

# CURRICULUM VITAE

## **Siamak Farhad**

Associate Professor  
Department of Mechanical Engineering  
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## **EDUCATION**

**Ph.D. in Mechanical Engineering**, University of Waterloo (Canada), 2012  
Advisor: Prof. Feridun Hamdullahpur  
Dissertation: *Performance Simulation of Planar Solid Oxide Fuel Cells*

## **PROFESSIONAL APPOINTMENTS**

- **Associate Professor**, Mechanical Engineering Dept., University of Akron (2019 – Present).
- **Assistant Professor**, Mechanical Engineering Dept., University of Akron (2013 – 2019).
- **Adjunct Assistant Professor**, University of Waterloo (2014 – 2019).
- **ASME Committee Member**, Development of Performance Test Code (2015 – Present).
- **ASEE Officer**, Manufacturing Division, (2019 – Present).
- **ASEE Officer**, Energy Conversion & Conservation Division, (2017 – Present).
- **Post-Doctoral Fellow**, Applied Nanomaterials & Clean Energy Lab., U. of Waterloo (2012 – 2013).
- **Visiting Researcher**, National Research Council (NRC) Canada (2008 – 2010).
- **Senior Design Engineer**, Hirbodan Oil & Gas and Power plant EPC Company (2003 – 2006).
- **Research Associate**, Energy Research Center, Amirkabir University of Technology (2002 – 2003).
- **Mechanical Engineer**, Vehicle Standard & Quality Inspection Institute (2001 – 2002).

## **RESEARCH SUMMARY**

My research activities are in the fields of “Energy” and “Design & Manufacturing.” My focuses in the field of “Energy” are mathematical modeling and experimental studies of transport phenomena in micro- and nano-structures, thermal management, system design & integration, and energy materials. My focuses in the field of “Design & Manufacturing” are on designing measurement systems and advanced manufacturing technologies. Most of my research activities are multidisciplinary and are linked to Nanotechnology, Electrochemistry, Thermodynamics, Thermal, and Material sciences. Selected research topics are: Recycling & regeneration of Li-ion battery materials, Designing optimum electrodes’ nano/micro-structure for batteries and fuel cells, System integration & hybridization of batteries and fuel cells, Energy harvesting by piezoelectric systems, Designing & fabrication of measurement systems, Robotic disassembly of electric vehicle battery.

## **TEACHING EXPERIENCE**

### **Undergraduate Level:**

4600–315: Heat Transfer

Spring 2014, Fall 2014, Fall 2015

4600–483: Measurements Lab.

Spring 2014, Fall 2014, Spring 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017,  
Spring 2018, Fall 2018, Spring 2019, Fall 2019

4600–498: Experimental Investigation in Mechanical Engineering

Summer 2017

4600–400: Thermal Systems Components

Spring 2015

### **Graduate Level:**

4600–696–602: Energy Storage Systems

Spring 2016

4600–696–402: Electric & Hybrid Vehicles

Summer 2016

### **Dual Level (Graduate & Undergraduate):**

4600–486/696: Multiphysics Modeling

Spring 2015 and Fall 2017

4600–415/515: Energy Conversion

Fall 2018

## **HONORS AND AWARDS**

1. Best Student Presentation Award (1<sup>st</sup>), CenTiRe, Virginia Tech, Blacksburg, Virginia, 2019.
2. Best Student Paper Award (1<sup>st</sup>), ASME Energy Sustainability Conference, Lake Buena Vista, Florida, 2018
3. Five Year Service Award, University of Akron, 2018.
4. Best Undergraduate Senior Design Project Award (1<sup>st</sup>), U. of Akron (2 Times: 2016, 2017).
5. Industrial Fellowship, NSERC (Natural Sciences & Eng. Research Council) Canada, 2013.
6. Strategic Post-Doctoral Fellowship, MITACS Elevate, 2012.
7. Best Idea Award (1<sup>st</sup>), Toyota Motor Manufacturing Canada (TMMC), 2010.
8. Best Poster Award (1<sup>st</sup>), Fuel Cell Research and Development Network, University of Ontario Institute of Technology (UOIT), 2011.

## **PROFESSIONAL ACTIVITIES**

1. Director of Advanced Energy Laboratory, Engineering Research Center, University of Akron (2015–Present).
2. Faculty Advisor of several undergraduate students, University of Akron (2014–Present).
3. Faculty Advisor, SAE Electric Formula Team, University of Akron (2015–2019).
4. Conference / Workshop Organizing:
  - Session Moderator – ASEE Conference, Session T116: Energy Efficiency and Power Grid Security (Salt Lake City, Utah 2018).
  - Track Chair – ASME Power & Energy Conference, Track 4-4: Thermal Energy Storage Systems (Charlotte, NC 2017).
  - Session Chair – ASME Power & Energy Conference, Session 4-4-2: Thermal Energy Storage Systems II: Systems (Charlotte, NC 2017).
  - Organizing Committee – Recent Advances in Fuel cells (Ontario, Canada 2011 and 2012); Networking Event in Applications of Micro/Nano Technologies (Ontario, Canada 2012); Summer Course, “Exergy and Its Applications for Better Environment and Sustainability” (UOIT, Ontario, Canada 2012).
5. Proposal Reviewer / Panelist
  - Panelist: NSF – CBET Program – Energy for Sustainability (Spring 2018)
  - Proposal reviewer – MITACS Program
  - Proposal reviewer – Research Foundation, University of Wisconsin-Milwaukee
6. Reviewer (Journal & Conference Papers)

