

MAHDI SHAHBAKHTI

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Academic Appointments

University of Alberta: Tenured Associate Professor (2019-), Canada

Director of Energy Mechatronics Lab (EML)

- Research interests: Energy Mechatronics, Hybrid Electric Vehicles, Connected and Automated Vehicles, Combustion Engines, Smart Buildings, HVAC, Building-Power Grid Integration, Renewable Energy

Michigan Tech. University: Adjunct Associate Professor (2020-), Research Associate Professor (2019-2020), Associate Professor (2017-2019), Assistant Professor (2012-2017), USA

- Directing Energy Mechatronics research for automotive & transportation systems, and smart buildings

University of California Berkeley: Post-doctoral Scholar, 2010 – 2012, USA

Supervisor: Prof. J. Karl Hedrick, Mech. Eng. Dept., Vehicle Dynamics and Control Laboratory

Projects with *Toyota Motor Company*:

- Developing easily verifiable methodology for design process of automotive powertrain controllers
- Techniques of model order reduction for control of automotive systems

University of Alberta: Instructor and Research Scholar, 2009, Canada

- Teaching a graduate course on combustion engines and alternative fuels; Research on HCCI engine controls

Education

Ph.D. in Mechanical Engineering, University of Alberta, Edmonton, Canada, 2004 - 2009

Thesis: Modeling and Experimental Study of an HCCI Engine for Combustion Timing Control

Advisor: Prof. C.R. Koch

M.Sc. in Mechanical Engineering (*Summa Cum Laude*), KNT University of Tech., Tehran, Iran, 2000 - 2003

Thesis: Dynamic Modeling of MPFI Engines for AFR Control during Cold Start and Warm up Conditions and Investigation of Factors Influencing Mixture Preparation and Pollutant Formation in these Conditions

Advisors: Prof. S.A. Jazayeri, Prof. Sh. Azadi

B.Sc. in Mechanical Engineering (*Summa Cum Laude*), KNT University of Tech., Tehran, Iran, 1996 - 2000

Thesis: Design of Feeding Mechanism of Metal Rod and Inert Gas for a MIG Welding Robot

Advisor: Prof. S.A. Mousavian

Industry Experience

R&D Engineer, IPCO, Tehran, Iran, Mar. 2001 – Aug. 2004

Iran Khodro Powertrain Company (www.ip-co.com), the largest powertrain manufacturer in the Middle East

- Dynamic modeling of gasoline engines and longitudinal vehicle dynamics
- Calibration of engines and design of control strategies for CNG-gasoline engine control units
- On-vehicle testing of powertrain controllers
- Benchmarking of Peugeot 206 engine - a mutual project with FEV® carried out in Aachen, Germany

R&D Engineer (Part time), Advanced Robotics Automatic Systems (ARAS), Tehran, Iran, 2000 - 2001

- Controller sensitivity analysis of a MIG welder robot for welding of typical boiler conjunctions used in Azarab Boiler Manufacturing Industries

Intern (Part time), Yekta Tahviah Arvand Air Conditioning Industries, Iran, 1998 - 2000

- Design a novel control test bench to simulate real operation of air-conditioning chillers

Selected Awards

Research/Academic

- Best Student Paper Award Finalists (top 6 papers), selected *three times* in 2012, 2013, 2016 ASME Dynamic System Control (DSC) Conferences, USA. Submissions to these conferences ranged from 233 to 406 papers.
- Best Paper Award, ASME Automotive and Transportation Systems Technical Committee – DSCC, 2015
- 2018 MARQUIS Who’s Who in the World (“top 3% of the professionals in the world”)
- Best Presentation in the Session, American Control Conference (ACC), 2012, 2015, 2016
- Best Presentation Award, SAE Int. Powertrain, Fuels & Lubricants Conference, Baltimore, MD, USA, 2016
- Research Excellence Fund, Michigan Tech University, 2013, 2014
- Best Paper Award, ASME Automotive and Transportation Systems Technical Committee – DSCC, 2012
- Canada NSERC (Natural Science and Engineering Research Council) Postdoctoral Fellowship, 2010 - 2012
- Andrew Stewart Memorial Graduate Prize, University of Alberta, 2009
- Prairie Mines & Royalty Ltd. Scholarship in Environments Engineering, University of Alberta, 2008
- THECIS - Ingenuity Scholarship, THECIS (The Center for Innovation Studies), Canada, 2008
- Queen Elizabeth II Graduate Scholarship - Doctoral Level, University of Alberta, 2008
- Lehigh Inland Cement Graduate Scholarship in Environmental Studies, University of Alberta, 2007
- Winning Team (first prize) of a Total of 66 Research Teams from 26 Canadian Universities, Canada Automotive21 High Qualified Personnel Competition, Windsor, Canada, June 11-13, 2007
- Chevron Graduate Scholarship in Natural Gas Engineering, University of Alberta, 2005
- Best Paper Award in 3rd International Conference on Internal Combustion Engines, Tehran, Iran, 2004
- Summa Cum Laude (ranked first among graduates) in both MSc Mech Eng – Powertrain (2003) and BSc Mech Eng – Thermofluids (2000), K. N. Toosi University of Technology, Tehran, Iran.

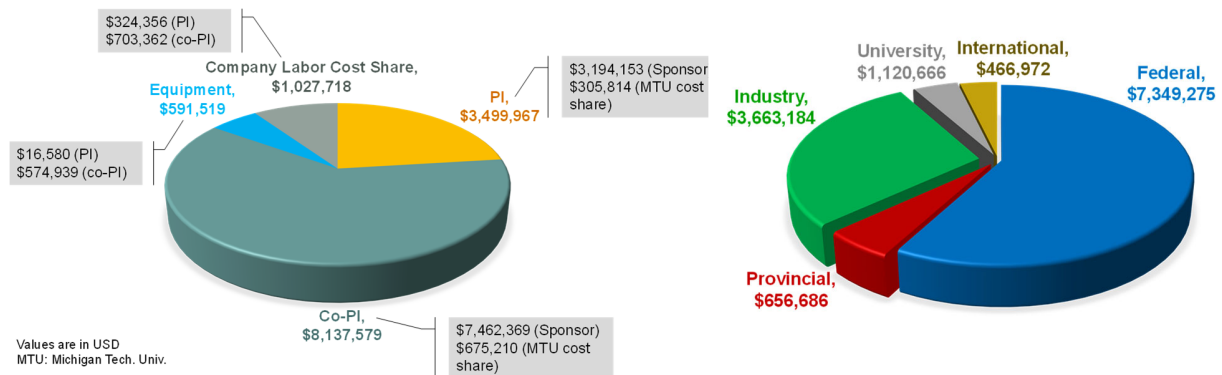
Teaching

- SAE Ralph R. Teetor Educational Award, 2016
- Provost’s List, Top 10% instructors among over 1050 evaluated sections/instructors university-wide, Michigan Tech University, Selected *four times* in Fall 2015, Fall 2016, Fall 2017, Spring 2018
- Zita and John Rosen Teaching Excellence Award for Principal Instructor, University of Alberta, 2009
Only one award across the university is granted annually to give special recognition to a graduate student principal instructor who is an especially skilled and dedicated teacher.

Leadership and Service

- Province of Alberta Graduate Citizenship Award for Student Leadership, Canada, 2009
- Award for Outstanding Contribution for “Most Youth Reached” in National Let’s Talk Science Program, Canada, 2007-2008
- Alan Wharmby Memorial Graduate Award in Mechanical Engineering, University of Alberta, 2008

Grants/Funding



Awarded

- 41- M. Shahbakhti (PI), C. R. Koch, " Performance Analysis of Alberta Zero Emissions Hydrogen Transit (AZEHT) Project Transit Buses ", 120,000 CAD, The Transition Accelerator, 2022 – 2024.
- 40- M. Shahbakhti (PI), C. R. Koch, " Scalable and Reconfigurable Powertrain Control Methods via Artificial Intelligence and Model Predictive Control ", 240,000 USD, Cummins Inc., 2022 – 2026.
- 39- C. R. Koch, V. Hosseini, M. Shahbakhti (co-PI), " Urban Transportation Emissions and GHGs; Technologies and Behavioral Shifts Towards Zero Emissions ", 498,750 CAD, Environment & Climate Change Canada, 2022 – 2027.
- 38- M. Shahbakhti (PI), C. R. Koch, " Fault Isolation of Solid Oxides Fuel Cell using Machine Learning ", 300,000 USD, Cummins Inc., 2021 – 2025.
- 37- A. Nouri, M. Shahbakhti (co-PI), " A Robust and Low-cost Technology for Risk Mitigation of Pathogenic Infection in HVAC Systems ", 540,000 CAD, including 270,000 CAD from NSERC Alliance Grant and 270,000 CAD from Engineered Air, 2022 – 2025.
- 36- C. R. Koch, V. Hosseini, M. Shahbakhti (co-PI), " Blue hydrogen - Diesel Dual-Fuel Engine Technology Development for a Transition to a Hydrogen Economy ", 827,425 CAD, Alberta Innovates, 2021 – 2023.
- 35- M. Shahbakhti (PI), C. R. Koch, " Cooperative Truck Platooning System (CTPS) ", 245,936 CAD, Alberta Motor Transport Association (AMTA) – Transport Canada, 2021 – 2022.
- 34- M. Shahbakhti (PI), C. R. Koch, " Artificial Intelligence and Model Predictive Control Applications for Engine Control and Calibration ", 37,532 CAD, Cummins Inc., 2020 – 2022.
- 33- M. Shahbakhti (PI), G. McTaggart-Cowan (Simon Fraser Univ.), S. Munshi (Westport Inc.), " Optimum high-efficient hybrid electric natural gas powertrain designs towards economically viable low emission trucks", 179,750 CAD, NSERC Alliance Grant, 2021 – 2024.
- 32- M. Shahbakhti (PI), " Intelligent Control of Connected and Automated Vehicles and Powertrains for Cold Climates ", 195,000 CAD, NSERC Discovery Grant, 2020 – 2025.
- 31- M. Shahbakhti (PI), C. R. Koch, V. Hosseini, " Intelligent and Sustainable Management Tool for UAlberta Fleet Vehicles: Operational Cost Reduction, GHG Reduction, and Campus Air Quality Improvement ", 145,709 CAD, EMSO - University of Alberta, 2020 – 2022.
- 30- M. Shahbakhti (PI), C. R. Koch, " Artificial Intelligence and Machine Learning for Engine Modeling and Virtual Field Calibration and Assessment of Heavy Duty Engines ", 76,904 CAD, IAV GmbH, 2019 – 2021.
- 29- M. Shahbakhti (PI), A. O. Vargas, C. R. Koch, V. Hosseini, " Urban Carrying Capacity under Cold Climate for Transportation Generated Air Pollution and Public Exposure ", 50,000 CAD, Social Sciences and Humanities Research Council of Canada (SSHRC) Grant, 2020 – 2021.
- 28- M. Shahbakhti (PI), " Exergy-Wise Predictive Control of Building and Automotive Energy Systems ", 27,000 CAD, NSERC Discovery Grant, 2019 – 2020.

- 27- J. Naber, M. Shahbakhti (co-PI), Y. Ra, J. Worm, S. Munshi (Westport Fuel Systems Inc.), " A Compression Ignition Mono-Fueled NG High-Efficiency, High-Output Engine for Medium and Heavy Duty Applications ", 1,786,494 USD including 1,156,042 USD from US Department of Energy, 450,000 USD from Westport and 180,452 USD Michigan Tech cost share, 2019 – 2022.
- 26- J. Naber, Y. Ra, S.-Y. Lee, M. Shahbakhti (co-PI), J. Worm, " Co-optimized PPCI-SI Engine System Demonstrator to Improve Fuel Economy while Meeting LEV III Emissions ", 1,161,130 USD including 899,372 USD from US Department of Energy and 261,758 USD for MTU cost share, 2019 – 2022.
- 25- M. Shahbakhti (lead PI), J. Naber, J. Mohammadpour (Univ. of Georgia), A. Borhan (Cummins Inc.), " GOALI: Collaborative Research: Control-oriented Modeling and Predictive Control of High Efficiency Low-Emission Natural Gas Engines ", 561,422 USD including 499,976 USD from US National Science Foundation and 61,446 USD from MTU, 2018 – 2021.
- 24- A. Barnard, M. Shahbakhti (co-PI), " Application of Carbon Nanotubes (CNT) for Heating Aftertreatment Systems in Vehicles ", 18,525 USD, Faurecia Automobile Company, 2018.
- 23- M. Shahbakhti (PI), D. Robinette J. Blough, " Improved Driveline Torque Shaping: Controls and Calibration ", 240,964 USD including 200,000 USD from Ford Motor Company and 40,964 USD for MTU cost share, 2018 – 2020.
- 22- J. Naber, M. Shahbakhti (co-PI), C. Morgan, " Development, Validation, and Integration Support for a Hardware-In-the-Loop (HIL) VD&PT Vehicle Model ", 59,600 USD, Hitachi America Ltd., 2018.
- 21- D. Robinette J. Blough, M. Shahbakhti (co-PI), " Improved Clunk Parameterization and Rig Development ", 240,964 USD including 200,000 USD from Ford Motor Company and 40,964 USD for MTU cost share, 2018 – 2020.
- 20- J. Naber, M. Shahbakhti (co-PI), " High Engine Speed Cranking and Individual Combustion Control for Reduced Cold Start Emissions ", 240,964 USD including 200,000 USD from Ford Motor Company and 40,964 USD for MTU cost share, 2018 – 2020.
- 19- M. Shahbakhti (PI), D. Robinette, J. Blough, " Driveline Torque Modeling and Estimation for Anti Jerk Control ", Ford Motor Company, 24,770 USD, 2017 – 2018.
- 18- M. Shahbakhti (PI), R. Robinett, " Micro Concentrated Solar Power (CSP) Contribution on the Management of an Electrical Grid Including Renewable Energy Sources ", Mohammadia School of Engineering via Morocco's Institut de Recherche en Energie Solaire et an Energies Nouvelles (IRESEN), 17,616 USD, 2017 – 2018.
- 17- J. Naber, D. Robinette, M. Shahbakhti (co-PI), K. Zhang, B. Chen, G. Cesiel (GM), " NEXTCAR: Connected and Automated Control for Vehicle Dynamics and Powertrain Operation on a Light-Duty Multi-Mode Hybrid Electric Vehicle ", US Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E), 3,505,824 USD including 2,801,390 USD from DOE, 553,362 USD from GM cost share, 151,072 USD for MTU cost share, 2017 – 2020.
- 16- J. Naber, J. Blough, B. Chen, M. Shahbakhti (co-PI), " Sensor Evaluation and Fusion for Closed Loop Combustion Control for SI Engines ", Ford Motor Company, 165,000 USD, 2016 – 2017.
- 15- M. Shahbakhti (PI*), J. Naber, S. Munshi (Westport Innovations Inc. - Canada), " High BMEP and High Efficiency Micro-Pilot Ignition Natural Gas Engine ", 1,224,356 USD including 600,000 USD from US Department of Energy, 125,000 USD from Westport cash to MTU, 175,000 USD for MTU cost share, and 324,356 USD from Westport in-kind cost share, 2016 – 2019. [*Original PI but changed to Naber due to the final award requirement for foreign national approval.]
- 14- M. Shahbakhti (lead PI), K. Hedrick (UC Berkeley), K. Butts (Toyota), " GOALI: Collaborative Research: Easily Verifiable Controller Design ", 328,390 USD including 299,986 USD from US National Science Foundation (NSF), 28,404 USD from MTU cost share, 2014 – 2017.
- 13- J. Naber, M. Shahbakhti (co-PI), P. Dice, " Investigation of Ignition Performance of Hitachi Coils for PFI Natural Gas Fueled Engine on a Single Cylinder, Boosted, Spark Ignition Engine ", 42,500 USD, Hitachi North America, Feb. 2016 – Aug. 2016.
- 14- M. Shahbakhti (PI), " FPGA Software for Real-Time Powertrain Control Research and Education ", Xilinx® Design Software Tool, 1,099.00 USD, Xilinx Inc., Mar. 2016.

