

BENJAMIN J. LAWLER

PERSONAL DATA

Associate Professor
School of Mechanical and Automotive Engineering
Clemson University
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EDUCATION

- Ph.D., University of Michigan, 2013, Mechanical Engineering
- M.S., University of Michigan, 2011, Mechanical Engineering
- B.S., University of Massachusetts Amherst, 2008, Mechanical Engineering

PROFESSIONAL EXPERIENCE

- Clemson University, 2019- , Associate Professor of Automotive Engineering
- Stony Brook University, 2015-2019, Assistant Professor of Mechanical Engineering
- Oak Ridge National Laboratory, 2013-2014, Postdoctoral Researcher
- University of Michigan, 2008-2013, NSF Graduate Research Fellow/Graduate Student

CONSULTING EXPERIENCE

- BASF, Tarrytown, New York (2016-2017), developed engine data processing techniques for fuel additives research group.

MEMBERSHIPS

- Member, American Society of Mechanical Engineers, ASME (2012-)
- Member, Society of Automotive Engineers, SAE (2011-)

HONORS AND AWARDS

- Dean's Professor Award, Clemson University College of Engineering, Computing, and Applied Sciences (2022-)
- Ralph R. Teetor Award, Society of Automotive Engineers (2022)
- Forest R. McFarland Award, Society of Automotive Engineers (2020)
- Students' Choice Award for Excellence in Teaching, Department of Mechanical Engineering, Stony Brook University (2018)
- Students' Choice Award for Excellence in Teaching, Department of Mechanical Engineering, Stony Brook University (2017)
- Dean's Award / Millionaires Club, Stony Brook University College of Engineering and Applied Sciences (2016)
- Outstanding Oral Presentation Award, Society of Automotive Engineers (2014)
- Best Presentation Award, ASME Internal Combustion Engine Division Spring Technical Conference (2012)
- Graduate Research Fellowship Program (GRFP), National Science Foundation (NSF) (2010)

PUBLICATIONS

H-Index: 20

Google Scholar H-Index: 24

Students are identified in the list of co-authors on any publication/presentation with an asterisk.

Refereed Journal Publications

Published

1. Gainey, B.*, Yan, Z.*, Gandolfo, J.*, Lawler, B., "Methanol and wet ethanol as interchangeable fuels for internal combustion engines: LCA, TEA, and experimental comparison," *Fuel*, Volume 333, Part 1, 2023, 126257, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2022.126257>.
2. Gandolfo, J.*, Gainey, B.*, Yan, Z.*, Jiang, C., Kumar, R., Jordan, E., Filipi, Z., Lawler, B., "Low thermal inertia thermal barrier coatings for spark ignition engines: An experimental study." *International Journal of Engine Research*. 2023;0(0). doi:10.1177/14680874221149458
3. 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." *International Journal of Engine Research*. 2022;0(0). doi:10.1177/14680874221135007
4. 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." *International Journal of Engine Research*. August 2022. doi:10.1177/14680874221114534
5. Gainey, B.*, Gandolfo, J.*, Yan, Z.*, Lawler, B., "Mixing controlled compression ignition with methanol: An experimental study of injection and EGR strategy." *International Journal of Engine Research*. June 2022. doi:10.1177/14680874221105161
6. Zhu, Q., Kumar, A., Sundar, A., Egan, D., Mirzaei, H., Chang, D., Schmid, M., Prucka, R., Lawler, B., Paredis, C., "Development of a Series Hybrid Electrified Powertrain for a High Speed Tracked Vehicle Based on Driving Cycle Simulation," *SAE Int. J. Advances & Curr. Prac. in Mobility* 4(4):1403-1412, 2022, doi:10.4271/2022-01-0367 (Conference paper converted to a journal paper)
7. Gainey, B.*, Yan, Z.*, Gandolfo, J.*, Lawler, B., "High Load Compression Ignition of Wet Ethanol Using a Triple Injection Strategy." *Energies* 2022, 15, 3507. <https://doi.org/10.3390/en15103507>
8. Zhou, Y.*, Lawler, B., "Validation of Kinetic Mechanisms against Various Ignition Delay Data and the Development of Ignition Delay Correlations for Ethanol, Natural Gas, and Primary Reference Fuel Blends under Homogeneous Charge Compression Ignition Conditions," *SAE International Journal of Engines* 15.03-15-03-0017 (2021).
9. Hariharan, D.*, Rahimi Boldaji, M.*, Yan, Z.*, Gainey, B.*, and Lawler, B., "Exploring the Effects of Piston Bowl Geometry and Injector Included Angle on Dual-Fuel and Single-Fuel RCCI." *ASME. J. Eng. Gas Turbines Power*. November 2021; 143(11): 111013. <https://doi.org/10.1115/1.4052203> (Conference paper converted to a journal paper)
10. Yan, Z.*, Gainey, B.*, Lawler, B., "A parametric modeling study of thermal barrier coatings in low-temperature combustion engines," *Applied Thermal Engineering*, Volume 200, 2022, 117687, ISSN 1359-4311, <https://doi.org/10.1016/j.applthermaleng.2021.117687>.
11. Gainey, B.*, Hoth, A., Waqas, M., Lawler, B., Kolodziej, C., "High Temperature HCCI Critical Compression Ratio of the C1-C4 Alcohol Fuels," *SAE Int. J. Adv. & Curr. Prac. in Mobility* 3(4):1495-1507, 2021, <https://doi.org/10.4271/2021-01-0511>. (Conference paper converted to a journal paper)
12. Robertson, D., O'Donnell, P.*, Lawler, B., and Prucka, R., "A Quasi-Dimensional Fuel Distribution Model for a Radially Stratified Engine." *ASME. J. Eng. Gas Turbines Power*. August 2021; 143(8): 081015. <https://doi.org/10.1115/1.4049991>
13. Gainey, B.*, O'Donnell, P.*, Yan, Z.*, Moser, S., Lawler, B., "LTC performance of C1-C4 water-alcohol blends with the same cooling potential," *Fuel*, Volume 293, 2021, 120480, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2021.120480>.
14. Yan, Z.*, Gainey, B.*, Gohn, J.*, Hariharan, D.*, Saputo, J., Schmidt, C., Caliarì, F., Sampath, S., Lawler, B., "A comprehensive experimental investigation of low-temperature combustion with thick thermal barrier coatings," *Energy*, Volume 222, 2021, 119954, ISSN 0360-5442, <https://doi.org/10.1016/j.energy.2021.119954>.

