

## **Zoran S. Filipi**

Professor and Timken Endowed Chair, Emeritus  
Director, School of Mechanical and Automotive Engineering, Emeritus  
College of Engineering, Computing and Applied Science, Clemson University  
*e-mail: zfilipi@clemson.edu*

### **PROFESSIONAL EXPERIENCE**

#### **POSITIONS AT CLEMSON UNIVERSITY**

- Director, School of Mechanical and Automotive Engineering August 2022 - 2024
- Founding Director, Center for Virtual Prototyping of Ground Systems October 2020 – 2024
- Chairman, Automotive Engineering Department, Jan. 2015 – Dec. 2021
- Executive Director of the Campbell Graduate Engineering Center Jan. 2015 – Dec. 2021
- Professor and Timken Endowed Chair in Vehicle System Design, Automotive Engineering Department January 2012 – 2024

#### **POSITIONS AT THE UNIVERSITY OF MICHIGAN**

- Research Professor, Mechanical Engineering Dept. 09/01/2008 – 12/31/2011
- Research Professor, University of Michigan Transportation Research Institute (courtesy appointment) 09/01/2009 – 12/31/2011
- Associate Research Professor, 09/01/2005 – 8/31/2008
- Associate Research Scientist, 09/01/2001 – 08/31/2005
- Assistant Research Scientist, 09/01/95 – 08/31/2001

#### **OTHER RELEVANT EXPERIENCE**

- Assistant Professor w/ tenure, Faculty of Mechanical Engineering, University of Belgrade, 9/23/93 - 12/01/94
- Lecturer/Research Investigator at the IC engine Division, Faculty of Mechanical Engineering, University of Belgrade, 1988 - 1993
- Fulbright Scholar at the University of Illinois, Urbana-Champaign, Department of Mechanical and Industrial Engineering, 1989 - 1990
- Visiting Scholar at the University of Bath, U.K., School of Mechanical Engineering, 11/88 - 2/89

### **EDUCATION**

- **Ph.D.**, Mechanical Engineering, University of Belgrade, 1992
- **M.S.E.** in Mechanical Engineering, University of Belgrade, 1987
- **B.S.E.** in Mechanical Engineering, University of Belgrade, 1980

### **HONORS AND AWARDS**

- ASME Internal Combustion Engine Award, 2024
- Fellow, American Society of Mechanical Engineers (ASME), 2015
- Fellow, Society of Automotive Engineers, 2011
- International Journal of Automobile Engineering Best Paper Award, 2012

- Springer Award for the Most Cited Article in the International Journal of Automotive Technology, 2012
- Donald Julius Groen Award by the Institution of Mechanical Engineers' Mechatronics, Informatics and Control Group for the best paper in 2010
- University of Michigan Research Faculty Achievement Award, 2010
- Forest R. McFarland Award, Society of Automotive Engineers, 2009
- Society of Automotive Engineers Excellence in Oral Presentation Award; 2001, 2009
- Michigan Memorial Phoenix Energy Institute Faculty Fellow, 2007 -
- University of Michigan Research Faculty Recognition Award, 2005
- UM College of Engineering Outstanding Research Scientist Award, 2003
- Japanese Special Invitation Fellowship Program, 1997
- Fulbright Grant for Doctoral Students, 1989
- Yugoslav Science Foundation Young Faculty Fellowship, 1988

## **INVITED PRESENTATIONS AND SEMINARS**

- February 2024, "Future of Energy for Mobility and Opportunities for IC Engine Research", Lund University, Sweden
- February 2024, faculty seminar, "Future of Energy for Mobility and Reimagining of the Low Heat Rejection Concept for Advanced IC Engines", Chalmers University, Sweden
- October 2023, invited talk, "The Future of Mobility: Talent Needs", Executive Session on the role of disruptive transformation on shaping the future of mobility, Smoky Mountains Mobility Conference, Chattanooga, TN
- March 2023, faculty seminar, "On the Future of Energy for Transportation and Reimagining of the Low Heat Rejection Concept for Internal Combustion Engines", University of Wisconsin, Madison, WI
- April 2021, keynote, "Virtual Prototyping of Autonomy-Enabled Ground Systems: Research Directions", 2021 SAE World Congress (WCX), Detroit, MI
- May 2020, keynote, "Advanced Thermal Barrier Coatings: Solutions Tailored for Different Combustion Systems and Future Directions", KCFP Engine Research Center Annual Conference, Lund University, Sweden
- April 2019, keynote, "Thermal Barrier Coatings for Improving IC Engine's Efficiency: Demonstrated Potential in the LTC Engine and the New Directions for a HD Diesel", SAE International High Efficiency IC Engine Symposium, Detroit, MI
- October 2018, invited speaker and panelist, "New Engine Concepts for the Uncertain Future", inaugural Smoky Mountains Mobility Conference, Chattanooga, TN
- January 2018, keynote address, "Prospects of Advanced Compression Ignition: Thermal Barrier Coatings for Improved Engine Efficiency and Range of Applicability", 7<sup>th</sup> International Conference on UAV Propulsion Technologies, Haifa, Israel, 2018
- March 2017, keynote address, "Impact of Novel Combustion Modes on the Future Fuel Demand", SIGMA Symposium on the Future of Energy for Transportation, Greenville, SC
- January 2017, keynote address, "Powertrain Technology Trends Impacting Future Fuels Markets", SIGMA Executive Leadership Conference, Vail, CO

- November 2016, keynote address, “Thermal Barrier Coatings for Improved HCCI Engine Efficiency and Operating Range: Small Engine Perspective”, SAE/JSAE 2016 Small Engine Technology Conference, Charleston, SC
- October 2016, keynote address, “Interplay Between Heat Transfer and Kinetics-driven Combustion: Lessons Learned and Directions for Future,” 2016 ASME Internal Combustion Engine Fall Technical Conference, Greenville, SC
- September 2015, keynote, “Overcoming Gasoline HCCI Technology Barriers: Management of Fuel Variability and In-cylinder Thermal Environment”, ICE2015 International Conference on Engines & Vehicles, Capri, Italy
- August 2015, faculty seminar, “Enhancing HCCI Engine’s High-Efficiency Potential: Fuel Effects and In-cylinder Thermal Environment”, Oak Ridge National Lab, TN
- June 2015, keynote address, “Fuel-Engine System: Effects of the Refinery Stream Gasoline Properties on HCCI Combustion”, International Conference on Engines for Vehicles ICEV 13, Stony Brook, NY
- May 2015, faculty seminar, “Heat Flux Measurements in a Low Temperature Combustion Engine: Insights and Development of Thermal Barrier Coatings for Improved Efficiency”, University of Windsor, Canada
- May 2015, panelist, “Advanced Powertrain Technology Development”, DoE ARPA-E Workshop on Powertrain Innovations for Connected and Autonomous Vehicles, Denver, CO
- October 2014, invited speaker, panel on “Emerging Powertrain and Emission System Technologies for Future Green Energy Opportunities and Greenhouse Emission Reduction”, SAE International Powertrain, Fuels & Lubricants Conference, Birmingham, UK
- October 2014, “A Model for Public-Private Partnerships for Research and Workforce Development for the Transportation Industry”, Conference Board - Business Performance Council, Greenville, SC
- July 2014, faculty seminar, “Pathways for Maximizing the High-efficiency and Low-emission Potential of Hydraulic Hybrid Powertrains”, ETH Zurich, Switzerland
- July 2014, faculty seminar, “Multi-physics Simulation for HEV Analysis and Optimization”, Porsche Entwicklungszentrum Weissach, Germany
- July 2014, faculty seminar, “High-efficiency and Low-emission Potential of Hydraulic Hybrid Powertrains”, University of Stuttgart, Germany
- July 2014, faculty seminar, “Insights Gained from Heat Flux Measurements in Lean-Burn IC Engines” University of Stuttgart, Germany
- June 2014, keynote speaker, “Automotive innovation-driving R&D process spurs transformation of collaborative research”, MathWorks Research Faculty Workshop, Newton, MA
- May 2014, invited speaker, “Efficient Small Engines for CHP: Research Needs, from Combustion and Heat Transfer to System Integration”, DoE ARPA-E Workshop, Chicago, IL
- April 2014, panelist, “Are We Done with Efficiency Improvements in Internal Combustion Engine Development? Maybe Not!”, SAE World Congress, Detroit, MI
- February 2014, “New Technologies Highlighted at the Washington Auto Show”, Interview for the Voice of America Global Television and Web News
- October 2013, “Alternative Fuels Opportunities for Heavy-Duty Vehicles”, SCCEBA Business Roundtable