- 11- J. Naber, S.Y. Lee, M. Shahbakhti (co-PI), " Continuation of Engine Ignition Studies ", 115,000 USD, Ford Motor Company, 2015-2016.
- 10- J. Naber, M. Shahbakhti (co-PI), " Injector Evaluation and Characterization " on Mahle Optical Single Cylinder DI SI Engine ", 63,477 USD, Nostrum Motors, 2015.
- 9- M. Shahbakhti (PI), R. Berkey, " Advancing Vehicle Education and Research through HIL Simulator and Student Competition Vehicle Support ", 25,000 USD, Denso North America, 2014-2015.
- 8- J. Naber, S.Y. Lee, M. Shahbakhti (co-PI), " Continuation of Ignition Studies ", 115,000 USD, Ford Motor Company, 2014-2015.
- 7- M. Shahbakhti (PI), " NI-based Automotive Hardware-in-the-Loop Setup Research", National Instruments, equipment 4,381 USD, 2015.
- 6- M. Shahbakhti (PI), " Optimal, Energy-Efficient Solutions for Integration of Buildings and Smart Grids ", 15,000 USD, Michigan Tech Research Excellence Fund, 2014-2015.
- 5- M. Shahbakhti (PI), " Research on Li-ion Battery in Hybrid Electric Powertrain Test Cell ", LG Chem Power Inc., equipment 11,100 USD, 2013.
- 4- J. Naber, S.Y. Lee, M. Shahbakhti (co-PI), " Ignition Studies ", 95,752 USD, Ford Motor Company, 2013-2014.
- 3- J. Naber, M. Shahbakhti (co-PI), " Optical Engine for Detailed Combustion Research ", equipment with value over 300,000 USD, Mahle Powertrain North America, 2013.
- 2- M. Shahbakhti (PI), " REF-MG: Mentoring in Advanced Powertrain Control ", 9,000 USD, Michigan Tech Research Excellence Fund, 2013-2014.
- 1- J. Worm, J. Naber, M. Shahbakhti (co-PI), 4-day course on " Torque-based Control of SI Engines ", 32,003 USD, DENSO North America Inc., Feb. 2013.

Publications (students under Shahbakhti's supervision/mentorship are indicated by “*”)

Book Chapters

- 1- S. Batool*, J. D. Naber, M. Shahbakhti, " Multi-mode Low Temperature Combustion (LTC) and Mode Switching Control ", pages 43-93, Book title: Advanced Combustion for Sustainable Transport, Springer, ISBN 978-981-16-8417-3, 2022.

Selected Peer Reviewed Journal Papers

- 82- A. R. Razmi*, A. Mohammad, S. M. Alirahmi; M. H. Nabat, E. Assareh, M. Shahbakhti, " A Green Hydrogen Energy Storage Concept based on Parabolic Trough Collector and Proton Exchange Membrane Electrolyzer/Fuel Cell: Thermodynamic and Exergoeconomic Analyses with Multi-Objective Optimization ", *International Journal of Hydrogen Energy*, 41 pages, 2022. [Accepted in Mar. 2022]
- 81- V. Bonfochi Vinhaes*, X. Yang*, G. McTaggart-Cowan, S. Munshi, M. Shahbakhti, J. Naber, " Development of a Medium-Duty Stoichiometric Diesel Micro-Pilot Natural Gas Engine ", *International Journal of Engine Research*, 14 pages, 2022. doi:10.1177/14680874221087954
- 80- S. Batool*, J. D. Naber, M. Shahbakhti, " Closed-loop predictive control of a multi-mode engine including HCCI, PPCI and RCCI combustion modes ", 21 pages, *SAE International Journal of Fuels and Lubricants*, 2022. [Accepted in Feb. 2022]
- 79- O. Wine*, A. O. Vargas, S. Campbell, V. Hosseini, C. R. Koch, M. Shahbakhti, " Cold Climate Impact on Air Pollution Related Health Outcomes: A Scoping Review ", *International Journal of Environmental Research and Public Health*, Vol. 19, Issue 3, 17 pages, 2022.

- 78- V. Bonfochi Vinhaes*, G. McTaggart-Cowan, S. Munshi, M. Shahbakhti, J. D. Naber, " Experimental Studies of Low Load Limit in a Stoichiometric Micro-Pilot Diesel Natural Gas Engine ", *Energies*, Vol. 15, Issue 3, 18 pages, 2022.
- 77- M. Toub*, R. D. Robinett III, M. Shahbakhti, " Building-to-Grid Optimal Control of Integrated MicroCSP and Building HVAC System for Optimal Demand Response Programs", *Optimal Control Applications and Methods*, 19 pages, 2022.
- 76- S. Hemmati*, R. Yadav*, S. Kaushik*, D. Robinette, M. Shahbakhti, " Important Powertrain Dynamics for Developing Models for Control of Connected and Automated Electrified Vehicles ", *IMEchE Part D: Journal of Automobile Engineering*, 18 pages, 2022. doi:10.1177/09544070211070738
- 75- A. Khameneian*, B. Khoshbakht Irdmousa*, P. Dice, M. Shahbakhti, J. D. Naber, P. Moilanen, C. Archer, C. Glugla, G. Huberts, " A Dynamic Method to Analyze Cold Start First Cycles Engine-Out Emissions at Elevated Cranking Speed Conditions of a Hybrid Electric Vehicle Including a Gasoline Direct Injection Engine ", *SAE International Journal of Engines*, Journal Article Number 03-15-06-0044, Vol. 15, Issue 6, 21 pages, 2022.
- 74- C. Reddy*, V. Bonfochi Vinhaes*, J. D. Naber, R. D. Robinett III, M. Shahbakhti, " Model Predictive Control of a Dual Fuel Engine Integrated with Waste Heat Recovery used for Electric Power in Buildings", *Optimal Control Applications and Methods*, 20 pages, 2022.
- 73- A. Mohammad, R. Rezaei, C. Hayduk, T. O. Delebinski, S. Shahpouri*, M. Shahbakhti, " Physical-oriented and Machine Learning-based Emission Modeling in a Diesel Compression Ignition Engine: Dimensionality Reduction and Regression ", *Int. J. of Engine Research*, 15 pages, 2022.
- 72- P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Real-time estimation of backlash size in automotive drivetrains ", *IEEE/ASME Transactions on Mechatronics*, 11 pages, 2022.
- 71- A. Khameneian*, X. Wang, P. Dice, J. D. Naber, M. Shahbakhti, C. Archer, P. Moilanen, C. Glugla, G. Huberts, " A Real-Time Control-Oriented Discrete Nonlinear Model Development for In-Cylinder Air Charge, Residual Gas and Temperature Prediction of a Gasoline Direct Injection Engine Using Cylinder, Intake and Exhaust Pressures ", *Control Eng. Practice*, Vol. 119, 21 pages, 2022.
- 70- M. Aliramezania, C. R. Koch, M. Shahbakhti, " Modeling, Diagnostics, Optimization, and Control of Internal Combustion Engines via Advanced Machine Learning Techniques: A Review and Future Directions ", *Progress in Energy and Combustion Science*, Vol. 88, 38 pages, 2022.
- 69- S. Shahpouri*, A. Norouzi*, C. Hayduk, R. Rezaei, M. Shahbakhti, C. R. Koch, " Hybrid Machine Learning Approaches and a Systematic Model Selection Process for Predicting Soot Emissions in Compression Ignition Engines ", *Energies*, Vol. 14, Issue 23, 25 pages, 2021.
- 68- A. Norouzi*, H. Heidarifar*, M. Shahbakhti, C. R. Koch, H. Borhan, " Model Predictive Control of Internal Combustion Engines: A Review and Future Directions ", *Energies*, Vol. 14, Issue 19, 40 pages, 2021.
- 67- S. A. Nadeem*, P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Model Predictive Control of an Automotive Driveline for Optimal Torque Delivery with Minimal Oscillations during Torque Converter Slipping Conditions ", *SAE International Journal of Passenger Cars: Mechanical Systems*, Paper No. 06-14-01-0004, Vol. 14, Issue 1, 16 pages, 2021.
- 66- M. Toub*, C. R. Reddy*, R.D. Robinett III, M. Shahbakhti, " Integration and Optimal Control of MicroCSP with Building HVAC Systems: Review and Future Directions ", *Energies*, Vol. 14, Issue 3, 42 pages, 2021.
- 65- S. Hemmati*, N. Doshi*, D. Hanover*, C. Morgan, M. Shahbakhti, " Integrated HVAC and Powertrain Thermal Energy Management for a Connected Hybrid Electric Vehicle ", *Applied Energy*, Vol. 283, 22 pages, 2021.

- 64- A. Paykani, A. Garcia Martinez, M. Shahbakhti, P. Rahnama, R. D. Reitz, " Reactivity Controlled Compression Ignition Engine: Pathways Towards Commercial Viability ", *Applied Energy*, Vol. 282, Part A, 23 pages, 2021.
- 63- S. Polat*, H. S. Yücesu, A. Uyumaz, K. Kannan*, M. Shahbakhti, " An Experimental Investigation on Combustion and Performance Characteristics of Supercharged HCCI Operation in Low Compression Ratio Engine Setting ", *Applied Thermal Engineering*, Vol. 180, 16 pages, Nov. 2020.
- 62- Y. Bao, J. Mohammadpour Velni, M. Shahbakhti, " Epistemic Uncertainty Quantification in State-space LPV Model Identification Using Bayesian Neural Networks ", *IEEE Control Systems Letters (L-CSS)*, Vol. 5, Issue 2, Pages 719-724, 2020.
- 61- X. Ma, M. Shahbakhti, T. Chigan, " Connected Vehicle based Distributed Meta-Learning for Online Adaptive Engine/Powertrain Fuel Consumption Modeling ", *IEEE Transactions on Vehicular Technology*, Vol. 69, Issue 9, Pages 9553-9565, 2020.
- 60- C. Reddy*, M. Shahbakhti, R. Robinett, M. Razmara*, " Exergy-wise Predictive Control Framework for Optimal Performance of MicroCSP Systems for HVAC Applications in Buildings ", *Energy Conversion and Management*, Vol. 210, 15 pages, 2020.
- 59- M. Toub*, C. Reddy*, M. Razmara*, M. Shahbakhti, R. Robinett, G. Aniba, " Model-Based Predictive Control for Optimal MicroCSP Operation Integrated with Building HVAC Systems ", *Energy Conversion and Management*, Vol. 199, 16 pages, 2019.
- 58- V. R. Chundru, B. S. Mahadevan*, J. H. Johnson, G. G. Parker, M. Shahbakhti, " Development of a 2D Model of a SCR Catalyst on a DPF ", *Emission Control Science and Technology*, Vol. 5, Issue 2, Pages 133-171, 2019.
- 57- E. Ansari*, T. Menucci, M. Shahbakhti, J. Naber, " Experimental Investigation into Effects of High Reactive Fuel on Combustion and Emission Characteristics of the Diesel - Natural Gas RCCI Engine ", *Applied Energy*, Vol. 239, Pages 948-956, 2019.
- 56- A. Raut*, B. Irdmousa*, M. Shahbakhti, " Dynamic Modeling and Model Predictive Control of an RCCI Engine ", *Control Engineering Practice*, Vol. 81, Pages 129-144, 2018.
- 55- E. Ansari*, M. Shahbakhti, J. Naber, " Optimization of Performance and Operational Cost for a Dual Mode Diesel-Natural Gas RCCI and Diesel Combustion Engine ", *Applied Energy*, Vol. 231, Pages 549-561, 2018.
- 54- M. Bidarvatan*, M. Shahbakhti, " Analysis and Control of Torque Split in Hybrid Electric Vehicles by Incorporating Powertrain Dynamics ", *ASME Journal of Dynamic Systems, Measurement, Control*, Vol. 140, Issue 11, No. 111009-111009-11, 2018.
- 53- M. Amini*, M. Shahbakhti, S. Pan, " Adaptive Discrete Second Order Sliding Mode Control with Application to Nonlinear Automotive Systems ", *ASME Journal of Dynamic Systems, Measurement, Control*, Vol. 140, Issue 12, No. 121010-121010-12, 2018.
- 52- B. M. Mahadevan*, J. Johnson, M. Shahbakhti, " Development of a Kalman Filter Estimator for Simulation and Control of Particulate Matter Distribution of a Diesel Catalyzed Particulate Filter ", *International Journal of Engine Research*, 19 pages, DOI: 10.1177/1468087418785855, 2018.
- 51- M. Razmara*, G. Bharati, M. Shahbakhti, S. Paudyal, R. Robinett, " Bilevel Optimization Framework for Smart Building-to-Grid Systems ", *IEEE Transactions on Smart Grid*, Vo. 9, No. 2, Pages 582-593, 2018.
- 50- A. Solouk*, M. Shakiba, J. Arora*, M. Shahbakhti, " Fuel Consumption Assessment of an Electrified Powertrain with a Multi-Mode High-Efficiency Engine in Various Levels of Hybridization ", *Energy Conversion and Management*, Vol. 155, Pages 100-115, 2018.
- 49- A. Rezaei*, J. B. Burl, A. Solouk*, B. Zhou, M. Rezaei, M. Shahbakhti, " Catch Energy Saving Opportunity (CESO), an Instantaneous Optimal Energy Management Strategy for Series Hybrid Electric Vehicles ", *Applied Energy*, Vol. 208, pages 655-665, 2017.