15. Gainey, B.*, Yan, Z.*, Lawler, B., "Autoignition characterization of methanol, ethanol, propanol, and butanol over a wide range of operating conditions in LTC/HCCI," *Fuel*, Volume 287, 2021, 119495, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2020.119495>.
16. Gainey, B.*, Yan, Z.*, Moser, S., Lawler, B., "Lean flammability limit of high-dilution spark ignition with ethanol, propanol, and butanol," *International Journal of Engine Research*, February 2021, doi:10.1177/1468087421993256.
17. Gainey, B.*, Lawler, B., "The role of alcohol biofuels in advanced combustion: An analysis," *Fuel*, Volume 283, 2021, 118915, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2020.118915>.
18. Gainey, B.*, Lawler, B., "A fuel cell free piston gas turbine hybrid architecture for high-efficiency, load-flexible power generation," *Applied Energy*, 2020, 116242, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2020.116242>.
19. Zhou, Y.*, Gainey, B.*, Lawler, B., "An ultrafast multi-zone HCCI model with Autoignition, Global reaction and Interpolation (AGI) for achieving comparable accuracy to detailed chemical kinetics models," *Combustion and Flame*, Volume 221, 2020, Pages 487-501, ISSN 0010-2180, <https://doi.org/10.1016/j.combustflame.2020.08.016>.
20. Gainey, B.*, Hariharan, D.*, Yan, Z.*, Zilg, S.*, Rahimi Boldaji, M.*, Lawler, B., "A split injection of wet ethanol to enable thermally stratified compression ignition." *International Journal of Engine Research*. 2020;21(8):1441-1453. doi:10.1177/1468087418810587
21. Gainey, B.*, Yan, Z.*, Rahimi-Boldaji, M.*, and Lawler, B. "On the Effects of Injection Strategy, EGR, and Intake Boost on TSCI with Wet Ethanol," *ASME. J. Eng. Gas Turbines Power*. August 2020, doi: <https://doi.org/10.1115/1.4048150>. (Conference paper converted to a journal paper)
22. Gainey, B.*, Yan, Z.*, Moser, S., Vorwerk, E., Lawler, B., "Tailoring Thermal Stratification to Enable High Load Low Temperature Combustion with Wet Ethanol on a Gasoline Engine Architecture," *International Journal of Engine Research*, 2020, <https://doi.org/10.1177/1468087420945960>.
23. Hariharan, D.*, Gainey, B.*, Yan, Z.*, Mamalis, S., and Lawler, B., "Experimental Study of the Effect of Start of Injection and Blend Ratio on Single Fuel Reformate RCCI," *ASME. J. Eng. Gas Turbines Power*. August 2020; 142(8): 081010. <https://doi.org/10.1115/1.4047814>. (Conference paper converted to a journal paper).
24. Priyadarshini, P, Sofianopoulos, A., Lawler, B., Lopez-Pintor, D., Dec, J., Mamalis, S., "Understanding Partial Fuel Stratification for Low Temperature Gasoline Combustion using Large Eddy Simulations," *International Journal of Engine Research*, <https://doi.org/10.1177/1468087420921042>.
25. Gohn, J.*, Gainey, B.*, Zainul, S.*, Lawler, B., "Wet ethanol in LTC: How water fraction and DTBP affect combustion and intake temperature at naturally aspirated and boosted conditions," *Fuel*, Volume 267, 2020, 117094, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2020.117094>.
26. Yan, Z.*, Gainey, B.*, Gohn, J.*, Hariharan, D.*, Saputo, J., Schmidt, C., Caliar, F., Sampath, S., Lawler, B., "The Effects of Thick Thermal Barrier Coatings on Low-Temperature Combustion," *SAE Int. J. Adv. & Curr. Prac. in Mobility* 2(4):1786-1799, 2020, <https://doi.org/10.4271/2020-01-0275>. (Conference paper converted to a journal paper)
27. Rahimi Boldaji, M.*, Gainey, B.*, O'Donnell, P.*, Gohn, J.*, Lawler, B., "Investigating the Effect of Spray Included Angle on Thermally Stratified Compression Ignition with Wet Ethanol Using Computational Fluid Dynamics," *Applied Thermal Engineering*, Volume 170, 2020, 114964, ISSN 1359-4311, <https://doi.org/10.1016/j.applthermaleng.2020.114964>.
28. Hariharan, D.*, Rahimi Boldaji, M.*, Yan, Z.*, Mamalis, S., Lawler, B., "Single-fuel reactivity controlled compression ignition through catalytic partial oxidation reformation of diesel fuel," *Fuel*, Volume 264, 2020, 116815, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2019.116815>.
29. Gainey, B.*, Gohn, J.*, Hariharan, D.*, Rahimi-Boldaji, M.*, Lawler, B., "Assessing the impact of injector included angle and piston geometry on thermally stratified compression ignition with wet ethanol," *Applied Energy*, Volume 262, 2020, 114528, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2020.114528>.
30. Yan, Z.*, Gainey, B.*, Hariharan, D.*, Lawler, B. "Improving the controllability of partial fuel stratification at low boost levels by applying a double late injection strategy," *International Journal of Engine Research*, 2020, <https://doi.org/10.1177/1468087419896511>.
31. Ran, Z., Hariharan, D.*, Lawler, B., Mamalis, S., "Exploring the potential of ethanol, CNG, and syngas as fuels for lean spark-ignition combustion - An experimental study," *Energy*, Volume 191, 2020, 116520, ISSN 0360-5442, <https://doi.org/10.1016/j.energy.2019.116520>.