- March 2013, "Characterizing Diesel Engine Transients and Real-time Models for Virtual Sensing", faculty seminar, University of Stuttgart, Germany
- July 2013, invited speaker, "Natural Gas and Electrified Powertrains for Heavy-Duty Vehicles", South Carolina Clean Energy Summit
- April 2013, invited speaker, "Onsite Power: Small scale, highly reliable engine opportunities", DoE workshop on Methane Mitigation, Fort Collins, CO
- April 2013, panelist, "Engine Combustion Modeling for Model-Based Control", 2013 SAE World Congress, Detroit, MI
- April 2013, panelist, "Light Duty/Heavy Duty Control, Calibration, and OBD", 2013 SAE World Congress, Detroit, MI
- February 2013, seminar, "Vision for Powertrain Research and the Impact of Gasoline Composition Variations on Homogeneous Charge Compression Ignition", Chevron Technology Center, Richmond, CA
- February 2013, "Multi-Physics Propulsion System Models for Studies of Electrified Vehicles", BMW Technical Center, Mountain View, CA
- January 2013, SmartState Science Café, "Hybrid Vehicles: An Electrified Car in Every Garage?", Columbia, SC
- November 2012, "Frontiers in Hydraulic Hybrid Propulsion Research: Modeling, Optimization, and Powertrain In-the-Loop Integration", Faculty Seminar, Ohio State University
- November 2012, "Energy for Transportation, and Opportunities of Plug-in Hybrids", Lecture at University of Michigan by invitation of Prof. S. Linic, Director of Energy Systems Engineering program, Ann Arbor, MI
- October 2012, Keynote Address, "Diesel Engine Transients: Novel Diagnostic Technique and Real-time Emissions Models for Control", IFP Energies Nouvelles E-COSM, Paris, France
- October 2012, Invited Talk "Characterizing Diesel Engine Transients and Real-time Models for Control", SAE Heavy Duty Vehicles Symposium - Technologies for High Efficiency & Fuel Economy
- March 2012, Invited Talk "Neuro-Fuzzy Model Tree Approach to Virtual Sensing of Transient Diesel Soot and NOx Emissions", International EmiMod Workshop (Emissions Modeling for Control and Diagnostics), Johannes Kepler University Linz, Austria
- November 2011, Invited talk, "Frontiers in Research of Hydraulic Hybrid Propulsion: Modeling Techniques, Optimization Frameworks, and Component-In-the-Loop Integration", SAE Symposium on High Efficiency Heavy Duty Vehicles, Troy, Michigan
- October 2011, seminar, "Hydraulic Hybrid Propulsion for Heavy Vehicles: Combining the Simulation and Engine-in-the-Loop Techniques to Maximize the Fuel Economy and Emission Benefits", invited by Robert Bosch LLC, Farmington Hills, MI
- September 2011, Keynote talk "Enhancing Real-World Benefits of the HCCI Engine: from Management of the Near-Wall Thermal Conditions to Vehicle Hybridization", 10th International Conference on Engines and Vehicles ICE2011, Capri, Italy
- July 2011, seminar, "Impact of Diesel Engine Transients on Particulate and NOx Emissions, and Development of a Diagnostic Technique for Cycle-Resolved Measurements of In-Cylinder Constituents", invited by Robert Bosch LLC, Farmington Hills, MI

- June 2011, keynote, “Hydraulic Hybrid Propulsion Systems: Compact and Cost-effective Alternative”, SAE Symposium TO ZEV - Highlighting the latest Powertrain, Vehicle and Infomobility Technologies, Turin, Italy
- January 2011, Invited talk, “Hydraulic Hybrid Propulsion Systems: Pathways and Tools for Maximizing the Benefits”, Lund University, Lund, Sweden,
- December 2010, keynote “Electrification of Advanced Military Vehicles“, Future of Electric Vehicles conference, San Jose, CA
- June 2010, Invited talk at the 1st annual US conference on the Design of Experiments in Engine Development, “Optimal Calibration of high DOF Engines Considering Multiple Objectives”, Plymouth, MI
- November 2009, Keynote Speaker at the Advanced Engine Control Symposium, “Approaches to Engine Control in a Series Hybrid Vehicle”, Tianjin, China
- November 2009, Keynote Speaker at the Advanced Engine Control Symposium – 2<sup>nd</sup> day, “A Simulation Based Approach for Developing Optimal Calibrations for High Degree-of-Freedom Engines”, Tianjin, China
- November 2009, Invited talk at the Beijing Institute of Technology, “Impact of Real-world Driving Conditions on PHEV Design, Control and Charging Schedules”, Beijing, China
- October 2009, Keynote, ASME Dynamic Systems and Control Conference, Frontiers session “Progress and Challenges in the Configuration, Control, and Battery Management of Vehicle-To-Grid (V2G) Integration Systems” V2G Integration, Hollywood, CA
- October 2009, invited talk, “Supervisory Control Strategies for a Series Hydraulic Hybrid”, Hydraulic Hybrid Session and Panel at the SAE Commercial Vehicle Congress, Chicago
- June 2009, invited talk at the International Workshop *Facing the Challenge of Future CO2 Targets: Impact on European Passenger Car Technologies*, “Pathways for Reducing Vehicle CO2 Emission Based on Hybrid and Plug-in Hybrid Propulsion Concepts”, Turin, Italy
- Feb. 2009, invited talk, “A Low-Cost Pathway to 100-mpg - Highly-Efficient Hydraulic Hybrids for a Range of Vehicle Applications”, SAE Government/Industry Meeting, Washington DC
- October 2008, “Evaluating the Low-emission Potential of the Series Hydraulic Hybrid Using the Engine-In-the-Loop Capability”, invited speaker, Hydraulic Hybrid Session and Panel at the SAE Commercial Vehicle Congress, Chicago
- June 2008, Panel speaker, International Bio-fuels Symposium; “Effect of Biodiesel and Blends on Diesel Engine Performance, Combustion and Emissions under Steady and Transient Conditions”, Tongji University, China
- April 2008, Keynote, “The HCCI Engine and Modern Diesel Engine Transient Control Challenge”, Workshop on Control Fundamentals and Latest Developments in Automotive Control, Applied Control Technology Consortium, Dearborn
- June 2007, Keynote, “The Impact of Diesel Engine Transients on Particulate Emissions”, 2007; International Workshop on Near Zero Emission Vehicle, Seoul, Korea
- June 2007, Invited talk with simultaneous translation, “Clean and Efficient Engine Technologies: gasoline HCCI and the Premixed Diesel”, Daewoo Auto & Technology Center, Seoul, Korea
- March 2007, seminar, “Recent Advances in Modeling Complex Powertrain Systems and the Role of Hardware-in-the-loop Facility”, Department of Thermodynamics and Energy, University of Rijeka, Croatia