Journal of Power Sources; International Journal of Hydrogen Energy; Applied Energy; Fuel Cell; International Journal of Energy Research; Environmental Impact Assessment Review; AIChE; Energies; Journal of Energy Storage; Ceramics International; ASME Journal of Electrochemical Energy Conversion and Storage, ASME Power & Energy Conferences.
7. Consulting & Engineering Activities:
  - Consultancy in performance evaluation of a rotary internal combustion engine
  - Consultancy in reforming fuels and bio-fuels
  - Consultancy in energy saving in boilers, heat exchangers, turbines, and compressors
  - Consultancy for vehicle standards and quality inspection
  - Consultancy in safety of electric/hybrid vehicles

## **JOURNAL PUBLICATIONS**

40. A.H Mohammed, R. Esmaeeli, H. Aliniagerdroudbari, M. Alhadri, S.R. Hashemi, G. Nadkarni, and **S. Farhad**, **Dual-Purpose Cooling Plate for Thermal Management of Prismatic Lithium-Ion Batteries During Normal Operation and Thermal Runaway**, *Applied Thermal Engineering*, 160 114106, 2019.
39. R. Esmaeeli, H. Aliniagerdroudbari, S.R. Hashemi, A. Nazari, M. Alhadri, W. Zakri, A.H. Mohammed, C. Batur and **S. Farhad**, **A Rainbow Piezoelectric Energy Harvesting System for Intelligent Tire Monitoring Applications**, *Journal of Energy Resources Technology*, 141(6), 062007, 2019.

38. **S. Farhad**, A. Nazari; **Introducing the Energy Efficiency Map of Lithium-ion Batteries**, *International Journal of Energy Research*, 43(2) 931-944, 2019.
37. M.S. Herdem, M. Mundhwa, **S. Farhad**, F. Hamdullahpur, **Catalyst Layer Design and Arrangement to Improve the Performance of a Microchannel Methanol Steam Reformer**, *Energy Conversion and Management*, 180 149-161, 2019.
38. M.S. Herdem, M. Younessi Sinaki, **S. Farhad**, F. Hamdullahpur, **An Overview of the Methanol Reforming Process: Comparison of Fuels, Catalysts, Reformers, and Systems**, *International Journal of Energy Research*, 2019.
35. R. Esmaeeli, H. Aliniagerdroudbari, S.R. Hashemi, M. Alhadri, W. Zakri, C. Batur, **S. Farhad**, **Design, Modeling, and Analysis of a High Performance Piezoelectric Energy Harvester for Intelligent Tires**, *International Journal of Energy Research*, 2019.
34. R. Esmaeeli, H. Aliniagerdroudbari, S.R. Hashemi, C. JBR, and **S. Farhad**, **Designing a New Dynamic Mechanical Analysis (DMA) System for Testing Viscoelastic Materials at High Frequencies**, *Modelling and Simulation in Engineering*, 2019.
33. M.S. Herdem, M. Mundhwa, **S. Farhad**, F. Hamdullahpur, **Multiphysics Modeling and Heat Distribution Study in a Catalytic Microchannel Methanol Steam Reformer**, *Energy & Fuels*, 32, 7220-7234, 2018.
32. H. Ilkhani, **S. Farhad**, **A Novel Electrochemical DNA Biosensor for Ebola Virus Detection**, *Analytical Biochemistry*, 557, 151-155, 2018.
31. M. Mastali, E. Foreman, A. Modjtahedi, E. Samadani, A. Amirfazli, **S. Farhad**, R. Fraser, M. Fowler, **Electrochemical-Thermal Modeling and Experimental Validation of Commercial Graphite/LiFePO<sub>4</sub> Pouch Lithium-Ion Batteries**, *International Journal of Thermal Sciences*, 129 218-230, 2018.
30. E. Foreman, W. Zakri, M.H. Sanatimoghaddam, A. Modjtahedi, S. Pathak, N.G. Garafolo, **S. Farhad**, **A Review of Inactive Materials and Components of Flexible Lithium-Ion Batteries**, *Advanced Sustainable Systems*, 1(11), 2017.
29. A.Ghorbani Kashkooli, E. Foreman, **S. Farhad**, D. Un Lee, W. Ahn, K. Feng, V. De Andrade, Z. Chen, **Morphological and Electrochemical Characterization of a Nanostructure Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub> Electrode Using Multiple Imaging Mode Synchrotron X-ray Computed Tomography**, *Journal of The Electrochemical Society*, 164 (12) A2861-A2871, 2017.
28. A. Nazari, **S. Farhad**, **Effects of Nominal Capacity and Electrode Materials on Heat Generation in Lithium-ion Batteries**, *Applied Thermal Engineering*, 125 1501-1517, 2017.
27. A. Ghorbani Kashkooli, E. Foreman, **S. Farhad**, D. Un Lee, W. Ahn, K. Feng, V. De Andrade, Z. Chen, **Synchrotron X-ray Nano Computed Tomography Based Simulation of Stress Evolution in LiMn<sub>2</sub>O<sub>4</sub> Electrodes**, *Electrochimica Acta*, 247 1103-1116, 2017.
26. A.G. Kashkooli, A. Amirfazli, **S. Farhad**, D.U. Lee, S. Felicelli, H.W. Park, K. Feng, V.D Andrade, Z. Chen, **Representative Volume Element Model of Lithium-ion Battery Electrodes Based on X-ray Nano-tomography**, *Journal of Applied Electrochemistry*, 47(3) 281-293, 2017.
25. M. Mastali, M. Farkhondeh, **S. Farhad**, R.A. Fraser, Michael Fowler, **Electrochemical Modeling of Commercial LiFePO<sub>4</sub> and Graphite Electrodes: Kinetic and Transport Properties and Their Temperature Dependence**, *Journal of The Electrochemical Society*, 163(13) A2803-A2816, 2016.