32. Gainey, B.*, Longtin, J., and Lawler, B., "A Guide to Uncertainty Quantification for Experimental Engine Research and Heat Release Analysis," *SAE Int. J. Engines* 12(5):509-523, 2019, <https://doi.org/10.4271/03-12-05-0033>.

<< Prior to Clemson >>

33. Sofianopoulos, A., Rahimi Boldaji, M.*, Lawler, B., Dec, J., Mamalis, S., "Effect of Engine Size, Speed, and Dilution Method on Thermal Stratification of Premixed HCCI Engines – A Large Eddy Simulation Study", *Int. J. of Engine Res.*, 2020, <https://doi.org/10.1177/1468087418820735>.
34. Zhou, Y.*, Sofianopoulos A., Lawler B., Mamalis S., "Advanced Combustion Free-Piston Engines: A comprehensive review", *Int. J. of Engine Res.*, 2020, <https://doi.org/10.1177/1468087418800612>.
35. Sofianopoulos, A., Rahimi Boldaji, M.*, Lawler, B., Mamalis, S., "Investigation of Thermal Stratification in Premixed Homogeneous Charge Compression Ignition Engines: A Large Eddy Simulation Study." *International Journal of Engine Research*, 2019, doi:10.1177/1468087418795525.
36. Hariharan, D.*, Yang, R., Zhou, Y.*, Gainey, B.*, Mamalis, S., Smith, R., Lugo-Pimentel, M., Castaldi, M., Gill, R., Davis, A., Modroukas, D., and Lawler, B., "Catalytic Partial Oxidation Reformulation of Diesel, Gasoline, and Natural Gas for Use in Low Temperature Combustion Engines." *Fuel*, Volume 246, 2019, Pages 295-307, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2019.02.003>.
37. Rahimi Boldaji, M.*, Sofianopoulos, A., Mamalis, S., and Lawler, B., "Computational Fluid Dynamics Investigations of the Effect of Water Injection Timing on Thermal Stratification and Heat Release in TSCI Combustion," *International Journal of Engine Research*, 2018, <https://doi.org/10.1177/1468087418767451>.
38. Zhou, Y.*, Sofianopoulos, A., Lawler, B., and Mamalis, S., "A system-level numerical study of a homogeneous charge compression ignition spring-assisted free piston linear alternator with various piston motion profiles," *Applied Energy*, Volume 239, 2019, Pages 820-835, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2019.01.240>.
39. Rahimi Boldaji, M.*, Gainey, B.*, and Lawler, B., "Thermally Stratified Compression Ignition Enabled by Wet Ethanol with a Split Injection Strategy: A CFD Simulation Study," *Applied Energy*, Volume 235, 2019, Pages 813-826, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2018.11.009>.
40. Zhou, Y.*, Hariharan, D.*, Yang, R., Mamalis, S., and Lawler, B., "A Predictive 0-D HCCI Combustion Model for Natural Gas, Ethanol, Gasoline, and Primary Reference Fuel Blends," *Fuel*, Volume 237, 2019, Pages 658-675, ISSN 0016-2361, <https://doi.org/10.1016/j.fuel.2018.10.041>.
41. Ran, Z., Hariharan, D.*, Lawler, B., Mamalis, S., "Experimental study of lean spark ignition combustion using gasoline, ethanol, natural gas, and syngas," *Fuel*, Volume 235, Pages 530-537, ISSN 0016-2361, 2019, <https://doi.org/10.1016/j.fuel.2018.08.054>.
42. Rahimi Boldaji, M.*, Sofianopoulos, A., Mamalis, S., and Lawler, B., "Computational fluid dynamics simulations of the effect of water injection characteristics on TSCI: a new, load-flexible advanced combustion concept," *ASME. J. Eng. Gas Turbines Power*. 2018; doi:10.1115/1.4040309. (Conference paper converted to a journal paper)
43. Rahimi Boldaji, M.*, Sofianopoulos, A., Mamalis, S., Lawler, B., "A CFD Investigation Comparing the Effects of Fuel Split Fraction on Advanced Low Temperature Combustion with a Primary Reference Fuel versus Ethanol", *Frontiers in Mechanical Engineering*, Volume 4, 2018, ISSN 2297-3079, 10.3389/fmech.2018.00006, <https://www.frontiersin.org/article/10.3389/fmech.2018.00006>
44. Lawler, B., Lacey, J., Güralp, O., Najt, P., and Filipi, Z., "HCCI combustion with an actively controlled glow plug: The effects on heat release, thermal stratification, efficiency, and emissions," *Applied Energy*, Volume 211, 2018, Pages 809-819, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2017.11.089>.
45. Yang, R., Hariharan, D.*, Zilg, S.*, Mamalis, S., Lawler, B., "Efficiency and Emissions Characteristics of an HCCI Engine Fueled by Primary Reference Fuels," *SAE Int. J. Engines* 11(6):993–1006, 2018, doi:10.4271/2018-01-1255. (Conference paper converted to a journal paper)
46. Sofianopoulos, A., Zhou, Y.*, Lawler, B., Mamalis, S., "Gas exchange processes of a small HCCI free piston engine – A computational study," *Applied Thermal Engineering*, Volume 127, 2017, Pages 1582-1597, ISSN 1359-4311, <https://doi.org/10.1016/j.applthermaleng.2017.08.089>.
47. Lawler, B., Splitter, D., Szybist, J., Kaul, B., "Thermally Stratified Compression Ignition: A new advanced low temperature combustion mode with load flexibility," *Applied Energy*, Volume 189, 1 March 2017, Pages 122-132, ISSN 0306-2619, <https://doi.org/10.1016/j.apenergy.2016.11.034>.