- January 3 – 8, 2007: “Hybrids and Their Impact on the Future of Automotive Industry and Engineering Education”, interview on the CNN Headline News, Comcast Newsmakers
- December 2006, “Cultivating and Sustaining University-Industry Collaborations”, KAIST-UM Workshop on New Opportunities in Mechanical Engineering Education, Honolulu, Hawaii
- August 2006, Keynote, “Simulation and Hardware-in-the-loop Techniques for Optimizing Advanced Hybrid Propulsion Systems”, AVL Modeling of Advanced Powertrain Systems Conference
- February 2006, Plenary talk, “Engine-in-the-Loop Testing for Evaluating Hybrid Emissions in Truck Applications”, SAE Hybrid Vehicle Technologies Symposium, San Diego
- August 2004, Plenary talk, Berkeley, “Experimental Insight into Heat Transfer in the Gasoline HCCI Engine”, SAE Homogeneous Charge Compression Ignition Symposium
- July 2003, Keynote, “New Frontiers in Vehicle System Modeling “, AVL Virtual Vehicle Thermal Management Conference
- October 2002, Seminar, “Systems Approach to Analysis of Hybrid Powertrain Technologies”, University of Hiroshima, Japan
- August 2002, Seminar, “Hydraulic Hybrid Systems for Automotive Applications”, Workshop on Reactive Flow Systems, KAIST, Korea,
- May 2002, Seminar, “Modeling Hydraulic Hybrid Propulsion Systems for Future Light and Medium Trucks”, EATON Technical Center – Southfield, MI
- December 2001, Invited talk, ”Automotive Research Center’s Approach to Modeling and Simulation of Future Truck Systems”, 21st Century Truck Partnership - Department of Transportation
- June 2001, Seminar, “The Effect of Stroke-to-Bore Ratio on Combustion, Heat Transfer and Efficiency of a Spark Ignition Engine of Given Displacement”, Daimler-Chrysler Technical Center
- April 1999, Seminar, “Environmental Impact of Heavy-Duty Diesels”, Federal Mogul, MI
- October 1996, Seminar, “Integrated, High-Fidelity Simulation of Engine-In-Vehicle Transients”, HORIBA Instruments, Japan
- October 1996, Seminar, “A Non-linear, Transient Diesel Engine Simulation for Predictions of Instantaneous Engine Speed and Torque”, Mazda Technical Research Center, Japan
- October 1996, Seminar, “Integrated Engine-In-Vehicle Simulation for Mobility, Fuel Economy and Drivability Studies”, Mitsubishi Research and Development Center, Japan
- October 1996, Seminar, “A Non-linear, Transient Diesel Engine Simulation, Its Validation and Integration With Driveline and Vehicle Dynamics Models”, Toyota Central Research Laboratories, Japan
- November 1996, Seminar, “The Effect of Stroke-to-Bore Ratio on Combustion, Heat Transfer and Efficiency of a Spark Ignition Engine of Given Displacement”, Honda Research & Development Center
- November 1996, Seminar, “Powertrain System Modeling”, New ACE Institute, Japan
- November 1996, Seminar, “Engine-in-Vehicle Modeling and Integration”, Waseda University

## PUBLICATIONS

### Full Articles in Refereed Journals, Transactions or Archives

1. Motwani, R., Gandolfo, J., Gainey, B., Filipi, Z., Lawler, B., "A 3D CFD-FEA Co-simulation Study of Low Thermal Effusivity TBCs Applied to the Piston and Valves of an SI Engine", *Int. Journal of Engine Research*, Vol. 25(12), 2024, pp. 2142-2162
2. Gainey, B., Vedpathak, K., Jordan, E.H., Sellnau, M., Filipi, Z., Lawler, B., "On Convection vive in Mixing-controlled Combustion with Thermal Barrier Coatings," *Applied Thermal Engineering*, Volume 247, 2024, 122991; <https://doi.org/10.1016/j.applthermaleng.2024.122991>
3. Gainey, B., Gandolfo, J., Yan, Z., Vedpathak, K., Kumar, R., Jordan, E.H., Sellnau, M., Filipi, Z., Lawler, B., "A Two-material Thermal Barrier Coating Spatially Tailored for High-efficiency GCI Combustion," *Int. Journal of Engine Research*, 25 (1), 2023, pp. 156-169
4. Gandolfo, J., Gainey, B., Yan, Z., Patel, A., Filipi, Z., Jiang, C., Kumar, R., Jordan, E. H., Lawler, B., "Analysis of Combustion Chamber Deposit Growth on Temperature Swing Thermal Barrier Coatings in a Spark Ignition Engine," *Int. Journal of Engine Research*, 24 (7), 2023, pp. 3105-3118
5. Gainey, B., Bhatt, A., O'Donnell, P., Prucka, R., Filipi, Z., Redon, F., Lawler, B., "Experimental Study of the Impact of Scavenging Efficiency on Diesel Combustion in an Opposed-Piston Two-Stroke Engine," *Int. Journal of Engine Research*, 24 (7), 2023, pp. 2921-2935
6. Yan, Z., Levi, A., Zhang, Y., Sellnau, M., Filipi, Z., Lawler, B., "A Numerical Evaluation and Guideline for Thermal Barrier Coatings on Gasoline Compression Ignition engines", *Int. Journal of Engine Research*, Vol. 24, Issue 5, 2023, pp. 2206-2222
7. Ganey, B., Gandolfo, J., Filipi, Z., Lawler, B., "Thermodynamic Analysis of Heat Transfer Reduction in Spark Ignition Using Thermal Barrier Coatings", Proceedings of the IMechE, Part D: *Journal of Automobile Engineering*, JAUTO-22-0587.R1, <https://doi.org/10.1177/09544070231189545>, 2022
8. Moser, S., Edwards, K. D., Schoeffler, T., Filipi, Z., "CFD/FEA Co-Simulation Framework for Analysis of the Thermal Barrier Coating Design and Its Impact on the HD Diesel Engine Performance", *Energies*, 14, 2044. <https://doi.org/10.3390/en14082044> ISSN 1996-1073, 2021
9. Farahani, S., Xu, B., Filipi, Z., Pilla, S., "A Machine Learning Approach to Quality Monitoring of Injection Molding Process Using Regression Models", *Int. Journal of Computer Integrated Manufacturing*, DOI: 10.1080/0951192X.2021.1963485
10. Xu, S. and Filipi, Z., "Quasi-Dimensional Multi-Zone Modeling of Methane-Diesel Dual-Fuel Combustion", *Frontiers in Mech. Eng.* 6:46, 16 July 2020, doi: 10.3389/fmech.2020.00046
11. Xu, B., Yebi, A., Rathod, D., Onori, S., Filipi, Z., Hoffman, M., "Experimental Validation of Nonlinear Model Predictive Control for a Heavy-Duty Diesel Engine Waste Heat Recovery System", *J. Dyn. Sys., Meas., Control.*, May 2020, 142(5): 051001 (13 pages)
12. Rathod, D., Xu, B., Filipi, Z., and Hoffman, M., "Experimental Evaluation of Evaporator Thermal Inertia for an Optimal Control Strategy of an Organic Rankine Cycle Waste Heat Recovery System", *SAE Int. J. Engines* 13(4):2020, doi:10.4271/03-13-04-0029.
13. Filipi, Z., Hoffman, M., O'Donnell, R., Powell, T., Jordan, E., Kumar, R., "Enhancing the efficiency benefit of thermal barrier coatings for homogeneous charge compression ignition engines through application of a low-k oxide", *International J of Engine Research*, Volume: 22 Issue: 6, pp. 1906-1923; Article first published online: June 1, 2020; DOI: 10.1177/1468087420918406