24. A. Modjtahedi, A. Amirfazli, **S. Farhad**. **Low Catalyst Loaded Ethanol Gas Fuel Cell Sensor**. *Sensors & Actuators B:Chemical*. 234, 70–79, 2016.
23. M. Mastali, E. Samadani, **S. Farhad**, R. Fraser, M. Fowler. **Three-dimensional Multi-Particle Electrochemical Model of LiFePO<sub>4</sub> Cells based on a Resistor Network Methodology**. *Electrochimica Acta*. 190, 574-587, 2016.
22. A.G. Kashkooli, G. Lui, **S. Farhad**, D.U. Lee, K. Feng, A. Yu, Z. Chen. **Nano-particle Size Effect on the Performance of Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub> Spinel**, *Electrochimica Acta*. 196: 33-40, 2016.
21. A.G. Kashkooli, **S. Farhad**, D.U. Lee, K. Feng, S. Litster, S.K. Babu, L. Zhu, Z. Chen. **Multiscale Modeling of Lithium-ion Battery Electrodes based on Nano-scale X-ray Computed Tomography**, *Journal of Power Sources*. 307: 496-509, 2016.
20. E. Samadani, M. Mastali, **S. Farhad**, R.A. Fraser, M. Fowler. **Li-ion Battery Performance and Degradation in Electric Vehicles under Different Usage Scenarios**, *International Journal of Energy Research*. 40:379-392, 2016.
19. M.S. Herdem, **S. Farhad**, F. Hamdullahpur. **Modeling and Parametric Study of a Methanol Reformate Gas-fueled HT-PEMFC System for Portable Power Generation Applications**, *Journal of Energy Conversion and Management*. 101:19-29, 2015.
18. E. Samadani, **S. Farhad**, W. Scott, M. Mastali, L.E. Gimenez, M. Fowler, R.A. Fraser. **Empirical Modeling of Lithium-ion Batteries Based on Electrochemical Impedance Spectroscopy Tests**. *Electrochimica Acta*. 160: 169-177, 2015.
17. M. Majdabadi, **S. Farhad**, M. Farkhondeh, R. Fraser, M. Fowler. **Simplified Electrochemical Multi-particle Model for LiFePO<sub>4</sub> Cathodes in Lithium-ion Batteries**. *Journal of Power Sources*. 275: 633-643, 2015.
16. A. Ghorbani Kashkooli, **S. Farhad**, V. Chabot, A. Yu, Z. Chen. **Effects of Structural Design on the Performance of Electrical Double Layer Capacitors**. *Applied Energy*. 138: 631-639, 2015.
15. H. Zarrin, **S. Farhad**, F. Hamdullahpur, V. Chabot, A. Yu, M. Fowler, Z. Chen. **Effects of Diffusive Charge Transfer and Salt Concentration Gradient in Electrolyte on Li-ion Battery Energy and Power Densities**. *Electrochimica Acta*. 125: 117-123, 2014.
14. M.S. Herdem, **S. Farhad**, I. Dincer, F. Hamdullahpur. **Thermodynamic Modeling and Assessment of a Combined Coal Gasification and Alkaline Water Electrolysis System for Hydrogen Production**. *International Journal of Hydrogen Energy*. 39: 3061-3071, 2014.
13. V. Chabot, **S. Farhad**, Z. Chen, A.S. Fung, A. Yu, F. Hamdullahpur. **Effect of Electrodes Physical and Chemical Properties on Lithium-ion Battery Performance**. *International Journal of Energy Research*. 37(14): 1723-1736, 2013.
12. A. Ghorbani Kashkooli, **S. Farhad**, A.S. Fung, Z. Chen. **Effect of Convective Mass Transfer on Lead-acid Battery Performance**. *Electrochimica Acta*. 97: 278-288, 2013.
11. **S. Farhad**, F. Hamdullahpur. **Effect of Composite Electrode Microstructure on Temperature Distribution in Solid Oxide Fuel Cells**. *Electrochimica Acta*. 99: 9– 14, 2013.
10. **S. Farhad**, F. Hamdullahpur. **Minimization of Polarization Resistance in Solid Oxide Fuel Cells by Proper Design of Micro-/ Nano-structure of Porous Composite Electrodes**. *Electrochimica Acta*. 61: 1–12, 2012.