48. Lawler, B., Mamalis, S., Joshi, S., Lacey, J., Guralp, O., Najt, P., and 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 February 2017, Pages 392-402, ISSN 1359-4311, <https://doi.org/10.1016/j.applthermaleng.2016.10.056>.
49. Kaul, B., Lawler, B., and Zahdeh, A., "Engine Diagnostics Using Acoustic Emissions Sensors," *SAE Int. J. Engines* 9(2):684-692, 2016, doi:10.4271/2016-01-0639. (Conference paper converted to a journal paper)
50. Yousefi, A., Birouk, M., Lawler, B., Gharehghani, A., "Performance and emissions of a dual-fuel pilot diesel ignition engine operating on various premixed fuels," *Energy Conversion and Management*, Volume 106, December 2015, Pages 322-336, ISSN 0196-8904, <http://dx.doi.org/10.1016/j.enconman.2015.09.056>.
51. Hoffman, M., Lawler, B., Filipi, Z., Guralp, O., Najt, P., "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*, vol. 16, no. 8, Dec. 2015, pp. 968–981, doi:10.1177/1468087414561274.
52. Hoffman, M., Lawler, B., Filipi, Z., Guralp, O., Najt, P., "Development of a Device for the Nondestructive Thermal Diffusivity Determination of Combustion Chamber Deposits and Thin Coatings." *ASME. J. Heat Transfer*. 2014; 136(7):071601-071601-10. doi:10.1115/1.4026908.
53. Lawler, B. and Filipi, Z., "Integration of a Dual-Mode SI-HCCI Engine into Various Vehicle Architectures," *Journal of Engineering for Gas Turbines and Power*, April 2013, Vol. 135, Issue 5, 052802, doi:10.1115/1.4022. (Conference paper converted to a journal paper)
54. Lawler, B., Hoffman, M., Filipi, Z., Guralp, O., and Najt, P., "Development of a Postprocessing Methodology for Studying Thermal Stratification in an HCCI Engine," *Journal of Engineering for Gas Turbines and Power*, October 2012, Vol. 134, Issue 10, 102801, doi:10.1115/1.4007010. (Conference paper converted to a journal paper)
55. Lawler, B., Ortiz-Soto, E., Gupta, R., Peng, H., and Filipi, Z., "Hybrid Electric Vehicle Powertrain and Control Strategy Optimization to Maximize the Synergy with a Gasoline HCCI Engine," *SAE International Journal of Engines* 4(1):1115-1126, 2011, doi:10.4271/2011-01-0888. (Conference paper converted to a journal paper)

Conference Proceedings (Reviewed)

(Note: There were 12 papers in SAE and ASME conferences that were converted to journal papers. Those papers are listed above in the "Refereed Journal Publications" section.)