14. Xu, B., Rathod, D., Zhang, D., Yebi, A., Zhang, X., Li, X., Filipi, Z., "Parametric Study on Reinforcement Learning Optimized Energy Management Strategy For a Hybrid Electric Vehicle", *Applied Energy*, 259, 114200, 2020
15. Xu, B., Hou, J., Shi, J., Li, H., Wang, Z., Rathod, D., and Filipi, Z., "Learning Time Reduction Using Warm Start Methods for a Reinforcement Learning Based Supervisory Control Strategy in Hybrid Electric Vehicle Applications", *IEEE Transactions on Transportation Electrification*, 2020, doi: 10.1109/TTE.2020.3019009
16. Xu, B., Rathod, D., Yebi, A., Filipi, Z., "Real-time Realization of Dynamic Programming Using Machine Learning Methods for IC Engine Waste Heat Recovery System Power Optimization", *Applied Energy*, Vol. 262, 114514, 2020
17. Xu, B., Yebi, A., Rathod, D., and Filipi, Z., "A Comparative Analysis of Real-time Power Optimization for Organic Rankine Cycle Waste Heat Recovery Systems", *Applied Thermal Engineering*, Vol. 164, 114442, 2020
18. Xu, B., Rathod, D., Yebi, A., Onori, S., Filipi, Z., Hoffman, H., "A Comprehensive Review of Organic Rankine Cycle Waste Heat Recovery for Heavy Duty Diesel Engine Applications", *Renewable & Sustainable Energy Reviews* 107, 145-170 (IF: 9.184), 2019
19. Powell, T., O'Donnell, R. Hoffman, M., Filipi, Z., Jordan, E. H., Kumar, R., Killingsworth, N., "Experimental Investigation of the Relationship between Thermal Barrier Coating Structured Porosity and HCCI Engine Combustion", *Int. Journal of Engine Research*, 2019, <https://doi.org/10.1177/1468087419843752>
20. Rathod, D., Xu, B., Filipi, Z., Hoffman, M., "An experimentally Validated, Energy Focused, Optimal Control Strategy For an Organic Rankine Cycle Waste Heat Recovery System", *Applied Energy*, 256, 113991, 2019
21. Xu, B. Hu, X., Tang, X., Lin, X., Li, H., Rathod, D., Filipi, Z., "Ensemble Reinforcement Learning-Based Supervisory Control of Hybrid Electric Vehicle for Fuel Economy Improvement", *IEEE Transactions on Transportation Electrification*, Vol. 6 (2), 2020, pp. 717-727
22. Xu, B., Rathod, D., Yebi, A., Filipi, Z., "A Comparative Analysis of Dynamic Evaporator Models for Organic Rankine Cycle Waste Heat Recovery Systems", *Applied Thermal Engineering*, 164, 2020, 114442
23. Lacey, J., Kameshwaran, K., Filipi, Z., Fuentes-Afflick, P., Cannella, W., "The effect of fuel composition and additive packages on deposit properties and homogeneous charge compression ignition combustion", *Int. Journal of Engine Research*, 1(16), 2019 <https://doi.org/10.1177/1468087419828624>
24. Hoffman, M., O'Donnell, R., and Filipi, Z., "Partial Transparency of Advanced Compression Ignition Combustion Chamber Deposits, Its Impact on Combustion Chamber Wall Temperatures and Application to Thermal Barrier Coating Design," *SAE Int. J. Engines* 11(2), 179-194, 2018
25. Lawler, B., Lacey, J., Guralp, O., Najt, P., Filipi, Z., "HCCI combustion with an actively controlled glow plug: The effects on heat release, thermal stratification, efficiency, and emissions", *Applied Energy*, Elsevier, Volume 211, 2018, pp. 809-819
26. Yebi, A., Xu, B, Liu, X., Shutty, J., Anschel, P., Onori, S., Filipi, Z., Hoffman, H., "Estimation and Predictive Control of a Parallel Evaporator Diesel Engine Waste Heat Recovery System", *IEEE Transactions on Control Systems Technology*, vol. 27, Issue 1, pp. 1-14, 2017; DOI 10.1109/TCST.2017.2759104



27. Powell, T, O'Donnell, R, Hoffman, M, Filipi, Z. "Impact of a Yttria-Stabilized Zirconia Thermal Barrier Coating on HCCI Engine Combustion, Emissions, and Efficiency," *ASME J. Eng. Gas Turbines Power* 139(11), 111504 2017(9 pages)
28. O'Donnell R, Powell T, Hoffman M, Filipi Z. "Inverse Analysis of In-Cylinder Gas-Wall Boundary Conditions: Investigation of a Yttria Stabilized Zirconia Thermal Barrier Coating for Homogeneous Charge Compression Ignition," *ASME Journal of Engineering for Gas Turbines and Power* 139(10), 2017
29. Zhang, X. and Filipi, Z., "Optimal Supervisory Control of the Series HEV with Consideration of Temperature Effects on Battery Fading and Cooling Loss," *SAE International Journal of Alternative Powertrains*, 5(2), 2016, pp.299-307
30. Liu, Z., Ivanco. A., Filipi, Z., "Naturalistic driving cycle synthesis by Markov chain of different orders", *International Journal of Powertrains*, 6 (4), 2017, pp. 307-322
31. Lacey, J., Kameshwaran, K., Sathasivam, S., Filipi, Z., Cannella, W., Fuentes-Afflick, P. A., "Effects of refinery stream gasoline property variation on the auto-ignition quality of a fuel and homogeneous charge compression ignition combustion," *Int. Journal of Engine Research*, Volume: 18 issue: 3, page(s): 226-239, 2016
32. Xu, B., Rathod, D., Kulkarni, S., Yebi, A., Filipi, Z., Onori, S., Hoffman, H., "Transient Dynamic Modeling and Validation of an Organic Rankine Cycle Waste Heat Recovery System for Heavy Duty Diesel Engine Applications," *Applied Energy*, 2017, 205: pp. 260-279.
33. Xu, B., Yebi, A., Onori, S., Filipi, Z., Liu, X., Shutty, J., Anshel, P., Hoffman, M. "Transient Power Optimization of an Organic Rankine Cycle Waste Heat Recovery System for Heavy-Duty Diesel Engine Applications." *SAE International Journal of Alternative Powertrains*, 6(1):2017, doi:10.4271/2017-01-0133.
34. O'Donnell, R. N., Powell, T. R., Filipi, Z. S., Hoffman, M. A. "Estimation of Thermal Barrier Coating Surface Temperature and Heat Flux Profiles in a Low Temperature Combustion Engine Using a Modified Sequential Function Specification Approach," *ASME. J. Heat Transfer*. 2017;139(4):041201-041201-9. doi:10.1115/1.4035101.
35. Liu, Z., Ivanco, A. and Filipi, Z.S., "Impacts of Real-World Driving and Driver Aggressiveness on Fuel Consumption of 48V Mild Hybrid Vehicle," *SAE International Journal of Alternative Powertrains*, 5(2016-01-1166), 2016, pp. 249-258.
36. Lawler, B., Mamalis, M., Joshi, S., Lacey, J., Guralp, O., Najt, P., Filipi, Z., "Understanding the effect of operating conditions on thermal stratification and heat release in a homogeneous charge compression ignition engine," *Applied Thermal Engineering*, Volume 112, 5 Feb. 2017, pp. 392-402, ISSN 1359-4311, <http://dx.doi.org/10.1016/j.applthermaleng.2016.10.056>.
37. Ivanco, A., Zhou, K., Hofmann, H. and Filipi, Z.S., "Powerpack Optimal Design Methodology with Embedded Configuration Benchmarking," *SAE International Journal of Alternative Powertrains*, 5(2016-01-0313), 2016, pp.223-227.
38. Abdelhamid, M., Pilla, S., Singh, R., Haque, I., and Filipi, Z., "A comprehensive optimized model for on-board solar photovoltaic system for plug-in electric vehicles: energy and economic impacts," *Int. J. Energy Res.*, 40: 1489–1508. doi: 10.1002/er.3534. 2016
39. Abdelhamid, M., Haque, I., Pilla, S., Filipi, Z.S. and Singh, R., "Impacts of Adding Photovoltaic Solar System On-Board to Internal Combustion Engine Vehicles Towards Meeting 2025 Fuel Economy CAFE Standards," *SAE International Journal of Alternative Powertrains*, 5(2). 2016
40. Zhang, D., Ivanco, A., and Filipi, Z., "Model-Based Estimation of Vehicle Aerodynamic Drag and Rolling Resistance," *SAE Int. J. Commercial Veh.* 8(2):433-439, 2015, doi:10.4271/2015-01-2776.