9. **S. Farhad**, F. Hamdullahpur. **Optimization of the Microstructure of Porous Composite Cathodes in Solid Oxide Fuel Cells.** *AIChE Journal*. 58(4): 1248–1261, 2012.
8. **S. Farhad**, F. Hamdullahpur. **Micro-modeling of Porous Composite Anodes for Solid Oxide Fuel Cells.** *AIChE Journal*. 58(6): 1893–1906, 2011.
7. **S. Farhad**, Y. Yoo, F. Hamdullahpur. **Performance Evaluation of Different Configurations of Biogas-fuelled SOFC Micro-CHP Systems for Residential Applications.** *International Journal of Hydrogen Energy*. 35(8): 3758–3768, 2010.
6. **S. Farhad**, F. Hamdullahpur. **Conceptual Design of a Novel Ammonia-fuelled Portable Solid Oxide Fuel Cell System.** *Journal of Power Sources*. 195: 3084–3090, 2010.
5. **S. Farhad**, Y. Yoo, F. Hamdullahpur. **Effects of Fuel Processing Methods on Industrial Scale Biogas-fuelled SOFC System for Operating in Wastewater Treatment Plants.** *Journal of Power Sources*. 195: 1446–1453, 2010.
4. **S. Farhad**, F. Hamdullahpur. **Developing Fuel Map to Predict the Effect of Fuel Composition on the Maximum Efficiency of Solid Oxide Fuel Cells.** *Journal of Power Sources*. 193(2): 632–638, 2009.
3. **S. Farhad**, F. Hamdullahpur. **Developing Fuel Map to Predict the Effect of Fuel Composition on the Maximum Voltage of Solid Oxide Fuel Cells.** *Journal of Power Sources*. 191(2): 407–416, 2009.
2. **S. Farhad**, M. Younessi, M. R. Golriz, F. Hamdullahpur. **Exergy Analysis and Performance Evaluation of CNG to LNG Converting Process.** *International Journal of Exergy*. 5(2): 164–176, 2008.
1. **S. Farhad**, M. Saffar-Avval, M. Younessi-Sinaki. **Efficient Design of Feedwater Heaters Network in Steam Power Plants Using Pinch Technology and Exergy Analysis.** *International Journal of Energy Research*. 32: 1–11, 2008.

## **CONFERENCE PUBLICATIONS**

31. M. Alhadri, W. Zakri, R. Esmaeeli, A.H. Mohammed, S.R. Hashemi, H. Barua, H. Aliniagerdroudbari, **S. Farhad**, **Analysis of Second-Life of a Lithium-Ion Battery in an Energy Storage System Connected to a Wind Turbine,** *IEEE Power and Energy Conference, Champaign, Illinois, DOI: 10.1109/PECI.2019.8698782, 2019.*
30. H. Aliniagerdroudbari, R. Esmaeeli, S.R. Hashemi, M. Alhadri, W. Zakri, **S. Farhad**, **A piezoelectric sandwich structure for harvesting energy from tire strain to power up intelligent tire sensors,** *IEEE Power and Energy Conference, Champaign, Illinois, DOI: 10.1109/PECI.2019.8698908, 2019.*
29. **S. Farhad**, D. Kandray, and M. Younessi Sinaki, **Undergraduate Students' Research on Energy Saving in Industrial Robots: Effect of Regular and Irregular Meetings on Deductive Research,** *ASME Annual Conference, Paper ID # 26532, Tampa, Florida, 2019.*
28. A. Nazari, R. Esmaeeli, S. R. Hashemi, H. Aliniagerdroudbari, and **S. Farhad**, **Low-Temperature Energy Efficiency of Lithium-ion Batteries,** *ASME IMECE, Pittsburgh, PA, United States, 2018.*
27. R. Esmaeeli, A. Nazari, H. Aliniagerdroudbaria, S.R. Hashemi, M. Alhadria, W. Zakri, **S. Farhad**, **Heat Built up During Dynamic Mechanical Analysis (DMA) Testing of Rubber Specimens,** *ASME IMECE, Pittsburgh, PA, United States, 2018.*

