

# MAHDI SHAHBAKHTI

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## Academic Appointments

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

Director of Energy Mechatronics Lab (EML)

- Research interests: Mechatronics, Hybrid Electric Vehicles, Connected and Automated Vehicles, HVAC, Intelligent Buildings

**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

**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 IC engines and alternative fuels; Research on engine controls

## Education

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

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

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

## Industry Experience

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

Iran Khodro Powertrain Company, the largest automotive powertrain manufacturer in the Middle East

- Calibration of engines and design of control strategies for CNG-gasoline engine control units
- On-vehicle testing of powertrain controllers
- Design of engine management system (ECM) strategies for light-duty vehicles
- Dynamic modeling of gasoline engines and longitudinal vehicle dynamics
- Benchmarking of Peugeot 206 engine - a mutual project with FEV<sup>®</sup> carried out in Aachen, Germany
- Investigating advanced methods to reduce automotive emissions, particularly vehicle cold start emissions
- **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

## Professional Service

### Technical Committees

- Elected chair of American Society of Mechanical Engineers (ASME)- Dynamic Systems, and Controls Division (DSCD) Automotive and Transportation Systems Technical Committee (>180 international members), 2020 – 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), secretary (2014-2016), publicity chair (2012-2014), and Fuels & Combustion thrust area leader (2012-2013) in ASME-DSCD Energy Systems Technical Committee
- Elected vice-chair (2018-2020), Elected secretary (2016-2018), lead session organizer (2014-2016) of ASME-DSCD Automotive and Transportation Systems Technical Committee

### Editorships

- Associate Editor, *ASME Journal of Dynamic Systems, Measurement, and Control*, 2017 – present
- Associate Editor, *Int. Journal of Powertrains* (Inderscience Publishers), 2014 – 2020
- 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 – present
- Guest Editor for Special Issue on “Enabling Green Mobility via Advanced Powertrain Engineering”, *Int. Journal of Powertrains (IJPT)*, 2019 – present
- 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)
- 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
- Editorial Board - Associate Editor, *Proceedings of 2014 American Control Conference*
- Editorial Board - Associate Editor, *Proceedings of 2014 ASME Dynamic Systems Control Conference*

### Consulting

- Law firms, Expert witness for patent/IP applications, 2018 – present
  - Finnegan, Henderson, Farabow, Garret & Dunner, LLP (Washington DC): Expert witness for IPRs in the automotive area; 2018 - 2019

- DOAR (New York, NY), Expert witness for ITC, and IPR cases, 2020 - present
- Maxwell Goss PLLC (Birmingham, MI): Expert witness for three IPRs in the area of vehicle controls and communication network, 2020

## Reviewing/Refereeing Activities

### Funding Agencies

- 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.
- 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.
- 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.
- 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.

### Books/eLearning

- 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 (32)

- 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.
- 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 " Control and Energy Management of Building Systems ", 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.

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