41. Liu, Z., Ivanco, A., Filipi, Z., "Quantification of Drive Cycle's Rapid Speed Fluctuations Using Fourier Analysis", *SAE Int. Journal of Alternative Powertrains*, 4(1), pp. 170-177, 2015
42. Zhou, K., Ivanco, A., Filipi Z. and Hofmann, H., "Finite-Element-Based Computationally Efficient Scalable Electric Machine Model Suitable for Electrified Powertrain Simulation and Optimization," *IEEE Transactions on Industry Applications*, vol. 51, no. 6, pp. 4435-4445, Nov.-Dec. 2015 doi: 10.1109/TIA.2015.2451094
43. Hoffman, M. A., Lawler, B. J., Guralp, O. A., Najt, P. M., Filipi, Z. S., "The impact of a Magnesium Zirconate thermal barrier coating on homogeneous charge compression ignition operational variability and the formation of combustion chamber deposits", *International Journal of Engine Research*, p. 968-981, Vol 16, Issue 8, doi:10.1177/1468087414561274. 2015
44. Xu, S., Anderson, D., Singh, A., Hoffman, M., Prucka, R., Filipi, Z., "Development of a Phenomenological Dual-Fuel Natural Gas Diesel Engine Simulation and Its Use for Analysis of Transient Operation", *SAE Int. J. Engines*, Oct. 2014 7: pp. 1665-1673; doi:10.4271/2014-01-2546
45. Zhang, X., Ivanco, A., Tao, X., Wagner, J., Filipi, Z., "Optimization of the Series-HEV Control with Consideration of the Impact of Battery Cooling Auxiliary Losses", *SAE Int. J. Alternative Powertrain*, 3(2): pp. 234-243. doi:10.4271/2014-01-1904, 2014
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  103. Filipi, Z., "The Effect of Using 4 Valves per Cylinder on Turbocharged SI Engine Performance - Simulation Study", Proc. of the 7th International Conference CONAT '93, Brasov, 1993.
  104. Petrovic, S., Cveticanin, Z., Filipi, Z., "Turbocharging of the 1.4 l Carburettor Engine", (in Serbo-Croatian), Proc. of the 6th International Symposium "Motor Vehicles and Engines '90", Kragujevac, 1990.
  105. Petrovic, S., Filipi, Z., Cveticanin, Z., Janicijevic, D., Popovic, M., Stanojevic, M., "Experimental and Theoretical Investigation of 1.4 L Spark Ignition Engine Turbocharging", Proc. of the 7th International Symposium MOTOR-SIMPO '90, Visoke Tatry, 1990.



106. Filipi, Z., Petrovic, S., Popovic, M., "Development and Experimental Investigation of a 1.1 L Turbocharged Intercooled Carburettor Engine", paper presented at the "1989 SAE International Congress & Exposition", SAE Special Publication volume SP-780, SAE paper 890458, 1989
107. Stanojevic, M., Filipi, Z., Petrovic, S., "Development of Pistons for Turbocharged Engine DMB 128.A" (in Serbo-Croatian), Proc. "Science and Motor Vehicles'89" International Conference, Belgrade, 1989
108. Filipi, Z., "Grapho-analytical Method for Matching a Turbocharger to SI Engine with Intercooler" (in Serbo-Croatian), Proc. International Conference "Science and Motor Vehicles '89", Belgrade, 1989
109. Filipi, Z., Petrovic, S., Popovic, M., "Experimental Optimization of the SI Engine - Turbocharger System" (in Serbo-Croatian), Proc. 5th International Symposium "Motor Vehicles and Engines '88", Kragujevac, 1988.
110. Filipi, Z., Petrovic, S., Popovic, M., "Experimental Investigation of a Turbocharged 1,1 l Gasoline Engine with Intercooler", Proc. 6th International Symposium MOTOR-SYMPO '88, Visoke Tatro, 1988
111. Filipi, Z., Petrovic, S., Popovic, M., "Effects of turbocharging the DMB 1.1 l SI Engine" (in Serbo-Croatian), Proc. "Science and Motor Vehicles '87" International Conference, JUMV paper 871217, Belgrade, 1987

### Chapters in Books

1. Filipi, Z., Chapter 24 "Hydraulic and pneumatic hybrid powertrains for improved fuel economy in vehicles", Alternative Fuels and Advanced Vehicle Technologies for Improved Environmental Performance, 2<sup>nd</sup> Edition, Woodhead Publishing Limited, Cambridge, UK, 2022
2. Xu, B., Yebi, A., Filipi, Z., "Modeling for Organic Rankine Cycle Waste Heat Recovery System Development", Chapter in Organic Rankine Cycle Technology for Heat Recovery, edited by Wang E., Published by IntechOpen, November 2018, DOI: 10.5772/intechopen.74127
3. Filipi, Z., Chapter 16 "Hydraulic and pneumatic hybrid powertrains for improved fuel economy in vehicles", Alternative Fuels and Advanced Vehicle Technologies, Woodhead Publishing Limited, Cambridge, UK, 2015
4. Filipi, Z., (2014) "Engine Thermal Management" in D. Crolla, D.E. Foster, T. Kobayashi and N. Vaughan (Eds.) Encyclopedia of Automotive Engineering, John Wiley & Sons Ltd: Chichester. DOI:10.1002/9781118354179.auto128. Published 23rd October 2014.
5. Filipi, Z., Chapter 8.3 Combustion in Compression-Ignition Engines, "Combustion Phenomena: Selected Mechanisms of Flame Formation, Propagation and Extinction", edited by Jozef Jarosinski and Bernard Veyssiere, Taylor & Francis – CRC Press, ISBN: 978-0-8493-8408-0, London 2009
6. Filipi, Z., articles on Diesel Engine and Ignition in the World Book Encyclopedia, ISBN: 0-7166-0106-0, World Book Inc., Chicago, IL, 2006
7. Filipi, Z., "Modeling Geometrical Interaction of the Spherical Flame Front and Combustion Chamber Walls" (in Serbo-Croatian), Chapter 4, Modeling of combustion in SI engines, School of Mechanical Engineering Press, Belgrade, 1994.
8. Filipi, Z., "Modeling the Turbulent Flame Entrainment Process in SI-engine" (in Serbo-Croatian), Chapter 5, Modeling of combustion in SI engines, School of Mechanical Engineering Press, Belgrade, 1994.

## INVENTIONS AND PATENTS

- “Hybrid Powertrain System Using Free Piston Linear Alternator Engines”, Patent No. US 2011/0011660 A1, Jan. 2011, filed July 2009, by a team of UM and GM researchers: Najt, P., Kuo, T.-W., Rask, R. (GM), Babajimopoulos, A., Filipi, Z., Lavoie, G., Assanis, D. (UM)
- “Method and Apparatus to Determine Magnitude of Combustion Chamber Deposits”, Patent No. US 7,367,319 (B2) issued May 6, 2008 to a team of UM and GM researchers: Kuo, T.-W., Najt, P., Eng, J., Rask, R. (GM), Guralp, O., Filipi, Z., Assanis, D., Hoffman, M. (UM)
- “Method for Mid Load Operation of Gasoline Direct-Injection Controlled Auto-Ignition Combustion Engines”, Patent No. US7128062(B2) issued Oct. 31<sup>st</sup>, 2006 to a joint UM – GM team: J. Chang, Z. Filipi, D. Assanis, O. Guralp, T.-W. Kuo, J. Eng, P. Najt
- “Artificial Neural Networks for Estimating the Air Flow Rate through a VVT Engine”, Invention Development Record P706964 disclosed 04/21/2004. Filed by a joint team of UM and DCX researchers: Bin Wu, Zoran Filipi, Dennis Assanis, Denise Kramer, Gregory Ohl, Michael Prucka, Eugene DiValentin
- “Pre-Turbocharging Catalyzed Porous Metal Foam Filter for Diesel Particulates Treatment”, Invention Disclosure No. 2924 to UM Tech Transfer Office, July 2004, by Albert J. Shih, Zoran Filipi, and Dennis Assanis