26. R. Esmaeeli, H. Aliniagerdroudbari, S.R. Hashemi, M. Alhadri, W. Zakri, C. Batur, **S. Farhad**, **Strain-Driven Piezoelectric Energy Harvester for Intelligent Tires**, *7<sup>th</sup> Global Conference on Global Warming (GCGW)*, Izmir, Turkey, 2018.
25. M. Alhadri, R. Esmaeeli, A.H. Mohammed, W. Zakri, S.R. Hashemi, H. Aliniagerdroudbari, H. Barua, **S. Farhad**, **Studying the Degradation of Lithium-Ion Batteries Using an Empirical Model for Aircraft Applications**. *ASME Power & Energy Conference*, Lake Buena, Florida, United States, June 25-27, 2018.
24. W. Zakri, M. Alhadri, A.H. Mohammed, R. Esmaeeli, S.R. Hashemi, H. Aliniagerdroudbari, **S. Farhad**, **Quasi-Solid Graphite Anode for Flexible Lithium-ion Battery**. *ASME Power & Energy Conference*, Lake Buena, Florida, United States, June 25-27, 2018.
23. S.R. Hashemi, A. Nazari, R. Esmaeeli, H. Aliniagerdroudbari, M. Alhadri, W. Zakri, A.H. Mohammed, A. Mahajan, **S. Farhad**, **Fast Fault Diagnosis of a Lithium-ion Battery for Hybrid Electric Aircraft**. *ASME Power & Energy Conference, Lake Buena, Florida, United States, June 25-27, 2018*.
22. A. Nazari, R. Esmaeeli, S.R. Hashemi, H. Aliniagerdroudbari, **S. Farhad**, **The Effect of Temperature on Lithium-ion Battery Energy Efficiency with Graphite/LiFePO<sub>4</sub> Electrodes at Different Nominal Capacities**. *ASME Power & Energy Conference, Lake Buena, Florida, United States, June 25-27, 2018*.
21. R. Esmaeeli, H. Aliniagerdroudbari, A. Nazari, S.R. Hashemi, M. Alhadri, W. Zakri, A.H. Mohammed, C. Batur, **S. Farhad**, **Optimization of a Rainbow Piezoelectric Energy Harvesting System for Tire Monitoring Applications**. *ASME Power & Energy Conference, Lake Buena, Florida, United States, June 25-27, 2018*.
20. A.H. Mohammed, M. Alhadri, W. Zakri, H. Aliniagerdroudbari, R. Esmaeeli, S.R. Hashemi, G. Nadkarni, **S. Farhad**, **Design and Comparison of Cooling Plates for a Prismatic Lithium-ion Battery for Electrified Vehicles**, *SAE Technical Paper, 2018-01-1188*, <https://doi.org/10.4271/2018-01-1188>, 2018.
19. M. Alhadri, A.H. Mohammed, **S. Farhad**, **Comparison of Duty-Cycle of a Lithium-Ion Battery for Electric Airplane and Electric Vehicle Applications**, *SAE Technical Paper, 2018-01-0666*, <https://doi.org/10.4271/2018-01-0666>, 2018.
18. R. Esmaeeli, H. Aliniagerdroudbari, C.S. JBR, C. Batur, **S. Farhad**, **Designing New Dynamic Mechanical Analysis (DMA) System for Testing Viscoelastic Materials at High Frequencies**. *36th Annual Meeting and Conference on Tire Science and Technology, Akron, Ohio, 2017*.
17. M.M.M. Kohneh, E. Samadani, **S. Farhad**, R. Fraser, M. Fowler. **Three-dimensional Electrochemical Analysis of a Graphite/LiFePO<sub>4</sub> Li-ion Cell to Improve Its Durability**. *SAE Technical Paper*. doi: [doi:10.4271/2015-01-1182](https://doi.org/10.4271/2015-01-1182), 2015.
16. E. Samadani, L. Gimenez, W. Scott, **S. Farhad**, M. Fowler, R. Fraser. **Thermal Behavior of Two Commercial Li-ion Batteries for Plug-in Hybrid Electric Vehicles**. *SAE Technical Paper*. doi: [10.4271/2014-01-1840](https://doi.org/10.4271/2014-01-1840), 2014.
15. E. Samadani, **S. Farhad**, S. Panchal, R. Fraser, M. Fowler. **Modeling and Evaluation of Li-ion Battery Performance Based on the Electric Vehicle Field Tests**. *SAE Technical Paper*. doi: [10.4271/2014-01-1848](https://doi.org/10.4271/2014-01-1848), 2014.