- 48- A. Solouk*, J. Tripp*, M. Shakiba, M. Shahbakhti, " Fuel Consumption Assessment of a Multi-Mode Low Temperature Combustion Engine as Range Extender for an Electric Vehicle ", *Energy Conversion and Management*, Vol. 148, pages 1478–1496, 2017.
- 47- M. Razmara*, G. R. Bharati, D. Hanover*, M. Shahbakhti, S. Paudyal, R.D. Robinett III, " Building-to-grid Predictive Power Flow Control for Demand Response and Demand Flexibility Programs ", *Applied Energy*, Vol. 203, pages 128-141, 2017.
- 46- K. Poorghasemi, R. Khoshtakht Saray, E. Ansari*, B. Khoshtakht*, M. Shahbakhti, J. D. Naber, " Effect of Diesel Injection Strategies on Natural Gas/Diesel Combustion Characteristics in a Light Duty Diesel Engine ", *Applied Energy*, Vol. 199, pages 430-446, 2017.
- 45- B. Bahri, M. Shahbakhti, A.A. Aziz, " Real-time Modeling of Ringing in HCCI Engines using Artificial Neural Networks ", *Energy*, Vol. 125, pages 509-518, 2017.
- 44- M. Fathi, O. Jahanian, M. Shahbakhti, " Modeling and Controller Design Architecture for Cycle-by-Cycle Combustion Control of Homogeneous Charge Compression Ignition (HCCI) Engines - A Comprehensive Review ", *Energy Conversion and Management*, Vol. 139, pages 1-19, 2017.
- 43- M. R. Amini*, M. Shahbakhti, S. Pan, J. K. Hedrick, " Bridging the Gap Between Designed and Implemented Controllers via Adaptive Robust Discrete Sliding Control ", *Control Engineering Practice*, Vol. 59, pages 1-15, 2017.
- 42- A. Solouk*, M. Shakiba, M. Shahbakhti, " Analysis and Control of a Torque Blended Hybrid Electric Powertrain with a Multi-Mode LTC-SI Engine ", *SAE Int. J. of Alternative Powertrains*, 15 pages, 6(1):2017, DOI:10.4271/2017-01-1153, 2017.
- 41- M. R. Amini*, M. Razmara*, M. Shahbakhti, " Robust Model-Based Discrete Sliding Mode Control of an Automotive Electronic Throttle Body ", *SAE Int. J. of Commercial Vehicles*, 15 pages, 10(1):2017, DOI:10.4271/2017-01-0598, 2017.
- 40- Y. Wang*, J. Zhang*, X. Wang*, P. Dice, M. Shahbakhti, J. Naber, M. Czekala, Q. Qu, G. Huberts, " Investigation of Impacts of Spark Plug Orientation on Early Flame Development and Combustion in a DI Optical Engine ", *SAE Int. J. Engines*, 17 pages, 10(3):2017, DOI:10.4271/2017-01-0680, 2017.
- 39- A. Solouk*, M. Shahbakhti, " Modeling and Energy Management of an HCCI based Powertrain for Series Hybrid and Extended Range Electric Vehicles ", *Int. J. of Powertrains*, Vol. 6, Issue 3, pages 226-258, 2017.
- 38- B. M. Singalandapuram*, J. H. Johnson and M. Shahbakhti, " Predicting Pressure Drop, Temperature and Particulate Matter Distribution of a Catalyzed Diesel Particulate Filter using a Multi-zone Model including Cake Permeability ", *Emission Control Science & Technology*, Vol. 3, Issue 2, pages 171-201, 2017.
- 37- A. Solouk*, M. Shahbakhti, " Energy Optimization and Fuel Economy Investigation of Series Hybrid Electric Vehicle Integrated with Diesel/RCCI Engines ", *Energies*, 9(12), pages 1-23, 1020; 2016.
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- 62- E. Ansari*, K. Poorghasemi*, B. K. Irdmoussa*, M. Shahbakhti, J. D. Naber, " Efficiency and Emissions Mapping of a Light Duty Diesel – Natural Gas Engine Operating in Conventional Diesel and RCCI Modes ", *SAE 2016 Int. Powertrains, Fuels & Lubricants Conference*, 15 pages, SAE Paper No. 2016-01-2309, Oct. 24-26, 2016, Baltimore, Maryland, USA.
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- 60- K. Khodadadi Sadabadi*, M. Shahbakhti, " Dynamic Modeling and Controller Design of Combustion Phasing of an RCCI Engine ", *2016 ASME Dynamic Systems Control Conference*, 10 pages, Oct. 12-14, 2016, Minneapolis, MN, USA.
- 59- G. R. Bharati, M. Razmara*, S. Paudyal, M. Shahbakhti, R. Robinett III, " Hierarchical Optimization Framework for Demand Dispatch in Building-Grid Systems ", 5 pages, *2016 IEEE Power & Energy Society (PES) General Meeting*, Jul. 17-21, 2016, Boston, MA, USA.
- 58- M. R. Amini*, M. Shahbakhti, J. K. Hedrick, " Discrete Sliding Controller Design with Robustness to Implementation Imprecisions via Online Uncertainty Prediction ", 6 pages, *2016 American Control Conference*, Jul. 6-8, 2016, Boston, MA, USA. (Selected as best presentation of the session)
- 57- M. Razmara*, M. Bidarvatan*, M. Shahbakhti, R. Robinett III, " Novel Exergy-Wise Predictive Control of Internal Combustion Engines ", 6 pages, *2016 American Control Conference*, Jul. 6-8, 2016, Boston, MA, USA. (Selected as best presentation of the session)
- 56- J. Dobbs*, M. Razmara*, M. Shahbakhti, S. Paudyal, " Selecting Control Input Type for a Building Predictive Controller Integrated in a Power Grid ", 6 pages, *2016 American Control Conference*, Jul. 6-8, 2016, Boston, MA, USA.
- 55- M. Razmara*, M. Bidarvatan*, M. Shahbakhti, R. Robinett III, " Innovative Exergy-based Combustion Phasing Control of IC Engines ", *2016 SAE World Congress*, 13 pages, SAE Paper No. 2016-01-0815, Apr. 12-14, 2016, Detroit, MI, USA.
- 54- M. R. Amini*, M. Shahbakhti, J. K. Hedrick, " Easily Verifiable Adaptive Sliding Mode Controller Design with Application to Automotive Engines ", *2016 SAE World Congress*, 16 pages, SAE Paper No. 2016-01-0629, Apr. 12-14, 2016, Detroit, MI, USA.
- 53- M. Bidarvatan* and M. Shahbakhti, " Energy Management of a Hybrid Electric Vehicle by Incorporating Powertrain Dynamics ", *ASME Dynamic Systems and Control Conference*, 10 pages, Oct. 28-30, 2015, Columbus, Ohio, USA. (Best Paper Award, ASME Automotive and Transportation Systems Technical Committee.)
- 52- M. Razmara*, M. Maasoumy, M. Shahbakhti, R. Robinett, " Exergy-Based Model Predictive Control for Building HVAC Systems ", 6 pages, *2015 American Control Conference*, Jul. 1-3, 2015, Chicago, IL, USA.
- 51- M. Razmara*, G. Bharati, M. Shahbakhti, S. Paudyal, R. Robinett, " Bidirectional Optimal Operation of Smart Building-to-Grid Systems ", 6 pages, *2015 American Control Conference*, Jul. 1-3, 2015, Chicago, IL, USA.

- 50- M. Bidarvatan*, D. Kothari*, M. Shahbakhti, " Integrated Cycle-to-Cycle Control of Exhaust Gas Temperature, Load, and Combustion Phasing in an HCCI Engine ", 6 pages, *2015 American Control Conference*, Jul. 1-3, 2015, Chicago, IL, USA. (Selected as best presentation of the session)
- 49- S. Polat*, K. Kannan*, M. Shahbakhti, A. Uyumaz, H. S. Yücesu, " An Experimental Study for the Effects of Supercharging on Performance and Combustion of an Early Injection HCCI Engine ", *Int. Research Conference on Engineering, Science and Management (IRCESM)*, 6 pages, June 3-4, 2015, Dubai, UAE. (Received best presentation award of the conference)
- 48- H. Saigaonkar*, M. Nazemi* and M. Shahbakhti, " Sequential Model for Residual Affected HCCI with Variable Valve Timing ", 15 pages, *2015 SAE World Congress*, SAE Paper No. 2015-01-1748, Apr. 21-23, 2015, Detroit, MI, USA.
- 47- M. Bidarvatan* and M. Shahbakhti, " Impact of Engine Dynamics on Torque Split Management of a Hybrid Electric Vehicle ", *ASME Dynamic Systems and Control Conference*, 10 pages, October 22-24, 2014, San Antonio, Texas, USA.
- 46- A. Solouk*, M. Shahbakhti, M. J. Mahjoob, " Energy Management and Control of a Hybrid Electric Vehicle with an Integrated Low Temperature Combustion (LTC) Engine ", *ASME Dynamic Systems and Control Conference*, 10 pages, October 22-24, 2014, San Antonio, Texas, USA.
- 45- M. J. Rezaei* and M. Shahbakhti, " Artificial Neural Networks Based Prediction of Performance and Exhaust Emissions in a Butanol Fuelled HCCI Engine", *Int. Conference on Advanced Technology & Sciences*, 6 pages, August 12-15, 2014, Antalya, Turkey.
- 44- M. Nazemi*, H. Saigaonkar*, M. Shahbakhti, " Thermo-kinetic Modeling of Variable Valve Timing Effects on HCCI Engine Combustion", *Int. Conference on Advanced Technology & Sciences*, 6 pages, August 12-15, 2014, Antalya, Turkey.
- 43- M. Maasoumy, M. Razmara*, M. Shahbakhti, A. Sangiovanni-Vincentelli, " Selecting Building Predictive Control Based on Model Uncertainty ", 7 pages, *American Control Conference*, Jun. 4-6, 2014, Portland, OR, USA.
- 42- M. Bidarvatan*, V. Thakkar*, M. Shahbakhti, " Grey-box Modeling and Control of HCCI Engine Emissions", 6 pages, *American Control Conference*, Jun. 4-6, 2014, Portland, OR, USA.
- 41- M. Amini*, M. Shahbakhti, A. Ghaffari, " A Novel Singular Perturbation Technique for Model-Based Control of Cold Start Hydrocarbon Emission ", 13 pages, *SAE World Congress*, SAE Paper No. 2014-01-1547, Apr. 8-10, 2014, Detroit, MI, USA.
- 40- M. Bidarvatan*, M. Shahbakhti, " Integrated HCCI Engine Control based on a Performance Index ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2013-19107, 11 pages, Oct. 13-16, 2013, Dearborn, Michigan, USA.
- 39- M. Bidarvatan*, M. Shahbakhti, " Grey-Box Modeling for HCCI Engine Control ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2013-19097, 10 pages, Oct. 13-16, 2013, Dearborn, Michigan, USA.
- 38- M. Boudaghi*, M. Shahbakhti, S. A. Jazayeri, " A New Physics-based Misfire Detection Technique for a SI Engine ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2013-19096, 11 pages, Oct. 13-16, 2013, Dearborn, Michigan, USA.
- 37- M. Maasoumy, B. Moridian*, M. Razmara*, M. Shahbakhti, A. Sangiovanni-Vincentelli, " On-line Simultaneous State Estimation and Parameter Adaptation for Building Predictive Control ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 21-23, 2013, Palo Alto, CA, USA. (Selected as the top 6 best student papers out of 406 conference paper submissions.)
- 36- R. Salehi*, M. Shahbakhti, A. Alasty, G. Vossoughi, " On-line Fault Detection and Isolation (FDI) for the Exhaust Path of a Turbocharged SI Engine ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 21-23, 2013, Palo Alto, CA, USA.

- 35- B. Bahri*, A. A. Aziz, M. F. Muhamad Said, M. Shahbakhti, " Misfiring Cycle Pressure Measurement for Diesel-converted HCCI Engine ", 6 pages, *ICA Int. Conference on Instrumentation, Control and Automation*, Aug. 28-30, 2013, Bali, Indonesia.
- 34- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " Ethanol Fuelled HCCI Engine: A Review ", 7 pages, *Int. Conference on Mechanical, Aeronautical and Automotive Engineering*, Jul. 4-5, 2013, SG, Singapore.
- 33- M. Bidarvatan*, M. Shahbakhti, " Two-Input Two-Output Control of Blended Fuel HCCI Engines ", Proceeding of *SAE World Congress*, SAE Paper No. 2013-01-1663, 15 pages, Apr. 16-18, 2013, Detroit, USA.
- 32- R. Salehi*, M. Shahbakhti, J. K. Hedrick, " Hybrid Switching Control of Automotive Cold Start Hydrocarbon Emission ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.
- 31- K. Edelberg*, M. Shahbakhti, J. K. Hedrick, " Incorporation of Implementation Imprecision in Automotive Control Design ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.
- 30- R. Salehi*, M. Shahbakhti, A. Alasty, G.R. Vossoughi, " Control Oriented Modeling of a Radial Turbine for a Turbocharged Gasoline Engine ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.
- 29- R. Salehi*, M. Shahbakhti, A. Alasty, G.R. Vossoughi, " Nonlinear Observer Design for Turbocharger in a SI Engine ", Proceeding of *American Control Conference*, 6 pages, Jun. 17-19, 2013, Washington, DC, USA.
- 28- B. Bahri*, A. A. Aziz, M. Shahbakhti, M. F. Muhamad Said, " A Diagnosis Technique for the Identification of Misfire in a Converted-Diesel HCCI Engine ", 6 pages, *13th WSEAS Int. Conference on Robotics, Control and Manufacturing Technology*, Apr. 2-4, 2013, Kuala Lumpur, Malaysia.
- 27- A. Hansen*, M. Shahbakhti, J. K. Hedrick, " Impact of Implementation Imprecision on Sliding Mode Controller Design for Cold Start Automotive Emissions ", 10 pages, *ASME Dynamic Systems and Control Conference*, Oct. 17-19, 2012, Ft. Lauderdale, FL, USA. (Best Paper Award, ASME Automotive and Transportation Systems Technical Committee.)
- 26- M. Shahbakhti, J. Li*, J. K. Hedrick, " Early Model-Based Verification of Automotive Control System Implementation ", 6 pages, *American Control Conference*, Jun. 27-29, 2012, Montréal, Canada. (Selected as best presentation of the session)
- 25- A. Cranmer*, M. Shahbakhti, J. K. Hedrick, " Grey-Box Modeling of Rotational Dynamics in Automotive Engines ", 6 pages, *American Control Conference*, Jun. 27-29, 2012, Montréal, Canada.
- 24- B. Bahri*, A. A. Aziz, M. F. Muhamad Said, M. Shahbakhti, " Artificial Neural Network Model for Predicting Exhaust Temperature of an Ethanol-Fueled HCCI Engine ", 4 pages, *JSAE Annual Congress*, JSAE Paper No. 20125168, May 23-25, 2012, Yokohama, Japan.
- 23- M. Bidarvatan*, M. Shahbakhti, S. A. Jazayeri, " Model-Based Control of Combustion Phasing in an HCCI Engine ", *2012 SAE World Congress*, SAE Paper No. 2012-01-1137, 17 pages, Apr. 24-26, 2012, Detroit, USA.
- 22- M. Shahbakhti, A. Ghazimirsaid, C. R. Koch, " Modeling Ranges of Cyclic Variability for Ignition Timing Control of HCCI Engines ", *ASME Dynamic Systems and Control Conference*, 8 pages, Oct. 31 - Nov. 2, 2011, Arlington, USA.
- 21- S. Asami, A. Cranmer*, M. Shahbakhti, J. K. Hedrick, " Model-based Control via Balanced Realization for Automotive Cold Start Hydrocarbon Reduction ", *ASME Dynamic Systems and Control Conference*, 8 pages, Oct. 31 - Nov. 2, 2011, Arlington, USA.
- 20- A. Ghazimirsaid, M. Shahbakhti, C. R. Koch, " Comparison of Crank Angle Based Ignition Timing Methods on an HCCI Engine ", *ASME Internal Combustion Engine Division Fall Technical Conference*, Paper No. ICEF2010-35087, 12 pages, Sept. 12-15, 2010, San Antonio, USA.