## TEACHING AND STUDENT ADVISING

### Ph.D. Committee Chair

- Sean Moser, **Chair**, “Coupled Thermal Mechanical Analysis Methodology for Thermal Performance Evaluation and Failure Mode Identification of Thermal Barrier Coatings for Heavy-Duty Engines”, December 2021, Clemson University
- Dhruvang Rathod, **Chair**, “Evaporator Modeling and an Optimal Control Strategy Development of an Organic Rankine Cycle Waste Heat Recovery System for a Heavy-Duty Diesel Engine”, May 2019, Clemson University
- Thomas Powell, **Chair**, “Impacts of Thermal Barrier Coating Morphology and Catalytic Properties on Low Temperature Combustion Engine In-Cylinder Processes”, December 2018, Clemson University
- Ryan O’Donnell, **Chair**, “Experimental and Analytical Techniques for Evaluating the Impact of Thermal Barrier Coatings on Low Temperature Combustion”, July 2018, Clemson University
- Bin Xu, **Co-Chair**, “Plant Modeling, Model Reduction and Power Optimization for an Organic Rankine Cycle Waste Heat Recovery System in Heavy-Duty Diesel Engine Applications”, completed December 2017, Clemson University
- Zifan Liu, **Chair**, “Battery Aging Studies Based on Real-World Driving”, completed April 2017, Clemson University
- Darui Zhang, **Chair**, “Vehicle Parameter Estimation and Driver Behavior Classification for Adaptive Shift Strategy of Heavy-Duty Vehicles”, completed June 2017, Clemson University
- Xueye Zhang, **Chair**, “Supervisory Control Optimization for a Series Hybrid Electric Vehicle with Consideration of Battery Thermal Management and Aging”, completed August 2016, Clemson University
- Dee Kivett, **Chair**, “An Analytic Hierarchy Based (AHP) Multi-Factor Evaluation Framework for Driver Awareness in Heavy Vehicles”, completed June 2016, Clemson University

- Shuonan Xu, **Chair**, “Physics-Based Models for Engine System Studies: Quasi-D Dual-Fuel Combustion and Real-Time Intake Charge Flow Estimation”, completed May 2016, Clemson University
- Shu Wang, **Co-Chair**, “Model Based Combustion Phasing Control for High Degree of Freedom Spark-Ignition Engines”, completed in March 2015, Clemson University
- Youngki Kim, “Power Capability Estimation Accounting for Thermal and Electrical Constraints of Lithium-Ion Batteries”, **Co-Chair**, completed in December 2013 (UM)
- Ben Lawler “A Methodology for Assessing Thermal Stratification in an HCCI Engine and Understanding the Impact of Engine Design and Operating Conditions”, **Chair**, completed in September 2013 (UM)
- Kevin Zaseck, “Modeling and Control of Hydraulic Linear and Free-Piston Engines”, **Co-Chair**, completed in September 2013 (UM)
- Joshua Lacey, “The Effects of Advanced Fuels and Additives on Homogeneous Charge Compression Ignition Combustion and Deposit Formation”, **Chair**, completed in December 2012 (UM)
- Rakesh Patil, “Combined Design and Control Optimization: Application to PHEV Design and Control for Multiple Objectives”, **Co-Chair**, completed in May in 2011 (UM)
- Mark Hoffman, “Characterizing the Effects of Thermal Barrier Coating Properties on HCCI Combustion and Deposit Formation”, committee **Co-Chair**, completed in September 2012 (UM)
- Rajit Johri, “Optimal Energy Management for Series Hydraulic Hybrid Vehicle considering Transient Behavior with Powertrain-in-Loop Validation”, committee **Chair**, completed in August 2011
- Fernando Tavares, “Thermally Boosted Concept for Improved Energy Storage Capacity of a Hydro-Pneumatic Accumulator”, committee **Chair**, completed in April 2011
- Tae-Kyung Lee, “Optimal Calibration and Transient Actuator Scheduling for a High Degree of Freedom Engine”, committee **Chair**, completed in March 2009
- Young Jae Kim, “Integrative Hydraulic Hybrid System Design Methodology Utilizing Modeling and Engine-in-the Loop Testing” Ph.D. committee **Chair**, completed in January 2008
- Jonathan Hagena, “Transient Diesel Engine Emission Characterization and Its Application Towards Development of Low Emissions Conventional and Hybrid Vehicle Strategies”, Ph.D. committee **Co-chair**, completed in January 2008
- Robert Prucka, “An Experimental Characterization of Residual Gas Fraction and a Model for Turbulence Intensity Estimation in a High Degree of Freedom Spark-Ignition Engine”, Ph.D. committee **Co-chair**, completed in January 2008
- Orgun Guralp, “The Effect of Combustion Chamber Deposits on Heat transfer and Combustion in an HCCI engine”, Ph.D. committee **Co-chair**, completed in March 2008
- Bin Wu, “Simulation-Based Management of an Engine System with Multiple Degrees of Freedom”, Ph.D. committee **Co-chair**, 2005
- Junseok Chang, “Thermal Characterization of Direct Injected Gasoline HCCI Engine Through Heat Flux Measurements on the Combustion Chamber Wall”, Ph.D. committee **Co-chair**, 2004
- Kukwon Cho, “Characterization of Combustion and Heat Transfer in a Direct Injection Spark Ignition Engine through the Measurements of Instantaneous Combustion Chamber Surface Temperature”, Ph.D. committee **Co-chair**, 2003

## Ph.D. Committee Membership

- John Gandolfo, “Low Carbon, High Cooling Potential Alcohol Fuels in a High Compression Ratio Spark Ignition, Engine”, Committee member, September 2024, Clemson University
- Joop Somhorst, Chalmers University, Sweden, “Thermal insulation of the combustion chamber in a light duty diesel engine”, Invited **PhD Defense Opponent**, February 2024
- Bashar Alzuwayer, “CVT Modeling and Simulation, an Optimization Framework for Design and Performance,” committee member, December 2016, Clemson University
- Chunjian Wang, “A Laminated Ring on Elastic Foundation Model with Application to Analysis of Tire-Road Contact,” committee member, December 2015, Clemson University
- Qilun Zhu, “A Study of Model Predictive Control for Spark Ignition Engine Management and Testing,” committee member, August 2015, Clemson University
- Fabian Koepple, University of Stuttgart, “Investigation of the potential of numerical simulation to predict the particulate emissions in SI-engines with gasoline direct injection”, Invited **PhD Defense Reviewer**, January 2015
- Sasa Trajkovic, Lund University, Sweden, “The Pneumatic Hybrid Vehicle: A New Concept For Fuel Consumption Reduction”, Invited **PhD Defense Opponent**, January 2011
- Donghoon Lee, “Modeling and Control of a heated air intake HCCI Engine”, committee member, completed 2011
- Simo Mäkiharju, “Effects of Upstream Flow Conditions and Pressure Perturbations on a Ventilated Cavity”, committee member, in progress
- Kyung Ho Ahn, “Estimation of Ethanol Content and Control of Air-to-Fuel Ratio in Flex Fuel Vehicles”, committee member, completed 2010
- Dongsuk Kum, “Modeling and Optimal Control of HEVs and Plug-in HEVs for Performance Objectives with Dynamic Costate”, committee member, completed 2010
- Michael Smith, “Transient Kinetic Modeling of Ammonia SCR System in Lean and Rich Engine Exhaust”, committee member, completed 2010
- Byungchan Lee, “Two-Stage Turbocharging: Matching and Boost Control Options”, Ph. D. committee member, completed in 2009
- Burit Kittirungsi, “A Scaling Methodology for Dynamic Models”, Ph.D. committee member, completed in 2008
- Yanbin Mo, “Development of HCCI Combustion Correlations for Simulation Studies of HCCI Engine Transient Operation”, Ph.D. committee member, completed in 2008
- Bradley Ziegler, “Instantaneous, Time-resolved Absorption Spectroscopy for Quantitative Interrogation of H<sub>2</sub>O and Temperature in Internal Combustion Engine Systems”, Ph.D. committee member, completed in 2008
- Chen-Chun Kao, “The Development of Smart Electrical Discharge Machining (EDM)”, Ph.D. committee member, 2007
- Manbae Han, “Species Resolved Hydrocarbon Emission Profiles From Advanced Diesel Combustion and Characterization of Heat-up Diesel Oxidation Catalyst”, committee member, 2007
- Rui Zhang, “Simultaneous multi-component fuel imaging strategies for an optical direct-injection spark-ignition engine”, Ph.D. committee member, 2006

