; Soltani, A.; **Taiebat, M.**; Khajepour A. "An Investigation on Dynamic Behavior and Control of Three-Wheeled Vehicle", *Proc. of 12th International Symposium on Advanced Vehicle Control, AVEC'14,* pp. 791-798, Tokyo, Japan, 2014.
- **Taiebat M.**; Kakaee A. H. "Simulation and Economic Analysis of Hybrid Urban Bus for the City of Tehran: A Life Cycle Assessment Model", *5th Scientific Congress on Renewable Energy Applications for Green Cities*, Tehran, Iran, 2013.

GRANTS

- "2019 International Conference on Resource Sustainability - Cities (icRS Cities 2019)," **National Science Foundation**, $30,000, 06/01/2019-05/31/2020. (PI: Prof. Ming Xu)
- "High-resolution urban air pollution mapping using fleet vehicles as mobile monitors," **DiDi Chuxing**, $150,000, 09/01/2018-08/31/2019. (PI: Prof. Ming Xu, co-PI: Prof. Ji Zhu)

MEDIA COVERAGE & RESEARCH SPOTLIGHT

- **PBS News Hour**, "5 charts show how your household drives up global greenhouse gas emissions" 9/21/2019 (from **The Conversation**).
- **Filling Space**, "How will the proliferation of autonomous vehicles affect sustainability?" 6/26/2019.
- **E&E News: ENERGYWIRE**, "Self-driving cars may need more fuel than previously thought" 4/18/2019.
- **Michigan News**, "U-M study: 'Induced' driving miles could overwhelm potential energy-saving benefits of self-driving cars" 4/17/2019.
    - Similar coverage in: **Tech Xplore**, **Futurity**, **Green Car Congress**, **Clean Technica**, **News Locker**, **Science Alert**, **Electronics Weekly**, **MI Tech News**, **Science Daily**, **EurekAlert!**, **ECN Magazine**, **Design Engineering**, **AV America**, **News Trotteur** (*in French*), **Motor Senna** (*in Portuguese*), **Quatro Rodas** (in *Portuguese*).
- **Consumer Affairs**, "Self-driving cars could lead to more driving miles, fewer environmental benefits" 4/22/2019.
- **E&E News: CLIMATEWIRE**, "Self-driving cars and CO_2 emissions: It's complicated" 9/19/2018.
- **International Energy Agency**, "Do automated cars dream of electric sharing?" 10/21/2018.
    - Republished in: **Modern Diplomacy**.

SELECTED AWARDS, HONORS & ACHIEVEMENTS

- ISSST Best Poster Presentation Award – Second Place, 2019
- Dow Doctoral Sustainability Fellowship ($15,000), Graham Sustainability Institute, 2019
- Rackham International Student Fellowship ($10,000), UMICH, 2018
- Earth Shift Global Poster Presentation Award, Joint ISIE/ISSST Conference, 2017
- Link Energy Fellowship Honorable Mention, 2017 & 2019
- Courtney R. Wilson Award, School for Environment & Sustainability, UMICH, 2017
- Merit Doctoral Scholarship, School for Environment & Sustainability, UMICH, 2016
- Graduate Student Academic Achievement Award, Mechanical Engineering Department, UBC, 2015.
- Stanford University Precourt Energy Efficiency Center Student Fellowship, 2015.
- Mitacs Globalink Mentorship Fellowship, UBC, 2015.
- International Graduate Student Scholarship, UBC, 2013 – 2015.
- Toyota/NSERC Automotive Partnership Scholarship, University of Waterloo, 2013.
- IUST *Distinguished* Student Award, 2011 and 2012.
- Best Undergraduate Final Project Award, IUST, 2013.
- National Foundation of Elite Scholars Award, Iran, 2008.