- 19- M. Shahbakhti, A. Ghazimirsaid, C. R. Koch, " Predicting the Distribution of Combustion Timing Ensemble in an HCCI Engine ", *ASME Internal Combustion Engine Division Spring Technical Conference*, Paper No. ICES2009-76007, 12 pages, May 3-6, 2009, Milwaukee, WI, USA.
- 18- A. Ghazimirsaid, M. Shahbakhti, C. R. Koch, " Nonlinear Dynamics in Cyclic Variations of Combustion Phasing in an HCCI Engine ", *ASME Internal Combustion Engine Division Spring Technical Conference*, Paper No. ICES2009-76157, 7 pages, May 3-6, 2009, Milwaukee, WI, USA.
- 17- M. Shahbakhti, C. R. Koch, " Dynamic Modeling of HCCI Combustion Timing in Transient Fueling Operation ", *Proceeding of SAE World Congress*, SAE Paper No. 2009-01-1136, 16 pages, Apr. 20-23, 2009, Detroit, USA.
- 16- M. Shahbakhti, R. Lupul, C. R. Koch, " Sensitivity Analysis & Modeling of HCCI Auto-Ignition Timing", *Proceeding of the Fifth IFAC Symposium on Advances in Automotive Control*, pages 303 - 310, Aug. 20-22, 2007, Monterey Coast, California, USA.
- 15- M. Shahbakhti, C. R. Koch, " Control Oriented Modeling of Combustion Phasing for an HCCI Engine ", *Proceeding of 2007 American Control Conference*, pages 3694-3699, Jul. 11-13, 2007, New York, USA.
- 14- M. Shahbakhti, R. Lupul, C. R. Koch, " Cyclic Variations of Ignition Timing in an HCCI Engine ", *Proceeding of Annual ASME/IEEE Joint Rail Conference (JRC) and the ASME Internal Combustion Engine Division (ICED) Conference*, Paper No. JRCICE2007/40032, 11 pages, Mar. 13-16, 2007, Pueblo, Colorado, USA.
- 13- M. Shahbakhti, R. Lupul, C. R. Koch, " Predicting HCCI Ignition Timing by Extending a Modified Knock-Integral Method ", *Proceeding of SAE World Congress*, SAE Paper No. 2007-01-0222, 13 pages, Apr. 16-19, 2007, Detroit, USA.
- 12- S. Sharifi Rad*, S. A. Jazayeri, M. Shahbakhti, " Automatic Driver Design and Longitudinal Dynamic Simulation for Passenger Cars ", *Proceeding of SAE World Congress*, SAE Paper No. 2006-01-1015, 9 pages, Apr. 3-7, 2006, Detroit, USA.
- 11- K. Swan, M. Shahbakhti, C. R. Koch, " Predicting Start of Combustion Using a Modified Knock-Integral Method for an HCCI Engine ", *Proceeding of SAE World Congress*, SAE Paper No. 2006-01-1086, 10 pages, Apr. 3-7, 2006, Detroit, USA.
- 10- S. Sharifi Rad*, S. A. Jazayeri, M. Shahbakhti, " Simulation of Vehicle Dynamics and Design of an Auto-driver for ECE Driving Cycles ", *Proceeding of 4th International Conference on Internal Combustion Engines (ICICE)*, 9 pages, Nov. 16-17, 2005, Tehran, Iran.
- 9- M. Shahbakhti, S. A. Jazayeri, M. Ghafari, A. R. Aslani, A. Sahraeian, S. Azadi, " A Novel Method to Estimate Parameters of the Wall-Wetting Fuel Model in MPFI Engines for Cold Start and Warm up Conditions ", *Proceeding of ASME Internal Combustion Engine Fall Technical Conference*, 12 pages, Oct. 24-27, 2004, Long Beach, CA, USA.
- 8- A. Sahraeian, M. Shahbakhti, A. R. Aslani, S. A. Jazayeri, S. Azadi, " Longitudinal Vehicle Dynamics Modeling on the Basis of Engine Modeling ", *Proceeding of SAE World Congress*, SAE Paper No. 2004-01-1620, 11 pages, Mar. 8-11, 2004, Detroit, USA.
- 7- A. R. Aslani, M. Shahbakhti, A. Sahraeian, S. M. Hoseinalipoor, S. A. Jazayeri, " Dynamic Modeling of a Port Fuel-Injected Engine with Sensitivity Analysis ", *Proceeding of SAE World Congress*, SAE Paper No. 2004-01-1771, 9 pages, Mar. 8-11, 2004, Detroit, USA.
- 6- M. Shahbakhti, S. A. Jazayeri, M. Ghafari, A. R. Aslani, A. Sahraeian, S. Azadi, " Control Oriented Modeling of Mixture Formation in MPFI Engines to Predict Air-Fuel-Ratio in Transient Conditions ", *Proceeding of 3rd International Conference on Internal Combustion Engines (ICICE)*, 15 pages, Feb. 17-19, 2004, Tehran, Iran.
- 5- A. Sahraeian, M. Shahbakhti, A. R. Aslani, " Development and Use of a Vehicle Power-train Simulation for Fuel Economy and Performance Studies ", *Proceeding of 3rd International Conference on Internal Combustion Engines (ICICE)*, 11 pages, Feb. 17-19, 2004, Tehran, Iran.
- 4- A. R. Aslani, M. Shahbakhti, A. Sahraeian, S. M. Hoseinalipoor, " Control Oriented Modeling of Paykan Injection Engine ", *Proceeding of 3rd International Conference on Internal Combustion Engines (ICICE)*, 9 pages, Feb. 17-19, 2004, Tehran, Iran. (Best paper award)

- 3- M. Shahbakhti, S. A. Jazayeri, A. R. Aslani, M. Ghafuri, S. Azadi, " Identification of Dynamic Fuel Parameters in PFI Engines for Different Thermal Conditions ", Proceeding of 7th International and 11th Annual Mechanical Engineering Conference, ISME, Vol. 2, pages 743-760, 2003, Mashhad, Iran.
- 2- M. Shahbakhti, A. Mohsenian rad, S. A. Jazayeri, S. Azadi, " An Investigation into the Effective Methods to Reduce Emissions of Passenger Cars During Cold Start and Warm up Conditions ", Proceeding of 7th International and 11th Annual Mechanical Engineering Conference, ISME, Vol. 2, pages 702-718, 2003, Mashhad, Iran.
- 1- A. R. Aslani, M. Shahbakhti, S. M. Hoseinalipoor, S. A. Jazayeri, A. Ohadi, S. Azadi, " Dynamic Modeling of a Port Fuel Injection Engine for Air/Fuel Ratio Determination ", Proceeding of 7th International and 11th Annual Mechanical Engineering Conference, ISME, Vol. 2, pages 773-785, 2003, Mashhad, Iran.

Submitted Conference Papers

Non-refereed Technical Papers

- 1- B. Chen, D. Robinette, M. Shahbakhti, K. Zhang, J. Naber, " Connected Vehicles and Powertrain Optimization ", Invited article, 9 pages, *ASME Dynamic System Control Magazine*, 2017.
- 2- J. K. Hedrick and M. Shahbakhti, " Model-based Verification of Automotive Control System Implementation ", Keynote paper, 8 pages, *Int. Conference on Advanced Vehicle Technologies and Integration (VTI)*, Jul. 16-19, 2012, Changchun, China.

Technical Presentation Papers (refereed abstract/extended abstract & oral presentation)

- 21- S. Batool*, J. D. Naber, M. Shahbakhti, " Machine Learning Approach for Identification of Heat Release Shapes in a Low Temperature Combustion Engine", *2022 SAE World Congress*, Apr. 5-7, 2022, Detroit, MI, USA.
- 20- A. Norouzi*, M. Shahbakhti, C.R. Koch, " Machine Learning-based Diesel Engine-out Emissions Model and Control Using the Learning-based Control Technique ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.
- 19- S.A. Nadeem*, P. Reddy*, M. Shahbakhti, M. Ravichandran, J. Doering, " Model Predictive Control of an Automotive Driveline for Optimal Torque Delivery with Minimal Oscillations during Torque Converter Slipping Conditions ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.
- 18- B. Khoshbakht*, A. Basina*, J. Valeni, H. Borhan, J. Naber, M. Shahbakhti, " Control-oriented Modeling of Maximum Pressure Rise Rate in RCCI Engines ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.
- 17- S. Batool*, J. Naber, M. Shahbakhti, " Closed-loop Predictive Control of a Multi-mode Engine Including HCCI, PPCI, and RCCI Combustion Modes ", *2021 SAE World Congress*, Apr. 13-15, 2021, Detroit, MI, USA.
- 16- S. Hemmati*, N. Doshi*, D. Hanover*, C. Morgan, M. Shahbakhti, " Integrated HVAC and Powertrain Control for a Connected Plug-in Hybrid Electric Vehicle ", *2019 SAE Thermal Management Systems Symposium (TMSS)*, Oct. 15-17, 2019, Plymouth, MI, USA.
- 15- B. S. Mahadevan*, J. H. Johnson, and M. Shahbakhti, " Development of a MPF Model with a Kalman Filter State Estimator for Simulation and Control of Particulate Matter Distribution of a CPF for Aftertreatment System Control Applications ", *2017 CLEERS (Cross-Cut Lean Exhaust Emissions Reduction Simulations) Workshop*, Oct. 3-5, 2017, Ann Arbor, MI, USA.
- 14- A. Solouk*, M. Shahbakhti, " Fuel Economy Benefits of Electrified Powertrains with Advanced Combustion Engines: Mild to Strong HEV Applications ", 7 pages, *2017 SIA Int. Powertrain Conference*, Jun. 7-8, 2017, Versailles, France.
- 13- A. Solouk*, M. Shahbakhti, " Potential of Low Temperature Combustion (LTC) Engine Technology for Range Extender Vehicles ", Proceeding of *2016 SAE Range Extenders for Electric Vehicles Symposium*, Nov. 2-3, 2016, Knoxville, TN, USA.

- 12- M. Nazemi*, S. Polat*, M. Shahbakhti, "Advanced Combustion Model of LTC Engines", 2014 *CONVERGE™ User Group Meeting*, Sept. 23-25, 2014, Madison, Wisconsin, USA.
- 11- M. Shahbakhti, K. Edelberg*, S. Pan*, A. Hansen*, J. Li*, J. K. Hedrick, " Model-Based Verification and Real-Time Validation of Automotive Controller Software ", *Proceeding of ASME Verification and Validation Symposium*, May 22-24, 2013, Las Vegas, NV, USA.
- 10- K. Edelberg*, M. Shahbakhti, J. K. Hedrick, " Modeling and Incorporation of Software Implementation Uncertainty to Realize Easily Verifiable Automotive Controllers ", *Proceeding of ASME Verification and Validation Symposium*, May 22-24, 2013, Las Vegas, NV, USA.
- 9- K. Ebrahimi, M. Shahbakhti, C. R. Koch, " Comparison of Butanol/n-Heptane to PRF Blended Fuels in HCCI Engines ", *2011 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS11-34, 6 pages, May 8-11, 2011, Winnipeg, Canada.
- 8- A. Ghazimirsaid, M. Shahbakhti, C. R. Koch, " Ignition Timing Criteria for Partial Burn Operation in an HCCI Engine", *2011 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS11-33, 6 pages, May 8-11, 2011, Winnipeg, Canada.
- 7- M. Shahbakhti, A. Ghazimirsaid, C. R. Koch, " Combustion Characteristics of Butanol/n-Heptane Blend Fuels in an HCCI Engine ", *2010 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS10-A018, 6 pages, May 9-12, 2010, Ottawa, Canada.
- 6- A. Ghazimirsaid, M. Shahbakhti, C. R. Koch, " Recognizing Partial Burn Operation in an HCCI Engine", *2010 Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS10-A017, 6 pages, May 9-12, 2010, Ottawa, Canada.
- 5- M. Shahbakhti, A. Ghazimirsaid, C. R. Koch, " The Effect of Operating Conditions on HCCI Exhaust Gas Temperature ", *Proceeding of Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS-A02, 6 pages, May 10-13, 2009, Montréal, Canada.
- 4- A. Ghazimirsaid, M. Shahbakhti, C. R. Koch, " Partial-Burn Crank Angle Limit Criteria Comparison on an Experimental HCCI Engine ", *Proceeding of Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, Paper No. CICS-A52, 6 pages, May 10-13, 2009, Montréal, Canada.
- 3- A. Ghazimirsaid, M. Shahbakhti, A. Audet, C. R. Koch, " HCCI Engine Cyclic Variation Characterization Using Both Chaotic and Statistical Approach ", *Proceeding of Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 12-14, 2008, Toronto, Canada.
- 2- M. Shahbakhti, R. Lupul, A. Audet, C. R. Koch, " Experimental Study of HCCI Cyclic Variations for Low-Octane PRF Fuel Blends ", *Proceeding of Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 13-16, 2007, Banff, Canada.
- 1- M. Shahbakhti, C. R. Koch, " Thermo-kinetic Combustion Modeling of an HCCI Engine to Analyze Ignition Timing for Control Applications ", *Proceeding of Combustion Institute-Canadian Section (CICS) Spring Technical Conference*, 6 pages, May 13-16, 2007, Banff, Canada.

Technical Posters

- 6- S. Vafaeenezhad, A. R. Hanifi, M. Cuglietta, A. R. Razmi*, A. Khaled Elkashat*, M. Shahbakhti, P. Sarkar, T. H. Etsell, " High-Efficiency and Stable Solid Oxide Fuel Cells and Electrolysis Cells ", *Canadian Hydrogen Convention*, April 26-28, 2022, Edmonton, Alberta, Canada.
- 5- M. Mashkournia, A. Ghazimirsaid, J. Boddez, M. Shahbakhti, D. Achtymichuk, D. Handford, " Flexible Operation of HCCI Combustion Using Intelligent Control ", *Canada Auto21 HQP Conference*, May 26-28, 2009, Hamilton, Ontario, Canada.
- 4- S. Varnhagen, A. Audet, M. Shahbakhti, D. Handford, A. Ghazimirsaid, " Flexible Operation of HCCI Combustion Using Intelligent Control ", *Canada Auto21 HQP Conference*, Jun. 1-4, 2008, London, Ontario, Canada.
- 3- A. Audet, R. Lupul, M. Shahbakhti, V. Hosseini, A. Ghazimirsaid, P. Kongsereparp, X. Yao, " Electronic Control for VVT and HCCI Combustion ", *Canada Auto21 HQP Conference*, Jun. 11-13, 2007, Windsor,

Canada.

- 2- R. Chladny, R. Lupul, M. Shahbakhti, V. Hosseini, P. Kongsereparp, Y. Gao, " Electronic Control for VVT and HCCI Combustion ", Canada Auto21 HQP Conference, May 15-17, 2006, Barrie, Canada.
- 1- R. Chladny, V. Hosseini, S. Chung, K. Frank, P. Kongsereparp, M. Shahbakhti, " Electronic Control for VVT and HCCI Combustion ", Canada Auto21 HQP Conference, May 10-12, 2005, Oshawa, Canada.