1. Gainey, B., Bhatt, A., Gandolfo, J., Vedpathak, K., Pearce, C., Redon, F., Lawler, B., "Experimental Comparison of Diesel and Wet Ethanol on an Opposed-Piston Two Stroke (OP2S) Engine," *SAE Technical Paper* 2023-01-0335, 2023, doi:10.4271/2023-01-0335.
2. Gandolfo, J.*, Gainey, B.*, Jiang, C., Jordan, E., Filipi, Z., Lawler, B., "Impact of Thermal Barrier Coatings on Intake and Exhaust Valves in a Spark Ignition Engine," *SAE Technical Paper* 2023-01-0243, 2023, doi:10.4271/2023-01-0243.
3. Gainey, B.*, Gandolfo, J.*, Gao, M.*, and Lawler, B., "Split Injection of High-Ethanol Content Fuels to Reduce Knock in Spark Ignition," *SAE Technical Paper* 2023-01-0326, 2023, doi:10.4271/2023-01-0326.
4. Wright, S., Ravikumar, A.*, Redmond, L., Lawler, B., Castanier, M., Gingrich, E., Tess, M., "Data Reduction Methods to Improve Computation Time for Calibration of Piston Thermal Models," *SAE Technical Paper* 2023-01-0112, 2023, doi:10.4271/2023-01-0112.
5. O'Donnell, P.*, Lawler, B., Sofianopoulos, A., and Lopez Pintor, D., "Effects of Injector Included Angle on Low-Load Low Temperature Gasoline Combustion Using LES," *SAE Technical Paper* 2023-01-0270, 2023, <https://doi.org/10.4271/2023-01-0270>.
6. Gohn, J.*, Gingrich, E., Tess, M., Korivi, V., Yan, Z.*, Gainey, B.*, Filipi, Z., Lawler, B., "Thermodynamic Modeling of Military Relevant Diesel Engines with 1-D Finite Element Piston Temperature Estimation," *SAE Technical Paper* 2023-01-0103, 2023, doi:10.4271/2023-01-0103.
7. Gainey, B.*, Yan, Z.*, Gandolfo, J.*, & Lawler, B., "Comparing the Injection Strategy of Gasoline Compression Ignition vs. Alcohol Compression Ignition: A Partial Review and Experimental Comparison." *Proceedings of the ASME 2022 ICE Forward Conference*. ASME 2022 ICE Forward Conference. Indianapolis, Indiana, USA. October 16–19, 2022. V001T02A007. ASME. <https://doi.org/10.1115/ICEF2022-90624>

8. O'Donnell, P.*, Gainey, B.*, Vorwerk, E., Prucka, P., Lawler, B., Huo, M., Salvi, A., "An Investigation into the Effects of Swirl on the Performance and Emissions of an Opposed-Piston Two-Stroke Engine using Large Eddy Simulations," *SAE Technical Paper 2022-01-1039*, 2022.
9. O'Donnell, P.*, Gandolfo, J.*, Gainey, B.*, Vorwerk, E., Prucka, R., Filipi, Z., Lawler, B., Hessel, R., Kokjohn, S., Huo, M., Salvi, A., "Effects of Port Angle on Scavenging of an Opposed Piston Two-Stroke Engine," *SAE Technical Paper 2022-01-0590*, 2022.
10. Motwani, R.*, Gandolfo, J.*, Gainey, B.*, Levi, A.*, Moser, S., Filipi, Z., Lawler, B., "Assessing the Impact of a Novel TBC Material on Heat Transfer in a Spark Ignition Engine through 3D CFD-FEA Co-Simulation Routine," *SAE Technical Paper 2022-01-0402*, 2022, <https://doi.org/10.4271/2022-01-0402>.
11. Moser, S., Gainey, B.*, Lawler, B.*, and Filipi, Z., "Thermodynamic Analysis of Novel 4-2 Stroke Opposed Piston Engine," *SAE Technical Paper 2021-24-0096*, 2021, doi:10.4271/2021-24-0096.
12. Gainey, B.*, Moser, S., Lawler, B., "Autoignition characterization of wet isopropanol-n-butanol-ethanol blends for ACI," *SAE Technical Paper 2021-24-0044*, 2021.
13. O'Donnell, P.*, Rahimi Boldaji, M.*, Gainey, B.*, Lawler, B., "Varying Intake Stroke Injection Timings with Wet Ethanol in LTC: A CFD Simulation Study," *SAE Technical Paper 2020-01-0237*, 2020.
14. Yan, Z.*, Gainey, B.*, Hariharan, D.*, Lawler, B., "Investigation into reactivity separation between direct injected and premixed fuels in RCCI combustion mode," *Proceedings of the ASME 2019 Internal Combustion Engine Division Fall Technical Conference*, ICEF2019-7130.
15. Gainey, B.*, Gohn, J.*, Yan, Z.*, Malik, K.*, Rahimi Boldaji, M.*, Lawler, B., "HCCI with Wet Ethanol: Investigating the Charge Cooling Effect of a High Latent Heat of Vaporization Fuel in LTC," *SAE Technical Paper 2019-24-0024*, 2019, doi:10.4271/2019-24-0024.