14. V. Chabot, **S. Farhad**, A.S. Fung, Z. Chen, A. Yu, F. Hamdullahpur. **The Impact of Lithium Diffusivity in the Active Electrode Material on the Power and Energy Density of Lithium-ion Cells.** *223<sup>th</sup> ECS meeting, Toronto, Ontario, Canada, 12-16 May 2013.*
13. **S. Farhad**, F. Hamdullahpur. **Effect of the Microstructure of Porous Composite Electrodes on the Electric Power Density of Solid Oxide Fuel Cells.** *ASME 9<sup>th</sup> Fuel Cell Science, Engineering and Technology Conference, Washington, DC, USA, 2011.*
12. **S. Farhad**, Y. Yoo, F. Hamdullahpur. **Performance Evaluation of Different Configurations of Biogas-fuelled SOFC Micro-CHP Systems for Residential Applications.** *European Fuel Cell Forum, Lucerne, Switzerland, 2009.*
11. **S. Farhad**, Y. Yoo, F. Hamdullahpur. **Conceptual Design of Anaerobic Digestion Gas-fuelled SOFC Systems to Generate Electricity and Heat in Wastewater Treatment Plants.** *ASME-ICEPAG, Newport Beach, California, USA, 2009.*
10. **S. Farhad**, F. Hamdullahpur. **Performance Evaluation of an Ammonia Fuelled Portable SOFC System.** *IEEEES Sharjah, UAE, 2009.*
9. **S. Farhad**, M. Younessi, M. Golriz, F. Hamdullahpur. **Second Law Analysis and Parametric Study of a CNG to LNG Converting Process.** *2<sup>nd</sup> International Green Energy Conference, Canada, 2006.*
8. **S. Farhad**, M. Saffar-Avval, M. Younessi-Sinaki. **Effects of Rotary Air Preheater Leakage on Steam Power Plants Performance.** *ECOS Conference, Norway, 2005.*
7. M. Younessi-Sinaki, M. Saffar-Avval, **S. Farhad**. **Dynamic Behavior of Steam Power Plants.** *ECOS Conference, Norway, 2005.*
6. **S. Farhad**, M. Younessi-Sinaki, M. Saffar-Avval. **Energy Saving in Operating Steam Power Plants Based on ASME Performance Test Codes.** *ASME Power Conference, Chicago, USA, 2005.*
5. **S. Farhad**, M. Younessi-Sinaki, A. H. Modarres. **Development of ASME Performance Test Codes for Operating Systems to Reduce Energy Consumption and Environmental Pollution.** *Kuwait International Mechanical Engineering Conference, 2004.*
4. M. Saffar-Avval, **S. Farhad**, M. Younessi-Sinaki. **Performance Evaluation of In-service Boilers based on ASME PTCs for Reduction of Fuel Consumption, Part A: Preparation for Conducting Periodic Performance Tests.** *ISME International Conference, 2004.*
3. M. Saffar-Avval, **S. Farhad**, M. Younessi-Sinaki. **Performance Evaluation of In-service Boilers based on ASME PTCs for Reduction of Fuel Consumption, Part B: Test Results.** *ISME International Conference, 2004.*
2. M. Saffar-Avval, M. Younessi-Sinaki, **S. Farhad**. **Periodic Performance Tests based on ASME PTCs for Energy Saving in Steam Turbines.** *ISME International Conference, 2004.*
1. M. Saffar-Avval, **S. Farhad**, M. Younessi-Sinaki. **Periodic Performance Tests based on ASME PTCs for Energy Saving in Gas Turbines.** *ISME International Conference, 2004.*

### **INVITED PRESENTATIONS / TALKS**

2. Energy Efficiency Map of Lithium-ion Battery, National Renewable Energy Laboratory (NREL), Golden, Colorado, June 2018.
1. Toward Performance Map of Lithium-ion Batteries, EMN Meeting on Batteries, Orlando, Florida, Feb. 22-25, 2016.



## **PATENTS**

2. Dynamic Mechanical Analysis System, US Patent, Publication #: US 2019/0017912 A1, 01/17/2019.
1. Polymer Electrolyte Membrane Fuel Cell (PEMFC) Sensor, US Patent, Publication #: US 2018/0266985 A1, 09/18/2018.

## **PROFESSIONAL AFFILIATIONS**

Member of ASME (Life-member), SAE, and ASEE.

Certificates: ASEE, National Effective Teaching Institute (NETI); Fanuc Robot Programing; I-Corps NSF Innovation Corps.

## **RESEARCH SUPERVISION**

### **(a) Ph.D. Students**

#### **Current:**

4. Hammad Alshammari  
Summer 2018 – Present      Regenerating and Reusing Recycled Cathode Active Materials for Manufacturing New Lithium-ion Batteries.
3. Haniph  
Aliniagerdroudbari  
Fall 2017 – Present      Post Testing Lithium-ion Battery Electrodes at Different Stages of Thermal Runaway.
2. Seyed Reza Hashemi  
Fall 2016 – Present      Monitoring and Fault Diagnosis of Lithium-ion Battery Packs for Aircraft Application.
1. Roja Esmaeeli  
Fall 2016 – Present      Development of a New Test System for Measurement of Mechanical Properties of Viscoelastic Materials.

#### **Graduated:**

4. Muapper Alhadri  
Fall 2015 – Summer  
2019      Empirical Modeling and Analysis of Degradation of the Lithium-Ion Battery for Different First- and Second-Use Applications.
3. Münür S. Herdem  
Summer 2014 – Spring  
2019      Multiphysics Modeling of Micro-channel Methanol Reformer. (Co-supervisor)
2. Waleed Zakri  
Fall 2014 – Summer  
2018      Fabrication and Simulation of Semi-Solid Electrodes for Flexible Lithium-ion Batteries.
1. Ali Ghorbani  
Kashkooli  
Spring 2014 – Fall 2017      Nanoscale X-ray Computed Tomography Based Modeling of Lithium ion Battery Electrodes. (Co-supervisor)

### **(b) M.Sc. Students**

#### **Current:**

2. Mike Kelly  
Fall 2019 – Present      Comparison of Properties of Different Viscoelastic Materials.
1. Ian Kay      Robotic Disassembly of Electric Vehicle Lithium-ion Battery