ACADEMIC EXPERIENCES & SERVICES

- **Invited Referee**
  - ***Journal Manuscripts****:* Applied Energy, Transportation Research Part D: Transport and Environment, Journal of Cleaner Production, Resources, Conservation & Recycling (*Outstanding Reviewer Certificate – Sept 2017*), ASME Journal of Dynamic Systems, Measurement & Control, Transportation Research Record, Journal of Transportation Research Board.
  - ***Conference Manuscripts****:* Transportation Research Board Annual Meeting (TRBAM 2019, TRBAM 2020), International Symposium for Sustainable Systems and Technology (ISSST 2018, ISSST 2019), IEEE Canadian Conference of Electrical & Computer Engineering (CCECE 2016)
  - ***Book Proposals****:* Elsevier Transport

- **Conference Committee**
  - Co-Chair of Breakout Session - Automated Vehicle Symposium (TRB-AVS), Orlando, FL, 2019
    - Breakout Session on *Energy and Environmental Implications of Connected and Automated Vehicles: Trends in Industry, Research, Regulations and Policy*
  - Workshop Organizer - TRB ADC70-Sponsored Workshop 1790: *Tools for Assessing the Energy, Emission, and Environmental Impacts of SMART Mobility Technologies*, Washington D.C., 2019
  - Organizing Committee Member - Automated Vehicle Symposium (TRB-AVS), San Francisco, CA, 2018
    - Reviewed and selected the presentation proposal for Breakout Session #17: *Energy and Emissions Implications of Connected and Automated Vehicles*
    - Led a roundtable discussion for assessment of priority research needs in panel of experts
    - Participated in drafting the research statement needs report for TRB-ADC70: Standing Committee on Transportation Energy

- **Teaching**
  - **UBC**: MECH 392: *Manufacturing Process*, (Teaching Assistant, Fall 2014); MECH 306: *Data Analysis and Mechatronics*, (Laboratory Lecturer, Spring 2015)
  - **IUST:** *Mechanical Design* (TA, Fall 2011 & Fall 2012); *Dynamics*, (TA, Fall 2012)

PROFESSIONAL EXPERIENCES

Center for Sustainable Systems, UMICH (Ann Arbor, MI)
Graduate Student Research Assistant 2016 – present
PI: Professor Ming Xu, Ph.D.
Project Title: Energy and environmental implications of connected and automated vehicles (CAVs)
- Quantifying energy and travel impact of unoccupied VMT in a robotaxis fleet
- Assessing the rebound effect and induced travel demand upon deployment of CAVs
- Forecasting CAV-enabled ownership and usage pattern shift

BC Hydro (Vancouver, BC, Canada)
Energy Efficiency Analyst 2016
- Evaluated various energy efficiency measures for electric distribution network in the city of North Vancouver.
- Completed site visits of commercial monitoring facilities and identified potential efficiency opportunities in multi-unit commercial buildings, resulting in $550K annual energy savings.

Clean Energy Research Center (CERC), UBC, Vancouver, BC, Canada
Research Assistant | Transportation Futures Initiative 2015 - 2016
Director/Supervisor: Professor Walter Mérida, Ph.D., P.Eng.
Project Title: BC Transportation Futures
- Developed techno-economic models of low/zero-carbon transportation infrastructures in British Columbia
- Quantified charging infrastructure demand for deployment of battery and fuel cell electric light vehicle fleet

- Reported and presented the results in collaboration with **Pacific Institute for Climate Solution**

Process Automation & Robotics Laboratory (PAR-Lab), UBC (Vancouver, BC, Canada)
Graduate Research Assistant 2013 – 2015
PI: Professor Farrokh Sassani, Ph.D., P.Eng.
Project Sponsor: *Natural Sciences and Engineering Research Council of Canada (NSERC)*
Project Title: Distinguishing sensor and system faults for diagnostics and monitoring

- Statistical analysis and uncertainty modeling of fused data from a cluster of sensors and feedback loop
- Employing minimum sensor redundancy for fault localization and compensation
- Verification and simulation of the developed approach on hydraulic actuation and storage system