- Kyoungjoon Chang, "Using 1-D Cycle Simulation and Transient Thermal Networks to Develop Strategies for Load and Speed Transitions in the HCCI Engine with Rebreathing", Ph.D. committee member, 2007
- Timothy Jacobs, "Simultaneous Reduction of Nitric Oxide and Particulate Matter Emissions From a Light Duty Diesel Engine Using Combustion Development and Diesel Oxidation Catalyst", Ph.D. committee member, 2005
- Pin Zeng, "Unsteady Convective Heat Transfer Modeling and Application to Internal Combustion Engines", Ph.D. committee member, 2004
- Wooheoum Cho, "A Study on Pressure Reactive Piston for Spark Ignition Engines", Ph.D. committee member, 2004
- Guntram Lechner, "A Concept to Establish Premixed Diesel Combustion", Ph.D. committee member, 2003
- Stani Bohac, "Reduction of Spark-Ignition Engine Hydrocarbon Emissions Through Optimization of Exhaust Valve Timing", Ph.D. committee member, 2002
- Corey Weaver, "Quantitative, Laser-Based Fuel Distribution and Combustion Measurements in a Port and Direct Fuel Injected Spark-Ignition Engine", Ph.D. committee member, 2001
- George Delagrammatikas, "A Design Optimization Methodology for Advanced and Hybrid, Diesel-Based, Automotive Powertrains", Ph.D. committee member, 2001

### **M.S. Thesis Committees**

- Sidhart Nakra, 2012
- Ben Lawler, 2011
- Kevin Zaseck, 2011
- Michael Woon, 2011
- Sakthish Ranganathan Sathasivam, 2011
- Joshua Lacey, 2011
- Ryan Bosn, M.Eng. Capstone Project Advisor, 2011
- Juan A. Garduno, M.Eng. Capstone Project Advisor, 2011
- Mark Heikkila, M.Eng. Capstone Project Advisor, 2011
- Brian Adornato, 2010
- Andrew Wong, M.Eng., 2009
- Javier Somoza, 2009
- Mark Hoffman, 2009
- Jackey Fong, M.Eng. Capstone Project Advisor, 2008
- Evan Frings, M.Eng. Capstone Project Advisor, 2008
- Bachar Kaafarani, M.Eng. Capstone Project Advisor, 2008
- Maxime Oullet, M.Eng. Capstone Project Advisor, 2008
- Shriram Vijayaraghavan, 2007
- Jason Moore, 2007
- Bryan Hoy, M.Eng. Capstone Project advisor, 2006
- Jason Devries, M.Eng. Capstone Project advisor, 2006
- Gerald Fernandes, 2005

- Orgun Guralp, M.S. 2004
- Jae Yoon Jung, M.Eng. Capstone Project advisor, 2004
- Roberto Nigro, M.Eng. Capstone Project advisor, 2004
- Carrie Morton, M.Eng. Capstone Project advisor, 2004
- Jonathan Hagen, 2004
- Wesley Williamson, 2004
- Se Young Yi, M.Eng. Capstone Project advisor, 2004
- Chad Jagmin, 2003
- Berrin Daran, 2002
- Tim Jacobs, 2002
- Brian Baldwin, 2001
- Gautam Bakshi, 2001
- Cheol Su Lee, 2001
- George Seaward, 2000

#### **Fulbright Visiting Scholar**

- Prof. Danilo Nikolic, University of Montenegro, Podgorica; Fall 2007 – Summer 2008

#### **Studienarbeit – Special Undergraduate Research Project at a German University**

- Christoph Pregizer, University of Stuttgart, Germany, 10/2010 -
- Michael Mosburger, University of Karlsruhe, Germany, 5/2006 - 11/2006.
- Patrick Englmaier, University of Applied Sciences in Regensburg, Germany, 10/2004 – 3/2005

#### **New Course Introduced at Clemson University**

AuE 8190 Advanced IC Engine Concepts; This course covers novel modes of combustion in IC engines, in-depth study of the underlying phenomena and advanced engine systems required to translate the novel combustion concept into a viable technology. The course prepares students for contributing to future advanced efforts in the research and development setting, at either the university or the industry R&D facility. The advanced IC engine concepts include the direct-injection stratified SI engines, Homogenous Charge Compression Ignition engines, mixing-controlled and premixed diesels, two-stroke and split-cycle engines. Critical phenomena such as the thermodynamics of advanced cycles, fluid flow, auto-ignition, combustion chemistry, and heat transfer establish the foundation. State-of-the-art modeling and simulation tools are introduced to establish a link between the fundamental processes and design, and support integration and analysis of engine systems, such as turbocharging, air- and EGR-management, variable valve actuation and exhaust aftertreatment. Taught 2012-2018, continued 2019-2021

AuE 881 Automotive Systems Overview, co-taught, developed a module on *Powertrain: Performance, Efficiency, Impact on the Environment, Integration*. Includes Energy for Transportation, Basics of Vehicle Performance and Fuel Economy, Energy Conversion, Driveline/Transmission, Energy Storage, Hybrid Vehicle Architectures, Fundamentals of HEV System Integration, Design and Control, 2016-2019

#### **New Courses Introduced at U of M**

ME599-05 Modeling, Analysis and Control of Hybrid Electric Vehicles, Winter 2011, 24 students on campus, 55 distance learning.

ME599-05 Modeling, Analysis and Control of Hybrid Electric Vehicles, Winter 2010, 36 students, evaluation score 4.29/4.82.

Co-instructor sharing duties equally with Prof. H. Peng

The course covers modeling, analysis and control of vehicles with electrified propulsion systems, including electric vehicles, hybrid vehicles, plug-in and fuel cell vehicles. It introduces the concepts and terminology, the state-of-the-art development, energy conversion and storage options, modeling, analysis, system integration and basic principles of vehicle controls. Part of the new DOE Transportation Electrification Education Partnership for Green Jobs and Sustainable Mobility

AUTO599 Analysis and Control of Alternative Powertrains, Winter 2008, Winter 2009 (19 on-campus students and 22 distance learning), evaluation scores 4.83/4.70

Co-instructor sharing duties equally with Prof. H. Peng

The course provides an overview of Alternative Powertrains, introduces fundamentals of energy conversion for propulsion, the concepts and terminology, system integration and basic principles of vehicle control systems. The energy conversion includes advanced combustion concepts, such as the Homogenous Charge Compression Ignition engine and the Low Temperature Combustion in a Premixed Diesel, alternative fuels, electric motors and batteries, hydraulic pump/motors and hydro-pneumatic accumulators. Vehicle system integration is analyzed in the context of all major hybrid architectures, e.g. the parallel, the series and the power-split, followed by application of advanced algorithms for optimization of hybrid power management. The course includes a student-team project.

### **Short Courses and Workshops**

- Design and Control of Hybrid Vehicles, University of Michigan Center for Professional Development, Co-chair with Prof. Huei Peng, first offered in February 2007, 26 participants Second offering November 12- 14, 18 participants; third offering June 8-10, 2009.
- Modeling and Computer Simulation of Internal Combustion Engines, University of Michigan Center for Professional Development, 1996, 1997, 1998, 1999, 2000, *Instructor*
- Turbocharging the IC Engine, Michigan State University, Lansing, May 4 -5, 1998, 20 participants, Instructor

## **SERVICE**

### **Administrative Duties at Clemson University**

- Director of the School of Mechanical and Automotive Engineering 2022-2024
- Founding Director, Virtual Prototyping of Autonomy-enabled Ground Systems, an interdisciplinary research center initiated with \$18M of initial funding from DoD; Cooperative Agreement executed in 2021 for a 5-year performance periods with a \$100M ceiling. Funds allocated up to September 2024 amount to a total of \$89M. More than 80 faculty are involved and as many PhD students at Clemson University 2020-2024
- Department Chair, Automotive Engineering 2015-2021
- Provost's ClemsonFORWARD Steering Committee 2019-2024
- Power and Energy Program Advisory Committee member (CURI) 2017-2021
- Member, Advisory Board for the ADRGS 2014-2016
- Member, Dean's Advisory Council 2013-2015
- Member, Dean's Strategic Planning Committee 2013-2015
- Chair, Tenure, Promotion and reappointment Committee, AuE Department 2012-2015