Invited Talks

- 29- M. Shahbakhti, " Cooperative Truck Platooning Trials in Alberta ", SAE Alberta Section, Mar. 17, 2022, Edmonton, Canada.
- 28- M. Shahbakhti, J. Lavery, " Intelligent Management of University of Alberta Fleet Vehicles ", Panel on Sustainability Awareness: Campus as a Living Lab, University of Alberta, Oct. 26, 2021, Canada.
- 27- M. Shahbakhti, A. Osornio-Vargas, " Urban Carrying Capacity under Cold Climate for Transportation Generated Air Pollution and Public Exposure", Canada's Social Sciences and Humanities Research Council (SSHRC), Panellist and Online Forum/Talks and, Living within the Earth's Carrying Capacity Program, Panel on Healthy Communities, Apr. 7, 2021, Canada.
- 26- M. Shahbakhti, " Exergy-wise Control of Energy Systems: A Promising Paradigm to Enable Maximum Energy Conversion Efficiency in Systems ", Control Seminars Series, University of Michigan – Ann Arbor, Delivered online due to Covid travel restrictions, Nov. 13, 2020, Ann Arbor, MI, USA.
- 25- M. Shahbakhti, " Modeling and Predictive Control of Multi-Mode Combustion Engines along with Hybrid Electric Vehicles, and Energy Saving Opportunities in a Connected World", Mechanical Engineering Department, University of British Columbia, Jan. 30, 2020, Vancouver, BC, Canada.
- 24- M. Shahbakhti, " Energy Mechatronics: Enabling Smart Buildings and Intelligent Autonomous Vehicles in a Connected World ", School of Sustainable Energy Engineering, Simon Fraser University, Jan. 27, 2020, Vancouver, BC, Canada.
- 23- M. Shahbakhti, " Intelligent Control of Building and Automotive Energy Systems in a Connected World ", College of Engineering Seminar Series, University of Georgia, Oct. 5, 2018, Athens, GA, USA.
- 22- M. Shahbakhti, " Energy Mechatronics: Enabling Smart Buildings and Building-to-Grid Operation in a Connected World ", Mechanical Engineering Department, University of Alberta, July 6, 2018, Edmonton, AB, Canada.
- 21- M. Shahbakhti, " Modeling and Control of Building and Automotive Energy Systems in the New Era of Connected World ", Mechanical and Aerospace (MAE) Engineering Graduate Seminar Series, MAE Department, University of California - Davis, May 17, 2018, Davis, CA, USA.
- 20- M. Shahbakhti, " Intelligent Control of Buildings Integrated with Renewable Solae Energy Sources ", Guest lecture at Alternative Energy Enterprise, Michigan Technological University, Mar. 27, 2018, Houghton, MI, USA.
- 19- M. Shahbakhti, " Control of Advanced Hybrid Electric Vehicles ", Center for Automotive Research (CAR), Ohio State University, Sep. 5, 2017, Columbus, OH, USA.
- 18- M. Shahbakhti, " Ultra Low CO₂ Transportation Technologies via Energy Mechatronics ", Department of Automotive, Mechanical, and Manufacturing Engineering, University of Ontario Institute of Technology, Aug. 11, 2017, Oshawa, ON, Canada.
- 17- M. Shahbakhti, " Physics-based Control of Energy Systems Ranging from Smart Buildings and Power Grid to Smart Hybrid Electric Vehicles ", Waterloo Institute for Sustainable Energy, WISE Lecture Series, University of Waterloo, Aug. 02, 2017, Waterloo, ON, Canada.
- 16- M. Shahbakhti, " Multi-Physics Modeling and Model-based Control of Energy Systems ", University of Calgary, Mechanical Engineering Department, Jun. 23, 2017, Calgary, AB, Canada.
- 15- M. Shahbakhti, " Advanced Engine and Powertrain Research Towards Fuel-efficient Vehicles ", VolvoCars Company, Jun. 2, 2017, Gothenburg, Sweden.

- 14- M. Shahbakhti, A. Solouk, " Fuel Economy Benefits of Electrified Powertrains with Advanced Combustion Engines: Mild to Strong HEV Applications ", *2017 SIA Int. Powertrain Conference*, Jun. 7, 2017, Versailles, France.
- 13- B. Mahadevan, J. Johnson, M. Shahbakhti, " Simulation of Temperature and Particulate Matter Distribution and Pressure Drop of a Catalyzed Diesel Particulate Filter ", *Cross Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) Focus Group* including a number of industry, government, and academic representatives, Teleconference Presentation, Mar. 22, 2017, USA.
- 12- M. Shahbakhti, D. Hanover, " Modeling and Control of Smart Buildings with Renewable Integrations ", Guest lecture at Alternative Energy Enterprise, Michigan Technological University, Mar. 14, 2017, Houghton, MI, USA.
- 11- M. Shahbakhti, " Control and Electrification of Multi-mode Low Temperature Combustion Engines ", University of Wisconsin-Madison, Mechanical Engineering Department, Feb. 27, 2017, Madison, WI, USA.
- 10- A. Solouk, M. Shahbakhti, " Potential of Low Temperature Combustion (LTC) Engine Technology for Range Extender Vehicles ", *2016 SAE Range Extenders for Electric Vehicles Symposium*, Nov. 2, 2016, Knoxville, TN, USA.
- 9- M. Shahbakhti, " Modeling and Control of Energy Systems ", Halla Visteon Climate Control Corp. (HVCC), Apr. 21, 2015, Van Buren Township, MI, USA.
- 8- M. Shahbakhti, " Model-based Control of a Low Temperature Combustion (LTC) Engine ", University of Wisconsin-Madison, Engine Research Center, May 23, 2013, Madison, WI, USA.
- 7- M. Shahbakhti, " Model-based Control of a Low Temperature Combustion (LTC) Engine ", GM R&D, October 16, 2013, Warren, MI, USA.
- 6- M. Shahbakhti, " Control Challenges and Opportunities for Advanced Automotive Combustion Engine Research ", 2013 IEEE Workshop on Open Problems and Challenges in Automotive Control, June 20, 2013, Washington DC, USA.
- 5- M. Shahbakhti, " LTC Engines: Opportunities, Challenges, and Solutions ", Michigan Tech University, Graduate Curriculum Seminar Series, Apr. 11, 2013, Houghton, MI, USA.
- 4- M. Shahbakhti, " Model-based Powertrain Controller Design and Verification ", University of Alberta, Apr. 20, 2012, Edmonton, Canada.
- 3- M. Shahbakhti, " Early Model-based Design and Verification of Powertrain Control System ", University of California - Merced, Feb. 8, 2012, Merced, CA, USA.
- 2- M. Shahbakhti, " Powertrain Research Seminar ", Cranfield University, Dec. 1, 2011, Cranfield, UK.
- 1- M. Shahbakhti, " Powertrain Modeling for Model-based Controller Design ", McMaster University, Jul. 14, 2011, Hamilton, Canada.

Professional Service

Technical Committees

- Elected chair of ASME-DSCD Automotive and Transportation Systems Technical Committee, 2018 – present
- Elected chair of ASME-Dynamic Systems & Control Division (DSCD) Energy Systems Technical Committee, 2018 – 2020
- Chair of Best Paper Selection Committee for the ASME Award of the Automotive and Transportation Systems Technical Committee, 2018 – 2020
- Member of ASME-DSCD Mechatronic Technical Committee, 2011 – present
- Member of IEEE CSS Technical Committee on Automotive Controls, 2015 – present

- Member of SAE Technical Committee on New Engines, Components, Actuators and Sensors, 2016 – present
- Elected vice-chair (2016-2018), Best Paper Award Committee Member (2016-2020), secretary (2014-2016), publicity chair (2012-2014), and Fuels & Combustion thrust area leader (2012-2013) in ASME-DSCD Energy Systems Technical Committee
- Best Paper Award Committee Chair (2018-2021), Elected secretary (2016-2018), lead session organizer (2014-2016) of ASME-DSCD Automotive and Transportation Systems Technical Committee

Editorships

- Editor
 - Guest Editor for Special Issue on “Optimal Design and Operation of Energy Systems”, *Int. Journal of Optimal Control Applications and Methods* (Wiley Publisher), 2020 – present
 - Guest Editor for Special Issue on “Connected and Automated Vehicles”, *ASME Journal of Dynamic Systems, Measurement, and Control*, 2020 – 2021
 - Guest Editor for Special Issue on “Enabling Green Mobility via Advanced Powertrain Engineering”, *Int. Journal of Powertrains (IJPT)*, 2019 – 2020
 - Guest Editor for Special Issue on “Vehicle Powertrain Research”, *Int. Journal of Powertrains*, 2016-2017
 - Guest Editor for *ASME Dynamic Systems and Control Division E-Newsletter* – Summer Issue, 2017
- Associate Editor
 - Associate Editor, *ASME Journal of Dynamic Systems, Measurement, and Control*, 2017 – present
 - Associate Editor, *Int. Journal of Powertrains* (Inderscience Publishers), 2014 – 2020
 - Associate Editor, Proceedings of 2022 IFAC International Symposium on Advances in Automotive Control, 2022
 - Associate Editor, Proceedings of 2014 American Control Conference
 - Associate Editor, Proceedings of 2014 ASME Dynamic Systems Control Conference
- Editorial Board Member, *International Journal of Vehicle Autonomous Systems* (2020 – present), *International Journal of Automobiles and Automobile Technologies* (2020 – present), *International Journal of Powertrains* (2020 – present), *Energies* (2020 – present)

Consulting

- Law firms, Expert witness for patent/IP applications, 2018 – present
 - DOAR (New York, NY), Fish & Richardson (Washington DC): Expert witness for three Inter Partes Reviews (IPRs) in the automotive area, 2020-2021
 - Maxwell Goss PLLC (Birmingham, MI): Expert witness for IPRs in the area of vehicle controls and communication network, 2020
 - DOAR (New York, NY), Latham & Watkins, LLP (Los Angeles, CA): Expert witness for one International Trade Commission (ITC) case in the HVAC area, 2020
 - Finnegan, Henderson, Farabow, Garret & Dunner, LLP (Washington DC): Expert witness for two IPRs in the automotive area; Included three depositions, 2018 - 2019

Reviewing/Refereeing Activities

Funding Agencies

- Panel for US Department of Energy (DOE), Reviewer for grant proposals, 2015, 2017, 2018.
- Panel for US National Science Foundation (NSF), Reviewer for grant proposals, 2015, 2016, 2019, 2020, 2021.
- Panel for US Department of Energy (DOE) Vehicle Technologies - Fuels Technologies (FT) Program, Annual Merit Review and Peer Evaluation, Washington DC, 2013, 2014, 2018, 2020, 2021.
- Grant proposal review, Mitacs (Canadian national research organization) Elevate program, Canada, 2022
- Panel for MTU REF Mentoring Grant Proposals, 2014.
- Grant proposal review, Poland National Science Centre (SHENG), 2018.
- Grant proposal review, Dutch Technology Foundation STW - NWO (Netherlands), 2016.
- Grant proposal review, IdEx Bordeaux (France), 2015.
- Grant proposal review, Luxembourg National Research Fund (Germany), 2014.
- Grant proposal review, Croatian Science Foundation, 2012, 2020.
- Grant proposal review, Shota Rustaveli National Science Foundation (USA), 2012.

National Institutions

- Review of the Research Program of the US DRIVE Partnership: Fifth Report (2017), 204 pages, Available online, US National Academies of Sciences, Engineering, Medicine, 2017.

Promotion & Tenure

- Promotion to Tenure application assessment, Tennessee Tech Univ., US, 2021.
- Promotion to Tenure application assessment, Carleton Univ., Canada, 2021.

Books/eLearning

- CRC Press, Review of a new book on engine controls, 2022.
- Elsevier Publishing, Review of a new book on nonlinear controls, 2020.
- Elsevier Publishing, Review of a new book on automotive powertrain testing, 2019.
- Springer International Publishing AG, Review of a new book on hybrid electric vehicle controls, 2017.
- IEEE eLearning Course, 2018.

Journals

- Automatica (Elsevier)
- Annual Reviews in Control (Elsevier)
- Journal of Dynamic Systems, Measurement, and Control (ASME)
- Applied Energy (Elsevier)
- Journal of the Energy Institute (Elsevier)
- Mechatronics (Elsevier)
- Int. Journal of Robust and Nonlinear Control (Wiley)
- Control Engineering Practice (Elsevier)
- IEEE/ASME Transactions on Mechatronics
- IEEE Transactions on Control Systems Technology

- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Intelligent Vehicles
- IEEE Transactions on Intelligent Transportation Systems
- IEEE Transactions on Transportation Electrification
- IEEE Systems Journal
- Transportation Research Part D: Transport and Environment (Elsevier)
- Journal of Mechanical Engineering Science - Proceedings of IMechE, Part C (SAGE)
- Int. Journal of Engine Research (SAGE)
- Int. Journal of Powertrains (Inderscience)
- International Journal of Vehicle Autonomous Systems (Inderscience)
- Journal of Automobile Engineering - Proceedings of IMechE, Part D (SAGE)
- SAE Int. Journal of Fuels and Lubricants
- Fuel (Elsevier)
- Journal of Petroleum Gas and Engineering (Academic Journals)
- Journal of Petroleum Technology and Alternative Fuels (Academic Journals)
- Combustion Science and Technology (Taylor & Francis)
- Journal of Heat Transfer Research (BegellHouse)
- Int. Journal of Vehicle Noise and Vibration (InderScience)

Conferences

- ASME: Dynamic Systems and Control Conference (DSCC); Internal Combustion Engine Conference
- SAE: World Congress; Powertrains, Fuels & Lubricants Conference
- IEEE/IFAC: American Control Conference; IFAC World Congress; IEEE Conference on Decision and Control; European Control Conference; Multi Conference on Systems and Control; IEEE Conference on Control Technology and Applications; Int. Symposium on Advances in Automotive Control

Chair/Co-chair Technical Sessions (34)

- Co-chair of the technical session on " Energy Systems Modeling, Estimation and Control ", 2021 IFAC Modeling, Estimation, Control Conference (MECC), Oct. 2021, Austin, TX, USA.
- Co-chair of the special session on " Underrepresented Stories in Controls & Robotics Industry ", 2021 IFAC Modeling, Estimation, Control Conference (MECC), Oct. 2021, Austin, TX, USA.
- Track Chair of 2020 IEEE Connected and Automated Vehicles Symposium (CAVS), Oct. 2020, Victoria, BC, Canada.
- Chair of the session on " Control Methods for Automotive Applications ", IEEE Conference on Control Technology and Applications, Aug. 2020, Montreal, QC, Canada.
- Co-chair of the special session on " Automotive Applications 1 ", IEEE Conference on Control Technology and Applications, Aug. 2020, Montreal, QC, Canada.
- Chair of the session on " Control and Energy Management of Building Systems ", 2019 American Control Conference, Jul. 2019, Philadelphia, PA, USA.
- Co-chair of the special industry session on " Autonomous and Connected Vehicles ", 2019 American Control Conference, Jul. 2019, Philadelphia, PA, USA.
- Chair of the session on " Homogenous Charge Compression Ignition – Part II ", 2019 SAE World Congress, Apr. 2019, Detroit, MI, USA.