Fall 2017 – Present      Packs for Recycling

**Graduated:**

5. Mohammed Abdul Haq Fall 2016 – Spring 2018      Dual-purpose Cooling Plates for Thermal Management of Li-ion Batteries During Normal Operation and Thermal Runaway.
4. M. Varma Koricherla Fall 2016 – Summer 2017      Experimental Modal Analysis of a Lithium-ion Battery Using Dynamic Excitation. (Co-supervisor)
3. Evan Foreman Fall 2015 – Spring 2017      Fluidized Cathodes for Flexible Lithium-ion Batteries
2. Amir Amirfazli Summer 2015 – Fall 2016      Low Catalyst Loaded Ethanol Gas Fuel Cell Sensor
1. Ashkan Nazari Fall 2014 – Summer 2016      Heat Generation in Lithium-ion Batteries

**(c) Postdoctoral Supervision:**

2. Hoda Ilkhani Fall 2016 – Spring 2018      Fabrication and Testing Electrochemical Sensors
1. Seyed Ali Modjtahedi Fall 2014 – Fall 2015      Fabrication and Testing Flexible Batteries

**(d) Graduate Research Assistants:**

5. Alireza Saatchi Spring 2017–Summer 2017      Studied on Electrochemical Sensors.
4. Mehrdad Mastali Spring 2013 – Spring 2016      Studied on 3D Thermal Modeling of Lithium-ion Batteries.
3. Ehsan Samadani Fall 2012 – Fall 2015      Studied on Empirical Modeling of Li-ion Batteries for Electric Vehicles.
2. Hadis Zarrin Summer 2012 – Fall 2013      Studied on Lithium-ion Transport in Electrolytes.
1. Victor Chabot Summer 2012 – Fall 2013      Studied on the Effect of Material Properties on the Performance of Lithium-ion Batteries.

**(e) Undergraduate Research:**

2. Letia Bass (NSF-REU) Fall 2017 – Spring 2018      Designing and building a new DMA measurement system.
1. Chiran JBR Fall 2016 – Fall 2017      Modeling and computer simulation for determination of natural frequency and mode shapes of a miniaturized test clamp.

## **DEFENSE COMMITTEE MEMBER**

### **Ph.D. Dissertations / Proposals:**

8. Mohammad Ranjbar Summer 2019 Optimal Signaling Strategies and Fundamental Limits of Next Generation Energy-Efficient Wireless Networks; Advisor: Dr. Nghi H. Tran, Electrical Eng. Dept.
7. Xiao Zhang Summer 2018 Probing Polymer Dynamics Using High Throughput Broadband Dielectric Spectroscopy; Advisor: Dr. Alamgir Karim, Polymer Engineering Department
6. Camilo Piedrahita Summer 2018 Neuro Inspired Polymer Electrolyte Membrane; Ion Concentration Gradient for Energy Restoration in Li-ion Batteries; Advisor: Thein Kyu, Polymer Eng. Dept.
5. Yahya Fageehi Summer 2018 Simulation-Based Optimization for Complex System with Supply and Demand Uncertainty, Advisor: Dr. Shengyong Wang, Mechanical Eng. Department
4. Ehsan Saeidpour Parizy Fall 2017 Electrical Energy Retail Price Optimization for an Interconnected / Islanded Power Grid; Advisor: Dr. Hamid Bahrami, Electrical & Computer Eng. Dept.
3. Fatih Cingoz Summer 2016 Effective Power Management for Autonomous Operations of Microgrids, Advisor: Dr. Yilmaz Sozer, Electrical & Computer Engineering Department
2. Shirin N. Oliiae Spring 2016 Catalytic Decomposition of Hydrazine; Advisors: Dr. Zhenmeng Peng and Dr. Harry M. Cheung, Chemical Engineering Department
1. Bikash Parajuli Spring 2016 Laminar flame speeds and autoignition of dimethyl ether at elevated pressure; Advisor: Gaurav Mittal, Mechanical Engineering Department

### **M.Sc. Theses/Reports:**

7. Ishwor Gautam Summer 2018 Quaternion Based Attitude Estimation Technique Involving the Extended Kalman Filter; Advisor: Celal Batur, Mechanical Eng. Dept.
6. Pashupati Dhakal Spring 2016 Numerical Investigations of the Effect of Fill Factor in an Internal Mixer for Tire Manufacturing Process; Advisor: Abhilash Chandy, Mechanical Eng. Dept.
5. Mohammad Moasherziad Spring 2016 Investigating on Steel Riveting Process and Obtaining the Equation for Calculation of Steel Riveting Force; Advisor: Dr. Sergio Felicelli, Mechanical Eng. Dept.
4. Bhavya Sree Godavarthi Fall 2014 A Computational Study on the Effect of Injection Strategy on Emissions in a DME Fueled CI Engine; Advisor: Gaurav Mittal, Mechanical Eng. Department
3. Amar KC Fall 2014 Numerical Simulations of Magnetohydrodynamic Flow and Heat Transfer; Advisor: Abhilash Candy, Mechanical Engineering Department
2. Michael Crawford Summer 2014 A Computational Study of Mixing in Jet Stirred Reactors, Advisor: Gaurav Mittal, Mechanical Engineering Department
1. Varun Anthony Davies Spring 2014 Auto-ignition Study of Ethanol and Heptane in a Rapid Compression Machine, Advisor: Gaurav Mittal, Mechanical Engineering Department