<< Prior to Clemson >>

16. Hariharan, D.*, Yang, R., Mamalis, S., Lawler, B., "Effects of Single versus Two-Stage Heat Release on the Load Limits of HCCI using Primary Reference Fuels," *SAE Technical Paper 2019-01-0950*, 2019, <https://doi.org/10.4271/2019-01-0950>.
17. Zhou, Y.*, Gainey, B.*, Mamalis, S., Lawler, B., "Understanding HCCI Combustion in a Free Piston Engine with a Multi-Zone, Thermally Stratified, Chemical Kinetic Model," *SAE Technical Paper 2019-01-0958*, 2019, <https://doi.org/10.4271/2019-01-0958>.
18. Gainey, B.*, Hariharan, D.*, Zilg, S.*, Rahimi Boldaji, M.*, Lawler, B., "TSCI with Wet Ethanol: an investigation of the effects of injection strategy on a diesel engine architecture," *SAE Technical Paper 2019-01-1146*, 2019, <https://doi.org/10.4271/2019-01-1146>.
19. Sofianopoulos, A., Rahimi Boldaji, M.*, Lawler, B., and Mamalis, S., "Analysis of Thermal Stratification Effects in HCCI Engines Using Large Eddy Simulations and Detailed Chemical Kinetics," *SAE Technical Paper 2018-01-0189*, 2018, <https://doi.org/10.4271/2018-01-0189>.
20. Rahimi Boldaji, M.*, Sofianopoulos, A., Mamalis, S., and Lawler, B., "Effects of Mass, Pressure, and Timing of Injection on the Efficiency and Emissions Characteristics of TSCI Combustion with Direct Water Injection," *SAE Technical Paper 2018-01-0178*, 2018, <https://doi.org/10.4271/2018-01-0178>.
21. Sofianopoulos, A., Zhou, Y.*, Lawler, B., Mamalis, S., "Multi-Dimensional Modeling of a 1kWe Free Piston Linear Alternator," *ASTFE 2017 Proceedings of the 2nd Thermal and Fluid Engineering Conference TFEC2017*, Las Vegas, Nevada, USA, April 2-5, 2017.
22. Lawler, B., Joshi, S., Lacey, J., Guralp, O., Najt, P., and Filipi, Z., "Understanding the Effect of Wall Conditions and Engine Geometry on Thermal Stratification and HCCI Combustion," *ASME 2014 Internal Combustion Engine Division Fall Technical Conference*, Columbus, Indiana, USA, October 19-22, 2014.
23. Kaul, B., Lawler, B., Finney, C., Edwards, M., Wagner, R., "Effects of Data Quality Reduction on Feedback Metrics for Advanced Combustion Control," *SAE Technical Paper 2014-01-2707*, 2014, <https://doi.org/10.4271/2014-01-2707>.
24. Lawler, B., Lacey, J., Dronniou, N., Dernette, J., Dec, J., Guralp, O., Najt, P., Filipi, Z., "Refinement and Validation of the Thermal Stratification Analysis: A post-processing methodology for determining temperature distributions in an experimental HCCI engine," *SAE Technical Paper 2014-01-1276*, 2014, doi:10.4271/2014-01-1276.

Conference Proceedings (Unreviewed)

1. Rahimi Boldaji, M.*, Sofianopoulos, A., Mamalis, S., and Lawler, B., "CFD Investigations of Direct Water Injection for Control of HCCI Combustion," *Symposium for Combustion Control*, RWTH Aachen, Aachen, Germany, June 28th-29th, 2017.

Research Reports

1. Lawler, B., "Single-Fuel Reactivity Controlled Compression Ignition Combustion Enabled by Onboard Fuel Reformation," Stony Brook University, Final Technical Report., Department of Energy, (March 2018).

PRESENTATIONS

(Note: This list only includes presentations that were not affiliated with a conference proceeding, or a conference proceeding that was converted to a journal paper, listed above)

1. Lawler, B., "Advanced Transportation Technologies: Propelling Our Transition to a Clean Energy Future, Decarbonizing transportation through electrification (incl. hybridization) and renewable fuels", 2022 Invited E4 Carolinas Webinar/Virtual Panel Discussion, Virtual (October 2022).
2. Lawler, B., "CFD Research at Clemson University's International Center for Automotive Research (CU-ICAR) Using CONVERGE CFD Software", 2021 Invited Convergent Science Webinar, Virtual (May 2021).
3. Rahimi Boldaji, M.*, Lawler, B., "CFD Simulation of TSCI with Wet Ethanol: Understanding the Effect of Spray Included Angle on Thermal Stratification", 2019 Converge Users Conference, New Orleans LA (September 2019).