- Co-chair of the session on " Homogenous Charge Compression Ignition – Part I ", 2018 SAE World Congress, Apr. 2018, Detroit, MI, USA.
- Co-chair of the session on " Control of Smart Buildings and Microgrids ", 2017 ASME Dynamic Systems Control Conference, Oct. 2017, Tysons Corner, VA, USA.
- Co-chair of the session on " Sliding Mode Control ", 2017 ASME Dynamic Systems Control Conference, Oct. 2017, Tysons Corner, VA, USA.
- Co-chair of the session on " Control and Energy Management of Building Systems ", 2017 American Control Conference, May 2017, Seattle, WA, USA.
- Co-chair of the session on " IC Engine Modeling and Control ", 2017 American Control Conference, May 2017, Seattle, WA, USA.
- Co-chair of the session on " Modeling, Optimization, and Control of Engine Exhaust Systems ", 2017 American Control Conference, May 2017, Seattle, WA, USA.
- Co-chair of the session on " Homogenous Charge Compression Ignition – Part I ", 2017 SAE World Congress, Apr. 2017, Detroit, MI, USA.
- Chair of the session on " Modeling and Control of Automotive Systems ", 2016 ASME Dynamic System Controls Conference, Oct. 2016, Minneapolis, MN, USA.
- Chair of the session on " Modeling and Control of Combustion Engines ", 2016 ASME Dynamic System Controls Conference, Oct. 2016, Minneapolis, MN, USA.
- Co-chair of the session on " Homogenous Charge Compression Ignition – Part I ", 2016 SAE World Congress, Apr. 2016, Detroit, MI, USA.
- Chair of the session on " Homogenous Charge Compression Ignition – Part II ", 2016 SAE World Congress, Apr. 2016, Detroit, MI, USA.
- Chair of the session on " Modeling and Control of Electric and Hybrid Vehicles ", 2015 ASME Dynamic System Controls Conference, Oct. 2015, Columbus, OH, USA.
- Chair of the session on " Estimation and Control of Advanced Internal Combustion Engines ", 2015 American Control Conference, Jul. 2015, Chicago, IL, USA.
- Co-chair of the session on " Control of Autonomous Vehicles and Connected Vehicles ", 2015 American Control Conference, Jul. 2015, Chicago, IL, USA.
- Co-Chair of the session on " Control-Oriented Modeling of Advanced Internal Combustion Engines ", 2015 American Control Conference, Jul. 2015, Chicago, IL, USA.
- Co-chair of the session on " Modeling and Control of IC Engines ", 2014 ASME Dynamic System Control Conference, Oct. 2014, San Antonio, TX, USA.
- Co-chair of the session on " Dynamic Systems Modeling for the Design and Optimization of Vehicle Systems ", 2014 ASME Dynamic System Control Conference, Oct. 2014, San Antonio, TX, USA.
- Co-chair of the session on " Energy Storage: Transportation Applications ", 2014 ASME Dynamic System Control Conference, Oct. 2014, San Antonio, TX, USA.
- Chair of the session on " Modeling and Control of Advanced IC Engine Combustion ", 2014 American Control Conference, Jun. 2014, Portland, OR, USA.
- Co-chair of the session on " Model-based Estimation for Control and Diagnosis of Automotive systems ", 2014 American Control Conference, Jun. 2014, Portland, OR, USA.
- Co-chair of the session on " Modeling and Control of Advanced Transportation Systems ", 2014 American Control Conference, Jun. 2014, Portland, OR, USA.

- Chair of the session on "Control of Advanced Combustion Engines", 2013 ASME Dynamic System Control Conference, Oct. 2013, Palo Alto, CA, USA.
- Chair of the session on "Control Design Methods for Advanced Powertrain Systems and components", 2013 ASME Dynamic System Control Conference, Oct. 2013, Palo Alto, CA, USA.
- Co-chair of the session on "Automotive Control Systems", 2013 ASME Dynamic System Control Conference, Oct. 2013, Palo Alto, CA, USA.
- Chair of the session on "Modeling and Control of Advanced Combustion Systems", 2013 American Control Conference, Jun. 2013, Washington, DC, USA.
- Chair of the session on "Modeling, Estimation, and Control of Advanced Engine Sensing and Actuation", 2013 American Control Conference, Jun. 2013, Washington, DC, USA.
- Chair of the session on "Modeling and Model-Based Control of Advanced IC Engines", 2012 ASME Dynamic Systems and Control Conference, Oct. 2012, Fort Lauderdale, FL, USA.

Organizing Technical Sessions at Conferences (> 60 sessions)

- Co-organized a technical session (PFL560) in the area of "Powertrain Actuators and Sensors" for 2022 SAE World Congress, Detroit, MI, USA.
- Co-organized a technical invited session in the area of Energy Systems Modeling, Estimation and Control at 2021 IFAC Modeling, Estimation, Control Conference (MECC), Austin, TX, USA.
- Co-organized a special session titled "Underrepresented Stories in Controls & Robotics Industry" at 2021 IFAC Modeling, Estimation, Control Conference (MECC), Austin, TX, USA.
- Co-organized a technical invited session in the area of Mechatronic Applications in Automotive Systems at 2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM).
- Co-organized a technical session (PFL560) in the area of "Powertrain Actuators and Sensors" for 2021 SAE World Congress, Detroit, MI, USA.
- Co-organized a technical invited session in the area of "robust and optimal control for building HVAC systems" at 2020 American Control Conference.
- Co-organized a special industry session titled "women in controls" at 2020 American Control Conference.
- Co-organized a special industry session on controls in autonomous vehicles at 2019 ASME Dynamic Systems and Control Conference.
- Co-organized a technical invited session in the area of modeling and control of thermal energy systems at 2019 ASME Dynamic Systems and Control Conference.
- Co-organized a technical invited session in the area of control and energy management of building systems at 2019 American Control Conference.
- Co-organized a special industry session in the area of connected and autonomous vehicles at 2019 American Control Conference.
- Co-organized two technical sessions in the area of combustion engines for 2019 SAE World Congress.
- Led and co-organized an invited session in the area of modeling and management of power and energy systems for 2018 ASME Dynamic Systems and Control Conference.
- Co-organized two technical sessions in the area of combustion engines for 2018 SAE World Congress.
- Co-organized one technical invited session in the area of control of smart buildings and microgrids for 2017 ASME Dynamic Systems and Control Conference.
- Co-organized one industry special session in the area of control research perspective in Automotive Industry for 2017 ASME Dynamic Systems and Control Conference.

- Led and co-organized eight technical invited sessions in the area of automotive systems for 2017 American Control Conference.
- Co-organized one technical invited session in the area of building energy systems for 2017 American Control Conference.
- Co-organized two technical sessions in the area of combustion engines for 2017 SAE World Congress.
- Led and co-organized three technical invited sessions in the area of Automotive and Transportation Systems for 2016 ASME Dynamic Systems and Control Conference.
- Led and co-organized five technical invited sessions in the area of automotive systems for 2016 American Control Conference.
- Co-organized two technical invited sessions in the area of building energy systems for 2016 American Control Conference.
- Co-organized two technical sessions in the powertrain area for 2016 SAE World Congress.
- Led and co-organized three technical invited sessions in division of Automotive and Transportation Systems (ATS) for 2015 ASME Dynamic Systems and Control Conference.
- Co-organized five technical invited sessions in the area of Automotive and Transportation Systems (ATS) for 2015 American Control Conference.
- Co-organized two technical sessions in the area of HCCI engines for 2015 SAE World Congress.
- Co-organized four technical invited sessions in the area of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2014 ASME Dynamic Systems and Control Conference.
- Co-organized seven technical invited sessions in the areas of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2014 American Control Conference.
- Co-organized six technical invited sessions in the area of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2013 ASME Dynamic Systems and Control Conference.
- Co-organized five technical invited sessions in the areas of Automotive and Transportation Systems (ATS) and Energy Systems (ES) for 2013 American Control Conference.
- Co-organized three invited technical sessions in the area of Automotive and Transportation Systems (ATS) in 2012 ASME Dynamic Systems and Control Conference.
- Organized and coordinated a series of teaching seminars entitled " What Contributes to Successful Teaching in Engineering " in the Faculty of Engineering, University of Alberta, 2007-2008.

Conference Organizing Team

- Conference International Program Committee Member, 10TH IFAC Symposium: Advances in Automotive Control, Columbus, Ohio, USA, August 28-31, 2022.
- Transportation Systems Symposium Co-chair, Canadian Society of Mechanical Engineers (CSME) International Congress, Edmonton, AB, Canada, June 5-8, 2022.
- Conference International Program Co-Chair, IFAC Modeling, Estimation, and Control Conference (MECC), Austin, TX, USA, Oct. 17-20, 2021.
- Member of Technical Program Committee (TPC), 2020 IEEE Connected and Automated Vehicles Symposium (CAVS), Victoria, Canada, 4-5 October, 2020.
- Member of Conference Scientific Committee, 2019 International Symposium on Automotive Science and Technology (ISASTECH), Ankara, Turkey, Sep. 5-6, 2019.
- Conference Program Co-Chair, 2019 International Conference on Advanced Vehicle Powertrains, Hefei, China, Aug. 25-27, 2019.

- Member of Program Committee, 2017 ASME Dynamic Systems and Control Conference, Tysons Corner, VA, USA, Oct. 11-13, 2017.
- Organizing Committee Chair, 2017 International Conference on Advanced Vehicle Powertrains, HangZhou, China, Sep. 25-27, 2017.
- Co-chaired and coordinated 2nd Annual Mechanical Engineering Graduate Symposium, over 180 participants from 8 different departments, University of Alberta, March 6, 2008.
- Member of organizing team for Combustion Institute/Canadian Section (CI/CS) spring technical conference, Banff, Alberta, Canada, May 14-16, 2007.

Workshops

- 1- M. Shahbakhti, H. Fathy, workshop (including 16 invited speakers) on “Connected and Automated Vehicles (CAVs)”, 2018 ASME Dynamic System and Control Conference, Atlanta, GA, USA, Sep. 30, 2018.
- 2- A. Scacchioli, M. Shahbakhti, workshop (including 6 invited speakers) on “From Data to Models and Decisions in Engineering Systems”, 2018 ASME Dynamic System and Control, Atlanta, GA, USA, Sep. 30, 2018.
- 3- M. Shahbakhti, K. Hedrick, K. Butts, half-day workshop on “Methods of Easily Verifiable Control Design”, American Control Conference, Boston, MA, USA, Jul. 5, 2016.
- 4- J. Worm, J. Naber, M. Shahbakhti, 4-day workshop on " Torque-based Control of SI Engines ", DENSO Inc., Southfield, MI, USA, Feb. 5-8, 2013.
- 5- M. Shahbakhti, N. Yusefi, " Automotive Engines and Power Transmission Systems ", Let’s Talk Science Workshop, Edmonton, Canada, Mar. 14, 2008.
- 6- M. Shahbakhti, N. Yusefi, " Vortex in Rotational Flows ", Let’s Talk Science Workshop, Edmonton, Canada, Mar. 14, 2008.
- 7- M. Shahbakhti, " HCCI Engines and Advanced Methods to Improve Emissions of Motor Vehicles ", 81th Annual GETCA Convention (Greater Edmonton Teachers Convention), Shaw conference center, Edmonton, Canada, Mar. 1-2, 2007.
- 8- M. Shahbakhti, " Vehicles’ Emissions ", Heritage Youth Researcher Summer (HYRS) Teachers Workshop, University of Alberta, Jul. 25-26, 2006.
- 9- M. Shahbakhti, " Engineering Solutions for Automotive Emissions ", HYRS Teachers Workshop, University of Alberta, Aug. 8-10, 2005.
- 10- M. Shahbakhti, " Methods to Reduce Emissions of Vehicles during Cold Start and Warm up Conditions ", 3rd International Conference on Internal Combustion Engines (ICICE), Tehran, Iran, Feb. 19, 2004.

Teaching/Mentoring Experience

Principal Instructor

Department of Mechanical Eng., University of Alberta

- MECE 541: *Combustion Engines*, 14 students, Winter 2021 (student evaluation: **4.9/5**)
- MECE 340: *Applied Thermodynamics*, 74 students, Spring-Summer 2020 (student evaluation: **4.9/5**)

Department of Mechanical Eng.-Eng. Mechanics, Michigan Tech. University

- MEEM 5295: *Advanced Propulsion for Hybrid Electric Vehicles*, 28 students, Spring 2019 (student evaluation: **4.64/5**)
- MEEM 2201: *Energy-Thermal-Fluids I*, 80 students, Fall 2018 (student evaluation: **4.4/5**)
- MEEM 5295: *Advanced Propulsion for Hybrid Electric Vehicles*, 45 students, Spring 2018 (student evaluation: **4.74/5**)

- MEEM 2201: *Energy-Thermal-Fluids I*, 85 students, Fall 2017 (student evaluation: **4.61/5**)
- MEEM 2201: *Energy-Thermal-Fluids I*, 85 students, Fall 2016 (student evaluation: **4.66/5**)
- MEEM 5295: *Advanced Propulsion for Hybrid Electric Vehicles*, 37 students, Spring 2016
- MEEM 2201: *Energy-Thermal-Fluids I*, 96 students, Fall 2015 (student evaluation: **4.57/5**)
- MEEM 2201: *Energy-Thermal-Fluids I*, 76 students, Spring 2015 (student evaluation: **4.35/5**)
- MEEM 2200: *Thermodynamics*, Spring 2014, two sections, 85 students (student evaluation – ave. of two sections: **4.3/5**)
- MEEM 2200: *Thermodynamics*, Spring 2013, 26 students (student evaluation: **4.36/5**)
- MEEM 5990/6990 Special Topics (graduate courses):
 - *Optimal and Model Predictive Controls*, 7 students, Fall 2013
 - *Design, Instrumentation, Control of HEV-LTC Powertrain Setup*, 20 students, 2013-2016
 - *Experiment and Simulation of LTC Engine in HEV Powertrain*, 4 students, Spring 2013
 - *HCCI Engine Control*, 1 student, Fall 2012

Department of Mechanical Engineering, KNT University of Technology

- ME16-31: *Design of Combustion Engines*, Winter 2010, 28 students (student evaluation: **3.61/4**)
- ME19-31: *Environmental Pollution Control*, Winter 2010, 32 students (student evaluation: **3.94/4**)

Department of Mechanical Engineering, University of Alberta

- MECE 541: *Combustion Engines and Alternative Fuels*, Fall 2008, 28 students (student evaluation: **4.7/5**)
- MECE 541: *Combustion Engines and Alternative Fuels*, Fall 2009, 50 students (student evaluation: **4.4/5**)

Teaching Assistant

Department of Mechanical Engineering, University of Alberta

- MECE 420: *Feedback Control Design of Dynamic Systems*, Winter 2005, Winter 2006
- MECE 330: *Fluid Mechanics*, Fall 2004, Fall 2005, Fall 2006, Winter 2007, Winter 2008
- MECE 541: *Combustion Engines*, Winter 2009

Teaching Professional Development

- University Teaching Program, University of Alberta, 2004 - 2009
 - Completed 50 hours of formal classroom training which covers a wide range of theoretical teaching topics through seminars and workshops.

Supervising/Mentoring

- **Postdoc/Research Engineer (3)**
 - Dr. O. Wine, Postdoctoral Researcher, Transportation Health Impact in Cold Climates, University of Alberta, 2020 - 2021.
 - Dr. H. Solmaz, Postdoctoral Researcher, Experimentation and Analysis of LTC Regimes in a Light-duty Engine, Michigan Tech University, 2015 - 2016.
 - Dr. M. Razmara, Research Engineer co-supervised by Prof. R. Robinett, Building-to-Grid Demand Response Optimization, Michigan Tech University, 2016 - 2017.