- Chair, Search Committee for the BMW Chair position, AuE Department 2012-2015
- Chair, Search Committee for two faculty positions in AuE Department, 2012-2013
- Member, Graduate Research Committee, AuE Department 2012-2013
- Member, Clemson University Research Foundation Strategic Planning Committee, 2012

### **Administrative Duties at UM prior to 2012**

- Director of the Center for Engineering Excellence through Hybrid Technology 2009 - 2011
- Deputy Director of the Automotive Research Center, 2009 - 2011
- Assistant Director of the Automotive Research Center, 2002 - 2009

### **Major Committee Assignments in the UM ME Department, College and/or University**

- ME Safety Committee 2009 - 2011
- Energy Systems Engineering Program Council Member, 2011- 2012
- ME Department Advisory Committee, 2002 – 2004, and 2004-2006
- ME Department Facilities Renovation Steering Committee, 2005 - 2006
- ME Department Space Strategic Planning Committee, 2003 - 2004
- College of Engineering Strategic Planning Advisory Committee, 2003

### **Service to Government or Professional Organizations**

- Executive Committee member, SAE Powertrains, Fuels & Lubricants Activity, 2010 – 2017
- Associate of the ASME Internal Combustion Engine Division, Fuels and Combustion Committee
- Invited participant, DoE-Army strategy meeting on Advanced Vehicle Power Technologies, 2011
- Chair of the SAE Advanced Power Sources Committee, 2008 – 2010
- State of Michigan Renewable Fuels Commission, 2006 - 2011
- Member of the SAE Combustion and Fuels Committee, 2005 –
- Member of the SAE Advanced Power Sources Committee, 2007- 2015
- Member of the SAE Hybrid Vehicle Standardization Committee, 2004

### **Advisory Boards**

- VKA – Institute for Combustion Engines, Aachen, Germany: on the International Advisory Board of the CMP Center for Mobile Propulsion, which directs the research activities of VKA 2021-
- Scientific Advisory Board of Tula Technology Inc., innovation company in San Jose, CA, 2012-

### **Editorial, Reviewing and Refereeing Activities**

- Editor-In-Chief, SAE International Journal of Alternative Powertrain, 2012-2020
- Associate Editor, ASME International Journal of Engineering for Gas Turbines and Power (JEGTP), 2010-2016



- Editorial Board Member, Proceedings of the Institution of Mechanical Engineers Part D: Journal of Automobile Engineering, 2010 -
- Editorial Board member, "Journal of Combustion", Hindawi Publishing Corp., 2009 – 2016
- Editorial Board member, "International Journal of Powertrain", Inderscience Publishers, 2010-
- Guest Editor, International Journal of Powertrains (Inderscience), Special issue on: "Energy and Propulsion Systems for Electrified Powertrains", 2012
- Guest Editor: Special Issue on “Vehicle Fuel Economy: High Efficiency Engines and Hybrid Powertrains”, Proceedings of the Institution of Mechanical Engineers Part D: Journal of Automobile Engineering, January 2013; 227 (1), DOI: 10.1177/0954407012470600; one of the top five most downloaded publications in 2013
- Guest Editor: Special Issue on “Modelling and Simulation of Ground Vehicles Systems”, International Journal of Vehicle Design, Vol. 61, Nos. 1/2/3/4, 2013. Inderscience
- Referee for a “PhD Thesis Award Barsanti e Matteucci”, awarded by the Italian Community of the Professors of Thermal and Hydraulic Machinery & Energy Systems, 2011
- NSF FY 2010 Unsolicited Panel on Combustion of Biofuels
- Reviewer: SAE Papers and Journals, International Journal of Engine Research, ASME Journal of Engineering for Gas Turbines and Power.

### **Organizing and Chairing Conference Sessions**

- Local Chair, SAE Energy and Propulsion Conference, 2023, Greenville, SC
- Conference Co-Chair: SAE 14<sup>th</sup> International Conference on Engines and Vehicles, 2019, Capri, Italy
- Organizer, SAE High-Efficiency IC Engine Symposiums 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2018
- Local Chair, 2016 ASME ICEF - Internal Combustion Engine Fall Technical Conference, Greenville, SC
- Organizer, 2013 SAE International Natural Gas symposium, March 2013, Greenville, SC
- Co-chair of the “EV system architecture concepts” track, IEEE conference on Electrical Vehicles-IEVC 2012, March 2012, Greenville, SC
- Organizer, SAE High Efficiency HD Vehicles Symposium 2011, Detroit, MI
- Chair of the Alternative Power Systems area at the 10th International Conference on Engines and Vehicles ICE2011, Capri, Italy, September 11-15, 2011. Led the team of sub-session organizers for advanced engine concepts, hybrid propulsion and hydrogen for transportation.
- Co-Chair of the 1st annual US Conference on the Design of Experiments in Engine Development, June 24<sup>th</sup>, 2010 in Plymouth, MI
- Chair of the Alternative and Advanced Power Systems area at the International Conference on Engines and Vehicles ICE2009, Capri, Italy, September 13-18, 2009. Led the team of five sub-session organizers responsible for 35 papers
- Organizer, “Engine Controls and Optimization”, Society of Automotive Engineers International Powertrain, Fuels & Lubricants Meeting, Florence, Italy, June 2009
- Member of the Organizing Committee, 2009 International Symposium on Cavitation (Chair S. Ceccio)

- Organizer, “Homogenous Charge Compression Ignition Engines”, Society of Automotive Engineers International Powertrains, Fuels & Lubricants Conference, Shanghai, China, June 2008
- Organizer, “Homogenous Charge Compression Ignition Engines”, Society of Automotive Engineers JSAE/SAE International Fuels & Lubricants Meeting, Kyoto, Japan, July 2007
- Co-organizer, Annual ARC Technical Conference on “Critical Technologies for Modeling and Simulation of Ground Vehicles”, Ann Arbor, 2007
- Organizer and Co-Chair, “Homogenous Charge Compression Ignition (HCCI)”, Society of Automotive Engineers Powertrain and Fluid Systems Conference, Toronto, Canada, 2006
- Co-organizer, Annual ARC Technical Conference on “Critical Technologies for Modeling and Simulation of Ground Vehicles”, Ann Arbor, 2006
- Organizer and Co-Chair, “Homogenous Charge Compression Ignition (HCCI)”, Society of Automotive Engineers Powertrain and Fluid Systems Conference, San Antonio, Texas, 2005
- Organizer, “Homogenous Charge Compression Ignition (HCCI)”, Society of Automotive Engineers Spring Fuels and Lubricants Meeting, Rio de Janeiro, Brazil, 2005
- Co-organizer, Annual ARC Technical Conference on “Critical Technologies for Modeling and Simulation of Ground Vehicles”, Ann Arbor, 2005
- Organizer and Chair, “Spark-Ignition Engine Modeling”, Society of Automotive Engineers Spring Fuels and Lubricants Meeting, Toulouse, France, 2004
- Co-organizer, Annual ARC Technical Conference on “Critical Technologies for Modeling and Simulation of Ground Vehicles”, Ann Arbor, 2004
- Organizer, “Spark-Ignition Engine Modeling”, SAE International Spring Fuels and Lubricants Meeting, Yokohama, Japan, 2003
- Co-organizer, Annual ARC Technical Conference on “Critical Technologies for Modeling and Simulation of Ground Vehicles”, Ann Arbor, 2003
- Organizer and Chair, “Spark-Ignition Engine Modeling”, SAE International Spring Fuels and Lubricants Meeting, Reno, Nevada, 2002
- Organizer and Chair, “Diesel Engines: Experiments”, SAE International Spring Fuels and Lubricants Meeting, Orlando, Florida, 2001

#### Membership

- American Society of Mechanical Engineers
- Society of Automotive Engineers