<< Prior to Clemson >>

4. Lawler, B., "Advanced Combustion Research at Stony Brook University: What is the Future for Combustion Engines?", Invited Seminar, Long Island Power Authority (LIPA) Board Meeting, Westbury, NY (October 2018).
5. Lawler, B., "Advanced Combustion Research at Stony Brook University", Invited Seminar, Advanced Energy Research and Technology Board Meeting, Mineola, NY (August 2018).
6. Lawler, B., "Single-Fuel Reactivity Controlled Compression Ignition Combustion Enabled by Onboard Fuel Reformation", 2017 Department of Energy's Vehicle Technologies Office Annual Merit Review, Washington DC (June 2017).
7. Lawler, B., "Advanced Combustion Engines for Automotive Applications and Distributed Generation: Current Research and Future Outlook", Invited Guest Seminar, Colorado State University, Fort Collins, CO (December 2016).
8. Lawler, B., "Advanced Combustion Engines for Automotive Applications and Distributed Generation: Current Research and Future Outlook", Invited Guest Seminar, Clemson University, Greenville, SC (October 2016).
9. Lawler, B., Lacey, J., Guralp, O., Najt, P., Filipi, Z., Dronniou, N., Dernet, J., Dec, J., "Validation of the Thermal Stratification Analysis (TSA): A Post-Processing Methodology for Studying Temperature Distributions in an HCCI Engine", 2013 Advanced Engine Combustion Working Group Meeting, Sandia National Laboratory, Livermore, CA (February 2013).
10. Lawler, B., Hoffman, M., Filipi, Z., Najt, P., Guralp, O., Dec, J., "Analytical Study of Temperature Distributions in an HCCI Engine", 2011 Advanced Engine Combustion Working Group Meeting, USCAR, Southfield, MI (August 2011). [Author, "Title of Presentation," Meeting Name (Invited), Venue (Date).]

PATENTS

"Single-Fuel Reactivity Controlled Compression Ignition Enabled by Onboard Fuel Reformation," United States of America, 15/082, 469, with Sotirios Mamalis

"Method for control of advanced combustion through split direct injection of high heat of vaporization fuel or water fuel mixtures", United States of America, Patent 17/626, 222, with Mozghan Rahimi Boldaji and Brian Gainey

SPONSORED RESEARCH

- “Vehicle Propulsion Digital Twins and Hardware Integration in the Virtual Environment (HIVE),” Clemson VIPR-GS Center, U.S. Army, PI, \$2,096,374 (\$349,396), (2023-).
- “Efficient Modeling and Guiding of Experimental Investigations of High-Performance Pistons Leveraging Bayesian and Machine Learning Approaches,” Clemson VIPR-GS Center, U.S. Army, Co-PI, \$889,636 (\$231,305), (2023-).
- “Opposed-Piston 2-Stroke Hybrid Commercial Vehicle System,” Subcontract on a Department of Energy project from Achates Power Inc., PI, \$750,000 (\$187,500), (2022-).
- “Cold-start emissions and deposit growth associated with advanced temperature-swing thermal barrier coatings for spark ignition combustion,” Ford University Research Program, PI, \$50,000 (\$50,000), (2021-).
- “New Two-Cylinder Prototype Demonstration and Concept Design of a Next Generation Class 3-6 Opposed Piston Engine,” Subcontract on a Department of Energy project from Achates Power Inc., PI, \$1,625,000 (\$406,250), (2020-).
- VIPR-GS Center “Focus Area 2.3: Power Generation and Propulsion Systems for Autonomous Off-Road Vehicles,” U.S. Army, PI, \$1,405,956 (\$351,489), (2020-)
- “Smart Configuration Optimizer Through Transformative ANalytics (SCOTTy),” Subcontract on an Office of Naval Research project from Palo Alto Research Center, Co-PI, \$955,000 (\$191,000), (2020-).
- “Novel Thermal Barrier Coatings for Gasoline Spark Ignition Engines,” Subcontract on an SBIR Phase II project through the Department of Energy from Solution Spray Technologies, PI, \$374,924 (\$262,447), (2020-).
- “Investigation of the effects of thermal barrier coatings on gasoline compression ignition combustion,” Aramco Services Corporation, Co-PI, \$974,386, (\$487,193), (2020-).
- “Hybrid Electrochemistry-Advanced Combustion for High-Efficiency Distributed Power (HE-ACED),” Subcontract on an ARPA-E program from Stony Brook University where I was Co-PI, PI, \$68,438, (\$68,438), (2019-2020).
- “Novel Thermal Barrier Coatings for Gasoline Spark Ignition Engines,” Subcontract on an SBIR Phase I program through the Department of Energy from Solution Spray Technologies, Co-PI, \$49,812, (\$9,962), (2019-2020).

<< Prior to Clemson >>

- “Naphthenic Biofuel-Diesel Blend for Optimizing Mixing Controlled Compression Ignition Engines,” Department of Energy, Co-PI, \$1,490,000, (\$372,500), (2019-2020).
- “Hybrid Electrochemistry-Advanced Combustion for High-Efficiency Distributed Power (HE-ACED),” ARPA-E, Co-PI, \$2,325,000, (\$581,250), (2018-2020).
- “Diesel Fuel Additive Testing for Improved Efficiency,” BASF, PI, \$44,000, (\$44,000), (2017-2018).
- “Single-Fuel Reactivity Controlled Compression Ignition Combustion Enabled by Onboard Fuel Reformation,” Department of Energy, PI, \$1,128,000, (\$676,800), (2015-2018).
- “Micro Internal Combustion Engine for Transformative Residential Applications,” ARPA-E, Co-PI, \$750,000, (\$262,500), (2015-2018).
- “Investigation of the Effects of Water Injection in Homogeneous Charge Compression Ignition,” Oak Ridge National Laboratory, PI, \$30,000, (\$30,000), (2015-2015).