- PhD Students (34)**Thesis advising (23)**

- A. Mirzazadeh Akbarpoor, PhD thesis co-adviser (50%), Low-cost Technology for Risk Mitigation of Pathogenic Infection in HVAC Systems, University of Alberta, 2022 - present.
- S. Moghadasi, PhD thesis adviser, Optimization and modeling of natural gas fueled hybrid electric trucks, University of Alberta, 2021 - present.
- S. Moghadasi, PhD thesis adviser, Optimization and modeling of natural gas fueled hybrid electric trucks, University of Alberta, 2021 - present.
- Z. Salehi, PhD thesis co-adviser (40%), Fault diagnostics of energy/power systems using methods of machine learning, University of Alberta, 2021 - present.
- M. Tofigh, PhD thesis main adviser (co-adviser: Dr. Bob Koch), Fault diagnostics of energy/power systems using methods of machine learning, University of Alberta, 2021 - present.
- L. Jaing, PhD thesis adviser, Control of connected and automated electric and hybrid electric vehicles, University of Alberta, 2021 - present.
- H. Abediasl, PhD thesis main adviser (co-adviser: Dr. Bob Koch), Control of connected and automated vehicles (CAVs) to minimize vehicle energy consumption for cold climate operation, University of Alberta, 2020 - present.
- S. Shahpouri, PhD thesis main adviser (co-adviser: Dr. Bob Koch), Design of machine learning approaches for modeling and calibration of vehicle powertrain control systems, University of Alberta, 2020 - present.
- A. Razmi, PhD thesis main adviser, Design and optimization of building energy systems for cold climates, University of Alberta, 2020 - present.
- A. Norouzi Yengeje, PhD thesis co-adviser (40%), Diesel engine emission and performance control using learning-based control strategy and machine learning approaches, University of Alberta, 2020 - present.
- P. Reddy, PhD thesis main adviser (co-adviser: Dr. Darrell Robinette), Anti jerk control of a vehicle driveline, Michigan Tech University, 2018 - present.
- S. Batool, PhD thesis main adviser (co-adviser: Dr. Jeff Naber), Model-based control of advanced multi-mode low temperature combustion engines, Michigan Tech University, 2018 - present.
- B. Khoshbakht Irdmousa, PhD thesis co-adviser (50%), Modeling and control of natural gas-diesel RCCI engines, Michigan Tech University, 2016 - present.
- X. Yang, PhD thesis co-adviser (50%), Experimental and Analytical Combustion Characterization of a Micro-Pilot Diesel Natural Gas Combustion Process, Michigan Tech University, 2016 - present.

Graduated (9):

- V. B. Vinhaes, PhD thesis co-adviser (50%), Combustion development of a high efficiency micro pilot diesel natural gas engine, Michigan Tech University, 2016 - 2022.
- C. R. Reddy, PhD thesis main adviser (co-adviser: Dr. Rush Robinett III), Model predictive control of energy systems for heat and power applications, Michigan Tech University, 2017 - 2022.
- A. A. Khameneian, PhD thesis co-adviser (50%), Model-based engine-out emissions analysis for a gasoline turbocharged direct injection spark-ignition engine in elevated HEV (hybrid electric vehicle) cranking speed, Michigan Tech University, 2016 - 2021.
- M. R. Amini, PhD thesis adviser, Easily verifiable controller design with application to automotive powertrains, Michigan Tech University, 2013 - 2017.
- A. Solouk Mofrad, PhD thesis adviser, Model-based control of hybrid electric powertrains integrated with LTC engines, Michigan Tech University, 2013 - 2017.
- B. Mahadevan, PhD thesis co-adviser (50%), Development of a Multi-Zone Catalyzed Particulate Filter Model and Kalman Filter Estimator for Simulation and Control of Particulate Matter Distribution of a CPF for Engine ECU Applications, 2014 - 2017.

- M. Razmara, PhD thesis main adviser (co-adviser: Dr. Rush Robinett III), Predictive control of power grid-connected energy systems based on energy and exergy metrics, Michigan Tech University, 2012 - 2016.
- M. Bidarvatan, PhD thesis adviser, Physics-based modeling and control of powertrain systems integrated with low temperature combustion engines, Michigan Tech University, 2012 - 2015.
- B. Bahri, PhD thesis co-adviser (30%), Investigation of HCCI engines fueled with ethanol blends, University Technology Malaysia, 2010 - 2013.

Visiting students (7)

- Y. Long, Visiting PhD candidate from Wuhan University of Technology in China, Modeling a MicroPilot NG Engine and Integration into a Plug-in Hybrid Electric Truck, University of Alberta, May 2021 - .
- M. Toub, co-hosted by Prof. R. Robinett, Visiting PhD candidate from Mohammed V University in Morocco, Modeling and control of concentrated solar power (CSP) for building energy management and building-to-grid operation, Michigan Tech University, Sep. 2016 - 2018.
- P. Ahmadizadeh, Visiting PhD candidate from Iran University of Science and Technology, Two-mode power split hybrid electric powertrain, Michigan Tech University, Feb. 2016 - Oct. 2016.
- K. Poorghasemi, Visiting PhD candidate from Sahand University of Tech in Iran, RCCI engine combustion modeling, Michigan Tech University, Feb. - Aug. 2015.
- M. Baloo, co-hosted by Prof. S.Y. Lee, Visiting PhD candidate from Amir Kabir University of Tech in Iran, Experimental combustion diagnosis, Michigan Tech University, Sep. 2014 - Jan. 2015.
- S. Polat, Visiting PhD candidate from Gazi University in Turkey, Modeling and experimental study of an HCCI engine, Michigan Tech University, Jan. 2014 - Mar. 2015.
- M. Pčolka, co-hosted by Prof. R. Robinett, Visiting PhD candidate from Czech Tech University in Prague, Building energy controls, Michigan Tech University, Jan. 2013 - May 2013.

Mentoring (4)

- S. Hemmati, PhD student, Control of connected and automated hybrid electric vehicles, Michigan Tech University, 2018 - 2019.
- S. Pan, PhD candidate, Adaptive sliding controller design with robustness to implementation imprecision, University of California, Berkeley, 2012.
- R. Salehi, Visiting PhD candidate from Sharif University in Iran, Hybrid switching controller for cold start emission reduction, University of California, Berkeley, 2012.
- Y. Chen, Visiting PhD candidate from Jilin University in China, Control of engine emissions during cold start, University of California, Berkeley, 2010 - 2011.

• MSc Students (76)

Thesis advising (32)

- A. Khaled, MSc thesis adviser, Modeling and optimization of solid oxides fuel cells, University of Alberta, 2021 - present.
- D. Yangiev, MSc thesis adviser, Modeling and optimization hybrid electric trucks fueled with natural gas fuel, University of Alberta, 2021 - present.
- L. Yang, MSc thesis adviser, Intelligent fleet management of electric and hybrid electric vehicles, University of Alberta, 2021 - present.
- A. Ansari, MSc thesis adviser, Intelligent fleet vehicles management for cold climate operation, University of Alberta, 2020 - present.
- N. Samadi, MSc thesis adviser, HVAC modeling and control to minimize Covid-19 virus transmission, University of Alberta, 2020 - present.

- J. McNally, MSc thesis co-adviser (40%), Experimental study of a hydrogen-diesel engine for low GHG emissions, University of Alberta, 2020 - present.
- H. Heidarifar, MSc thesis adviser, Machine learning based HVAC control of a department store using real-time occupancy estimation, University of Alberta, 2020 - present.

Graduated (25):

- S. A. Nadeem, MS thesis main adviser (co-adviser: Dr. Darrell Robinette), Design of an anti-jerk controller for both locked and slipping torque converter conditions in a vehicle, Michigan Tech University, 2019 - 2020.
- R. Sitaraman, MS thesis main adviser (co-adviser: Dr. Jeff Naber), Identification of heat release shapes and combustion control of an LTC engine, Michigan Tech University, 2018 - 2020.
- R. Moharjan, MS thesis adviser, Optimization of diesel engine and after-treatment system for a series hybrid forklift application, Michigan Tech University, 2018 - 2019.
- A. Basina, MS thesis adviser, Modeling and control of maximum pressure rise rate in RCCI engines, Michigan Tech University, 2018 - 2019.
- N. Doshi, MS thesis main adviser (co-adviser: Dr. Darrell Robinette), Modeling of thermal dynamics in Chevrolet Volt GEN II hybrid electric vehicle for integrated powertrain and HVAC optimal operation through connectivity, Michigan Tech University, 2018 - 2019.
- K. Darokar, MS thesis main adviser (co-adviser: Dr. Darrell Robinette), Automotive driveline backlash state and size estimator design for anti-jerk control, Michigan Tech University, 2018 - 2019.
- P. Reddy, MS thesis main adviser (co-adviser: Dr. Darrell Robinette), Control oriented modeling of an automotive drivetrain for anti-jerk control, Michigan Tech University, 2017 - 2018.
- R. Yadav, MS thesis main adviser (co-adviser: Dr. Darrell Robinette), Modeling and analysis of energy consumption in Chevrolet Volt Gen II Hybrid Electric Vehicle, Michigan Tech University, 2017 - 2018.
- A. Abhay Raut, MS thesis adviser, Model-based control of an RCCI engine, Michigan Tech University, 2016 - 2017.
- N. Kondipati, MSc thesis adviser, Experimental Study, Modeling and Controller Design for an RCCI Engine, Michigan Tech University, 2015 - 2016.
- J. Arora, MSc thesis adviser, Design of Real-Time Combustion Feedback System and Experimental Study of an RCCI Engine for Control, Michigan Tech University, 2015 - 2016.
- K. Kannan, MSc thesis adviser, An Experimental Investigation of Low Temperature Combustion Regimes in a Light Duty Engine, Michigan Tech University, 2014 - 2016.
- J. Dobbs, MSc thesis adviser, Model Predictive Control of Building Energy Management Systems in a Smart Grid Environment, Michigan Tech University, 2013 - 2015.
- K. Khodadadi, MSc thesis adviser, Modeling and Control of Combustion Phasing of an RCCI Engine, Michigan Tech University, 2013 - 2015.
- M. R. Nazemi, MSc thesis adviser, Modeling and Analysis of Reactivity Controlled Compression Ignition (RCCI) Engine Combustion, Michigan Tech University, 2013 - 2015.
- M. Paranjape, MSc thesis adviser, Optimal Control of Building Energy with Smart Grid Interaction, Michigan Tech University, 2013 - 2014.
- H. Saigaonka, MSc thesis adviser, An Investigation of Variable Valve Timing Effects on HCCI Engine Performance, Michigan Tech University, 2013 - 2014.
- D. Kothari, MSc thesis adviser, Experimental Setup and Controller Design for an HCCI Engine, Michigan Tech University, 2013 - 2014.
- V. Thakkar, MSc thesis adviser, Modeling and Experimental Setup of an HCCI Engine, Michigan Tech University, 2013 - 2014.

- A. Soloukmofrad, MS thesis co-adviser (50%), Modeling and control of a hybrid electric powertrain using an HCCI engine, University of Tehran, 2011 - 2013.
- M. Amini, MSc thesis co-adviser (50%), Model-based Control of Cold Start Hydrocarbon Emissions in SI Engines, KNT University, 2010 - 2012.
- M. Boodaghi, MSc thesis co-adviser (50%), Strategies of Misfire Detection in Gasoline-CNG Bi-fuel Engines, KNT University, 2010 - 2011.
- M. Marami, MSc thesis co-adviser (50%), Simulation of Oil Circuit in an SI Engine at Cold Start Transient Conditions, KNT University, 2010 - 2011.
- M. Dehghani, MSc thesis co-adviser (50%), Thermodynamic Modeling of HCCI Exhaust Temperature, KNT University, 2010 - 2011.
- M. Bidarvatan, MSc thesis co-adviser (50%), Control of Combustion Phasing in an HCCI Engine, KNT University, 2010 - 2011.

Technical report advising (10)

Graduated (10):

- C. Niu, MEng Capstone project adviser, Alberta residential building's energy consumption simulation and optimization, University of Alberta, 2021 - 2022.
- Z. Luan, MEng Capstone project adviser, Performance analysis of alternative heavy-duty transit buses, University of Alberta, 2021 - 2022.
- M. Owais, MEng Capstone project adviser, Measurement and analysis of fuel consumption, wind velocity and angle from a class 8 truck, University of Alberta, 2021.
- P. Rakeshkumar, MEng Capstone project adviser, Real-time fuel consumption of university's vehicle fleet using on-board diagnostic (OBD) sensor, University of Alberta, 2021.
- S. Bhasme, MS technical report main adviser (co-adviser: Dr. Darrell Robinette), Modeling Chevy Volt Gen II supervisory controller in charge sustaining operation, Michigan Tech University, 2018 - 2019.
- V. B. Vinhaes, MS technical report co-adviser (50%), Combustion development of a high efficiency diesel micro pilot natural gas engine, Michigan Tech University, 2016 - 2018.
- K. Suresh, MS technical report main adviser (co-adviser: Dr. Darrell Robinette), Modeling and analysis of Chevy Volt Gen II hybrid vehicle in electric mode, Michigan Tech University, 2017 - 2018.
- P. Lakhani, MS technical report main adviser (co-adviser: Dr. Darrell Robinette), Modeling and analysis for driveline jerk control, Michigan Tech University, 2017 - 2018.
- A. Soloukmofrad, MS technical report adviser, Energy management of hybrid electric powertrains integrated with low temperature combustion engines, Michigan Tech University, 2013 - 2015.
- M. Razmara, MS technical report main adviser (co-adviser: Dr. Rush Robinett III), Model Predictive Control of Building HVAC Systems, Michigan Tech University, 2012 - 2014.

Mentoring (34)

- Sh. Sharifi, Short term scholar, Experimental study of solid oxides fuel cell, University of Alberta, 2022 - .
- R. Khonsarian, Short term scholar, Modeling and control of connected and automated vehicles (CAVs), University of Alberta, 2019-2020.
- V. Prasaad Raghupathy, Short term scholar, Study and analysis of HVAC systems in Electric Vehicles, Michigan Tech University, 2019-2020.
- A. Mahapatra, Short term scholar, Simulation of CNT materials for threeway catalyst cold start heating, Michigan Tech University, 2019.

- R. Kamaraj, Short term scholar, Investigations into state-of-the-art hybrid electric vehicles powertrain configurations, Michigan Tech University, 2018.
 - A. Somasundaram, Short term scholar, Modeling of mode switching control strategies of Chevy Volt II plug-in hybrid electric vehicle, Michigan Tech University, 2018.
 - J. Tripp, Short term scholar, Modeling of powertrain and vehicle dynamics for Chevy Volt II, Michigan Tech University, 2017.
 - M. Darji, Short term scholar, Electrification of high-efficiency engines, Michigan Tech University, 2017.
 - K. C. Dhankani, Short term scholar, LPV modeling of an RCCI engine, Michigan Tech University, 2016.
 - D. B. Lodaya, Short term scholar, Modeling and optimization of two-mode power split hybrid electric powertrain, Michigan Tech University, 2016.
 - G. Ramanathan, D. Dhanraj, Short term scholars, Control of robot's electric motor for throwing ball and demonstration for MTU's Summer Youth Program, Michigan Tech University, 2016.
 - J. Dwivedi, V. Ghadge, E. Malik, D. Dhanraj, Short term scholars, Calibration and torque control of 100-kW E-motor for hybrid electric powertrain test bed, Michigan Tech University, 2015 – 2016.
 - R. R. Zakkam, H. Nutulapati, M. Cheruvathur, Short term scholars, Experimental setup for a LTC engine and hybrid electric powertrain, Michigan Tech University, 2014.
 - F. Ahmed, G. Xiong, A. Ketkale, A. Kondra, A. Girase, and H. Su, Short term scholars, Experimental setup for low temperature combustion engine research, Michigan Tech University, 2013 - 2014.
 - Z. Han, S. Viswanathan, Z. Huang, and N. Ghike, Short term scholars, Control of electric motor and Lithium-ion battery for HEV powertrain, Michigan Tech University, 2013 - 2014.
 - B. Moridian, Short term scholar, Adaptive parameter/state estimation for building energy control, Michigan Tech University, 2012 - 2013.
 - A. Hansen, Visiting M.Sc. student from Technische Universität Hamburg-Harburg, Discrete sliding mode control of automotive controllers, University of California, Berkeley, 2012.
 - K. Edelberg, MSc student, Robust model-based controller design using implementation imprecision bounds, University of California, Berkeley, 2012.
 - A. Cranmer, MSc student, Modeling HC tailpipe emissions from an SI engine, University of California, Berkeley, 2010 - 2011.
 - S. Sharifirad, Visiting MSc student from KNT University, Automatic driver controller design for standard driving test cycles simulation, Iran Khodro Engine Research Center, 2003 - 2004.
- **BSc Students (31)**
 - Thesis advising (8)**
 - A. Solouk Mofrad, BSc thesis co-adviser (50%), On-board diagnosis of catalytic converters in SI engines, KNT University, 2010.
 - A. Kazemi Taskoh, BSc thesis co-adviser (50%), Control strategies to reduce cold start and warm-up emissions from passenger cars, KNT University, 2010.
 - M. Aliramezani, BSc thesis co-adviser (50%), Control strategies of Anti-lock Braking Systems (ABS) in passenger cars, KNT University, 2010.
 - J. Rezaee, BSc thesis co-adviser (50%), Experimental study of an HCCI engine running with butanol blended fuels, KNT University, 2010.
 - A. Shahrokhshahi and H. Zamani, BSc thesis co-adviser (50%), Strategies to control/monitor evaporative emissions in passenger cars, KNT University, 2010.
 - H. Jafarian, BSc thesis co-adviser (50%), Simulation of bearings of a SI engine using AVL-EXCITE software, KNT University, 2010.