Automotive Engineering Research Center (AERC), IUST (Tehran, Iran)
Undergraduate Research Assistant 2012 – 2013
Supervisors: Dr. AmirHasan Kakaee, Dr. Avesta Goodarzi
Project Title: Economic & environmental life-cycle assessment of hybrid urban bus

- Modeled and simulated a fleet of series-hybrid urban buses under different driving situations using ADVISOR
- Executed an integrated LCA approach for fleet level comparison of diesel vs. hybrid bus using GREET model
- Developed a time series predictor for the to fully electric fleet with zero emissions

Iran Khodro Company, R&D Center, New Product Development Department (Tehran, Iran)
Intern and Development Engineer 2011 – 2012

- Modeled and tested a series hybrid electric powertrain on manufacturing platform in collaboration with AERC
- Validated FEV model specifications of EF7-TC engine using Adams/Engine
- Feasibility study of replacing rear suspension system of SAMAND with Twist-Beam suspension system

INDAMIN Saipa Company, R&D Center (Tehran, Iran)
Intern 2010

- Performed a Finite Element and Modal Analysis of the foot valve for a hydraulic shock absorber in a semi-active suspension system under stochastic loading and thermal condition using ANSYS
- Conducted a thorough investigation on Magneto-Rheological fluid for active and semi-active suspension

COMPUTER PROFICIENCY

- **Programming, Statistical Modeling, & Data Analysis:** R (Proficient in tidyverse, ggplot2, plotly), Matlab, Python, SQL (SQLite), Git Version Control.
- **General:** Microsoft Office Suite, Data Analysis ToolPak, Adobe CS Suite, LaTeX
- **Selected Certificates:** R Programming Environment (JHU/Coursera 9/2019), Advanced R Programming (JHU/Coursera 10/2019), Building Data Visualization Tools (JHU/Coursera 11/2019)

PROFESSIONAL AFFILIATIONS

- *Transportation Research Board; ADC70: Standing Committee on Transportation Energy,* Member, 2018–present
- *American Chemical Society – ASC,* Member, 2018–2019
- *International Society of Industrial Ecology – ISIE,* Student Member, 2017–2018
- *American Society of Mechanical Engineers – ASME,* Student Member, 2013–2014
- *Iran National Foundation of Elite Scholars,* Honorary Member, 2008–2013

EXTRA-CURRICULAR & VOLUNTEER ACTIVITIES

- **Doctoral Organizing Committee**, School for Environment & Sustainability, 2018 – present
  - **Chair** of Doctoral Speaker Event (2019 – present)
- **Session Moderator**, Capstone Seminar, School for Environment & Sustainability, 2017 & 2018 & 2019
- **Session Moderator**, Behavior, Energy, Climate Change Conference, Sacramento, CA, 2015
- **Mentor**, Mitacs Globalink Program, Vancouver, BC, 2015
  - Supervised and mentored a team of five international interns at UBC for 5 months
  - Evaluated the performance and posted the progress to Mitacs foundation on weekly basis
- **Lead Organizer**, Graduate Student Society, UBC, Vancouver, BC, 2014
  - Managed and organized a team of 15 volunteers for the "2014 Orientation Event"
  - Held regular board meetings to assign directives and delegate activities
- **Advisor & Mentor**, Research Mentorship Program, UBC, Vancouver, BC, 2014 – 2015
- **Technical Advisor**, "Formula UBC" for Competitions in the International Formula SAE (FSAE) Collegiate Design Series, 2014
- **Technical Coordinator**, IUST Electric Vehicle Design Team, Vehicle Dynamics group, Nation-Wide Competitions, IUST, Tehran, Iran, 2011
  - Developed a quarter and a full vehicle model and performed suspension system component tests
- **Vice-President**, "IUST Scientific Association", and **Scientific Committee Head**, "Cultural Council of Automotive Engineering Department", IUST, Tehran, Iran, 2009 – 2011
- ***Volunteered*** in various executive committees of 30+ Academic and Professional events, 2010 – present
  - Budget oversight, Conference planning, Engagement activities