## **UNDERGRADUATE SENIOR DESIGN / CAPSTONE PROJECT SUPERVISION**

27. Troy Hudson, Mohammad Felemban Fall 2018 – Spring 2019 Hydrogen Fuel System for an Internal Combustion Engine
26. Greg Young, Thomas Thornton, Nate Moskos Fall 2018 – Spring 2019 Shop N' Charge Design
25. Samuel Horn, Ben Roessler, Isaac Smith Energy Saving in Industrial Robots

- Fall 2018 – Spring 2019
24. Ziyad Almohatrish, Michael Condo, Jacob Eberly, John Wilson  
Fall 2018 – Spring 2019  
Design of Piezoelectric Energy Harvester for Intelligent Tires
  23. Letia Bass, Michaela McCrae, Ethan Goodman, Joseph Mazur  
Fall 2017 – Spring 2018  
Test Setup for Rubber Properties Measurements
  22. Andres Viduya, Matt Mc-Clone, Alec Drzemieck, Brandon Groves  
Fall 2017 – Spring 2018  
Energy Saving by Properly Programming of Industrial Robots
  21. Noah Purdy, Olivia Cole, Jake Happ  
Fall 2017 – Spring 2018  
Designing and Building a Safe Chamber for Battery Post Tests
  20. Johnathan Klebe, Tyler Miller, Mitchell Wheeler, Madison Popa  
Fall 2017 – Spring 2018  
Designing and Building a New Garbage Disposer System
  19. Kaitlin Klotzle, Cynthia Stoller, Kelsey Wilson, Katrina Elfrink, Crysta Yamamoto  
Fall 2016 – Spring 2017  
Designing a Light-Weight, Inexpensive, Disposable, and High-Strength Lighted Ear Curette **AWARD WINNER**
  18. Matt Stolfer, Matt Murrow, Aaron Moser, Ryan Kramanak, Jered Tyler  
Fall 2016 – Spring 2017  
Flexible Battery Design and Testing
  17. Elisha Dale, Anatoliy Torchilo, Chiran JBR, Megan Staimer  
Fall 2016 – Spring 2017  
Designing a New DMA Device for Measurement of Rubber Mechanical Properties
  16. Ben Todd, Matt Rabenold, Carl Vilaro, Joshua Van Pelt  
Fall 2016 – Spring 2017  
Auxiliary Power for Trucks by Wind Turbine
  15. Luke Baker, Cory Price  
Fall 2015 – Spring 2016  
Aerial Aquatic Drone (Hydro Drone) **AWARD WINNER**
  14. Steven Feyedelem, Robert Mitman  
Fall 2015 – Spring 2016  
Designing a New Weight Lifting Clip
  13. Stephen Hostutler, Daniel Bolovan  
Fall 2015 – Spring 2016  
Soap Pump Dispenser System Design
  12. Trevin Hartzler  
Fall 2015 – Spring 2016  
High-voltage Battery Pack Design for Electric FSAE Race Car
  11. Kyle Leifhert, Joseph Dejacimo, Jared Cornett, Annie Klindworth  
Fall 2015 – Spring 2016  
Designing Nano Drones with Hybrid Structural Energy Storage
  10. Zachary Wysocki, Isaiah William, Matthew Jost, Lucas Barker  
Fall 2015 – Spring 2016  
Designing a New Housing for Fuel Cell Sensors to Minimize Fuel Leakage
  9. Alex Prorok  
Fall 2015 – Spring 2016  
Optimization of Formula SAE Electric Vehicle Frame with Finite Element Analysis
  8. Fitim Musahu  
Summer 2015 – Fall 2015  
Impact Attenuator for Formula Electric Vehicle

7. Tony Romito  
Summer 2015 – Fall 2015  
Electrochemical Sensor Fabrication and Testing
6. Heather Perod, Michael Massaro, Matthew Massaro  
Fall 2014 – Spring 2015  
Designing Low Cost and Modern Rims for Vehicles
5. Aaron Jackson, Chris Remington, Evan Foreman, Dylan Irvine, Samuel Endrizzi  
Fall 2014 – Spring 2015  
Designing Heat Sinks for Effective Cooling of Lithium-ion Battery Packs in Electric Vehicles
4. Nick Galbincea  
Fall 2014 – spring 2015  
Formula Electric SAE, Heat Transfer Analysis of Braking System and Rotor Design for Vehicle
3. Rob Weise, Andrew Rodaites  
Fall 2014 – Spring 2015  
Designing Fuel Cell and Battery Operated Equipment for Underground Mines for Reducing Ventilation Load
2. Adam Ghannoum  
Fall 2014 – Spring 2015  
Pilot-chute Improvement and Optimization
1. James Hayes  
Fall 2014 – Spring 2015  
Computer Design and Analysis of Shell and Tube Heat Exchangers for Minimization of Pressure Drop