- M. Amereh, BSc thesis co-adviser (50%), Numerical modeling of the flow under engine's hood of Samand vehicle using Fluent software, KNT University, 2010.

Co-op (4)

- J. Sathya Sai, Co-op student, Data collection and synchronization for analysis of two platooning trucks, University of Alberta, Fall 2021.
- S. Virk, Co-op student, Design of a vehicle data acquisition system for two platooning trucks, University of Alberta, Summer-Fall 2021.
- E. Stewart, Co-op student, co-supervised with Prof. Bob Koch, Vehicle OBD setup and data analysis for reducing vehicle fuel consumption from the UAlberta fleet vehicles, University of Alberta, Fall 2020.
- H. Holzer, Co-op student, co-supervised with Prof. Bob Koch, Vehicle OBD setup, University of Alberta, Summer 2020.

Mentoring (19)

- D. Hanover, Short term scholar, PV Panel modeling, HVAC modeling for an MTU building and a Chevy Volt Vehicle, Michigan Tech. University, 2015 – 2018.
- A. Krisztian, Short term scholar, Analysis of the experimental data from Chevy Volt Gen 2 vehicle, Michigan Tech. University, Summer 2017.
- R. P. Robles, Short term scholar, Sizing Analysis of Energy Storage Systems and Solar PV Panels for Commercial Buildings, Michigan Tech. University, 2016.
- S. Hedblom, Student project as part of The Honors Institute, Skiing's mechanical efficiency, Michigan Tech. University, 2015.
- T. Kovach, Short term scholar, Experimental study of building energy efficiency, Michigan Tech. University, 2014.
- A. Soneji, R. Bhasin, A. Neti, N. Neti, A. Hayashi, S. Bigdeli, S. Raghunathan, Mech. Eng. undergraduate students, Modeling, control and testing of a 2.4-liter Toyota engine and exhaust aftertreatment system, University of California, Berkeley, 2012.
- J. Li, and A. Cheng, Senior Mech. Eng. undergraduate students, Verification and hardware-in-the-loop testing of automotive controllers, University of California, Berkeley, 2012.
- M. Muller, P. Sang Cho, and R. Sze, Senior Mech. Eng. undergraduate students, Model analysis and control trajectory modification for reducing hydrocarbon emissions in SI engines, University of California, Berkeley, 2011.
- S. Varnhagen, NSERC summer student, HCCI experimental study, University of Alberta, 2008.
- K. Swan, NSERC summer student, HCCI combustion modeling, University of Alberta, 2006.

University/Community Service

Theses/Proposals (examination committee member/chair)

PhD committees (21):

- Mudasser Seraj, PhD thesis defense, “Mobility and Safety Implications of Automated Vehicles in Mixed Traffic by Recognizing Behavioral Variations of Drivers”, University of Alberta, 2021.
- Zhihao Zhao, PhD thesis defense, “High Injection Pressure Impinging Diesel Spray Characteristics and Subsequent Soot Formation in Reacting Conditions”, Michigan Tech University, 2021.
- Wenyuan Sun, PhD thesis defense chair, “Molecular Dynamics Study of Clay-Polymer Interactions in the Treatment of Mature Fine Tailings”, University of Alberta, 2021.
- Alireza Noamani, PhD candidacy exam, “Development of Wearable Technologies for Standing and Sitting Balance Evaluation”, University of Alberta, 2020.

- Jihoon Lim, PhD thesis defense, “Gain-scheduling and Preview Control of Selective Catalytic Reduction Systems in Diesel Engines”, The University of British Columbia (Vancouver), 2020.
- Xin Wang, PhD proposal and thesis defense, “A Study of Model-based Control Strategy for a Gasoline Turbocharged Direct Injection Spark Ignited Engine”, Michigan Tech University, 2015-2020.
- David Gordon, PhD candidacy exam, “Realtime Machine Learning based In-Cycle Control of Homogeneous Charge Compression Ignition for Combustion Stability and Emissions Improvement”, University of Alberta, 2020.
- Mudasser Seraj, PhD candidacy exam, “Mobility and Safety Implications of Automated Vehicles in Mixed Traffic by Recognizing Behavioral Variations of Drivers”, University of Alberta, 2019.
- Xin Ma, PhD proposal and thesis defense, “Connected Vehicle-Based Distributed Machine Learning for Adaptive Fuel Consumption and Eco-Driving”, University of Massachusetts at Lowell, 2016-2019.
- Mufaddel Dahodwala, PhD proposal and thesis defense “Experimental and Computational Investigation of Dual Fuel Diesel-Natural Gas RCCI Combustion in a Heavy-Duty Diesel Engine”, Michigan Tech University, 2016-2018.
- Zhihao Zhao, PhD proposal, “Study of High Injection Pressure Impinging Diesel Spray and Combustion Processes” Michigan Tech University, 2018.
- Mojtaba Bahramgiri, PhD oral exam, Michigan Tech University, 2018.
- Guna R. Bharati, PhD proposal, and thesis defense, “Hierarchical Optimization for Vehicle-to-Grid and Building-to-Grid Integration” Michigan Tech University, 2015-2017.
- Yanyu Wang, PhD proposal, and thesis defense, “The Interaction of Ignition and In-Cylinder Flow on Flame Kernel Development and Combustion Variability in an Optically Accessible Direct Injection Engine”, Michigan Tech University, 2014-2017.
- Ehsan Ansari, PhD proposal, and thesis defense, “Combustion, Emissions, and Performance Optimization in a DI/PFI-RCCI Diesel/Natural Gas Turbocharged Engine”, Michigan Tech University, 2014-2017.
- Bin Zhou, PhD proposal entitled “Hybrid Electric Vehicle Battery Aging Estimation and Optimization based on Energy Consumption Minimization Strategy”, Michigan Tech University, 2017.
- Amir Rezaei, PhD proposal, and thesis defense, “Optimal Energy Management Strategies for Hybrid Electric Vehicles”, Michigan Tech University, 2015-2017.
- Jiongxun Zhang, PhD proposal entitled “Experimental Characterization of Spark Ignited Direct Injection Gasoline Engine Injection Processes”, Michigan Tech University, 2015.
- Mufaddel Dohodwala, committee member for PhD qualifying exam, Michigan Tech University, 2014.
- Zhuyong Yang, committee member for PhD qualifying exam, Michigan Tech University, 2014.
- Eva Žáčková, PhD thesis entitled “Identification for Model Predictive Control under Closed-loop Conditions”, Czech Technical University, 2013.

MSc committees (26):

- Michael E. Nicol-Seto, MSc thesis entitled “Investigation of a Drive Mechanism Modification to Increase Thermodynamic Power of a Low Temperature Differential Gamma Type Stirling Engine”, University of Alberta, 2021.
- Habiba Imam, MSc thesis entitled “Towards an Autonomous Robot-based Laser Cladding Repair Process: A Framework for Damage Detection, Localization and Path Planning”, University of Alberta, 2021.
- Aditya Kodkani, MSc thesis entitled “Numerical Analysis of a Hybrid Cooling Tower and its Plume”, University of Alberta, 2021.
- Ali Lotfi, MSc thesis entitled “Study of Light-duty Gasoline Vehicle Cold Climate NOx and Particulate Number Emissions in Real-world Driving Conditions”, University of Alberta, 2020.
- Ali Alizadeh, MSc thesis entitled “Assessment of Co-processing Hydrodeoxygenated Fast Pyrolysis Oil and Vacuum Gas Oil in a Fluid Catalytic Cracking Unit”, University of Alberta, 2020.

- Jason Philip Michaud, MSc thesis entitled “Low Temperature Difference Alpha-Type Stirling Engine for the Experimental Determination of Optimal Parameters to maximize Shaft Power”, University of Alberta, 2020.
- Mario Alberto Soriano Morales, MSc thesis entitled “Multi-Sensor Data Fusion and Reconfigurable Measurement System: A Machine Learning Approach”, University of Alberta, 2019.
- Muralidhar Nischal, MSc thesis entitled “Application of Sensor Fusion for SI Engine Diagnostics and Combustion Feedback”, Michigan Tech University, 2019.
- Anurag Kamal, MSc thesis entitled “Physical Modeling of Lithium-Ion Aging for Automotive Applications”, Michigan Tech University, 2018.
- Gaurav Bagwe, MSc technical report entitled “ Video Frame Reduction in Autonomous Vehicles ”, Michigan Tech University, 2018.
- Huanqing Wang, MSc thesis entitled “ Development of Dynamic Programming and Receding Horizon Control Strategies for GM Volt II Multi-mode Hybrid Electric Vehicle ”, Michigan Tech University, 2018.
- Kovid_Sachdeva, MSc technical report entitled “ Development of Optimal Operating Point maps and Mode Shift Strategy for Chevrolet Volt Gen II Plug-in Hybrid Electric Vehicle ”, Michigan Tech University, 2018.
- Kaushik Prabhu, MSc thesis entitled “ Sensor Fusion for Spark Ignited Engines ”, Michigan Tech University, 2018.
- Yash Borghate, MSc thesis entitled “ Cold Start Analysis and Modeling of a Direct-Injection Gasoline Engine ”, Michigan Tech University, 2018.
- Abhishek Jadav, MSc thesis entitled “Experimental and Modeling Study of Particulate Matter Oxidation under Loading Conditions for a SCR Catalyst on a Diesel Particulate Filter ”, Michigan Tech University, 2017.
- Sandesh S. Rao, MSc thesis entitled “An Experimental Investigation on the Effect of Dual Coil Ignition Discharges on Dilute Combustion in a Spark Ignition Engine ”, Michigan Tech University, 2017.
- Omkar Dilip Rane, MSc thesis entitled “Multi Resonant Feedback Control of Wave Energy Converters using Recursive Least Squares”, Michigan Tech University, 2017.
- Biswajit Barik, MSc thesis entitled “Designing a Real-time Velocity Predictor for Powertrain Optimization of Connected and Automated Vehicles”, Michigan Tech University, 2017.
- Reem Merchant, MSc thesis entitled “New Model to Predict Heat Transfer Coefficient for Flow Boiling in Microfin Tubes”, Michigan Tech University, 2016.
- Arya Yazdani, MSc thesis entitled “Air Charge Estimation for an SI Engine using In-cylinder Pressure Sensor”, Michigan Tech University, 2016.
- Rui Hu, MSc thesis entitled “State of Charge Balancing Droop Control”, Michigan Tech University, 2015.
- Prathamesh Chendvankar, MSc technical report entitled “1D Simulation of Direct Water Injection in a Spark Ignited Engine”, Michigan Tech University, 2015.
- Jiongxun Zhang, MSc technical report entitled “Optical Access Engine Setup and Validation”, Michigan Tech University, 2015.
- Ritam Misra, MSc thesis entitled “Impact of Plug-in Electric Vehicles and Wind Generators on Harmonic Distortion of Electric Distribution Systems”, Michigan Tech University, 2014.
- Zhe Huang, MSc technical report entitled “SVPWM Switching Pattern for Z-Source Inverter, Simulation and Application in HEV/EV Motor Drive”, Michigan Tech University, 2014.
- Dustin Loveland, MSc thesis entitled “Development of a Predictive Combustion Model of a Spark Ignited Engine with Gasoline Direct Injection, Variable Valve Timing, Duration and Lift Technologies”, Michigan Tech University, 2012.

University Service

- Member of AASUA Finance Committee, University of Alberta, 2020 - present
- Member of AASUA Equity & Diversity Committee, University of Alberta, 2020 - present
- Co-adviser of Alternative Energy Enterprise (AEE), Michigan Tech. University, 2018 - 2019
- MTU Review Committee to Assess Participation into National APLU (Association of Public and Land-grant Universities) Program to Increase the Diversity of STEM Faculty, Michigan Tech. University, Fall 2017.
- Member of MEEM Department Seminar Committee, Michigan Tech. University, 2012 – 2016.
- Judge for MEEM Senior Capstone Design Critical Design Review, Michigan Tech. University, Spring 2017.
- Facilitator at the MEEM and Graduate School Orientation, Michigan Tech. University, 2016.
- Member of MEEM Department Faculty Development Committee, Michigan Tech. University, 2014.
- Judge for Undergraduate Research Expo, Michigan Tech. University, 2015.
- Review panel for Research Excellence Fund - Mentoring Grant Proposals, Michigan Tech. University, 2014.
- Judge in Graduate Research Colloquium (GRC), Michigan Tech. University, 2013, 2015.
- Faculty host for two of the MTU's Leading Scholar Award Finalists, Michigan Tech. University, 2012, 2013.

Community Service

- Led and co-organized a half-day workshop on “Controls and Robotics” in Michigan Tech’s Summer Youth Program -- ME: Design the Future, high school students in grades 9-12, Jul. 27, 2016.
- Mentoring FIRST® Robotics Competition Team on motor controller design, Houghton High School, 2016
- Judge in Western UP Science Fair, Houghton, MI, March 23, 2015.
- Judge in Canada-Wide Youth Science Fair, Ottawa, May 10-18, 2008.
- Member of University of Alberta Student Life Advisory Committee for graduate students, 2008-2009.
- Student representative of the University of Alberta graduate students in the Council of Faculty of Graduate Studies and Research (FGSR), 2007-2009.
- Member of University of Alberta Grant Selection Committee for graduate students, 2007-2008.
- Elected Vice-President Events of Mechanical Engineering Graduate Students Association (MEGSA), University of Alberta, 2007-2008.
- One of the main coordinators for 2008 GSA (Graduate Students Association) Universal Orientation for over 400 new graduate students recruited to the University of Alberta in September 2008.
- Judge in Edmonton Regional Science Fair, Northern Alberta Institute of Technology (NAIT), Edmonton, April 9, 2007.

Professional Development

- Certificate of “Ingenuity - Innovation for Researchers” from THECIS (The Centre for Innovation Studies), a three-month course to advance understanding the use of innovation as a subject of both study and practice, 2008, AB, Canada.

Professional Affiliations

- Canadian Society of Mechanical Engineers (CSME)
- American Society of Mechanical Engineers (ASME)
- Society of Automotive Engineers (SAE)
- International Federation of Automatic Control (IFAC)
- Renewable Fuel Association (RFA)
- The Combustion Institute
- Biomass Energy Research Association (BERA)
- The New York Academy of Sciences (NYAS)