GRADUATE STUDENT ADVISING

List in chronological order while denoting those students that you have been the major advisor, co-advisor, or committee member. List the month/year of graduation or anticipated graduation for each student.

Doctoral Graduates

- Moser, S., “FEA modeling of thermal barrier coatings for combustion chamber surfaces,” 12/2021, (Committee member).
- Yan, Z., “An assessment of thermal barrier coatings for the low-temperature combustion family: from HCCI to GCI,” 8/2021, (Advisor).
- Gainey, B., “The Role of Low Carbon Alcohol Fuels in Advanced Combustion,” 12/2020, (Advisor).

- Robertson, D., “Combustion phasing modeling for control of spark-assisted compression ignition (SACI) engines”, 12/2022 (Committee member)
- Hariharan, D., “Single-Fuel Reactivity Controlled Compression Ignition enabled by onboard fuel reforming,” 12/2019, (Advisor).
- Zhou, Y., “A Comprehensive Study of Free Piston Engines with an Ultra-Fast Predictive Homogeneous Charge Compression Ignition Model,” 8/2019, (Advisor).
- Rahimi Boldaji, M., “Thermally Stratified Compression Ignition Enabled by Water injection or Wet Ethanol,” 8/2019, (Advisor).
- Sofianopoulos, A., “Investigation of Thermal and Compositional Stratification in Low Temperature Combustion Engines Using Large Eddy Simulations,” 12/2018, (Committee member).
- Ravikumar, D., “Thermal studies on cryogenic components for the electron - ion collider at Brookhaven National Laboratory,” 5/2018, (Committee member).

Master’s Graduates

- Priyadarshini, P., (MS) “Investigation of Compositional Stratification in Low Temperature Combustion Engines using Large Eddy Simulations,” 7/2019, (Committee member).
- Guleria, G., (MS) “Computational Fluid Dynamics Modeling of Single Fuel Reactivity Controlled Compression Ignition Combustion,” 7/2019, (Committee member).
- Yan, Z., (MS) “Investigation into the reactivity separation between the direct injected and premixed fuels in RCCI combustion,” 12/2018, (Advisor).
- Gainey B., (MS) “Thermally Stratified Compression Ignition with Wet Ethanol,” 9/2018, (Advisor).
- Leakey, A., (MS) “Membrane Distillation for Desalination of Brackish Water: Robust Design and System Optimization,” 8/2018, (Committee member).
- Paranjape, S., (MS) “System-level Modeling of Hybrid Electric Vehicles,” 5/2018, (Committee member).
- Ku Nam, H., (MS) “In-situ Monitoring of Thin Inorganic Film Deposition Process by Low Temperature Laser-assisted Chemical Vapor Deposition,” 5/2018, (Committee member).
- Ran, Z., (MS) “Experimental Investigation of Spark-Ignition Combustion with Gasoline and Alternative Fuels,” 4/2018, (Committee member).
- Ruttkayova, S., (MS) “Product and Manufacturing Process Quality Control of Patterned Vertically Aligned Carbon Nanotube Devices,” 5/2018, (Advisor).
- Rahimi Boldaji, M., (MS) “Computational Fluid Dynamics simulations of water injection in HCCI combustion,” 9/2017, (Advisor).
- Zhou, Y., (MS) “System-level Matlab/Simulink Model and Experimental investigation of a novel free piston linear alternator for residential applications,” 9/2017, (Advisor).
- Condy, D., (MS) “Experimental testing of a free piston linear alternator,” 5/2017, (Advisor).
- Sofianopoulos, A., (MS) “3-D Computational Fluid Dynamics Modeling of a Free Piston Natural Gas Engine,” 12/2016, (Committee member).
- Pandya, P., (MS) “System-level modelling of a Cooperative Fuel Research (CFR) engine operating under SI and HCCI combustion modes,” 8/2016, (Committee member).
- Hariharan, D., (MS) “Experimentally enabling HCCI combustion on a Cooperative Fuels Research engine,” 5/2016, (Advisor).
- Ustuner, G., (MS) “Computational Fluid Dynamics Modeling of a Gasoline Homogeneous Charge Compression Ignition Engine,” 4/2016, (Committee member).

Current Graduate Advising

- Deb, N., (PhD Elec. Eng.), TBD, May 2021, (Committee member).
- Hoang, H.P., (PhD Elec. Eng.), TBD, May 2021, (Committee member).
- O'Donnell, P., (PhD AuE), “Large Eddy Simulations of Low Temperature Gasoline Combustion Engines,” August 2023, (Advisor).
- Gandolfo, J., (PhD AuE), TBD, May 2024, (Advisor).
- Motwani, R., (PhD AuE), TBD, December 2024, (Advisor).
- Gohn, J., (PhD AuE), TBD, December 2024, (Advisor).
- Ravikumar, A., (PhD AuE), TBD, May 2025, (Advisor).
- Bhatt, A., (PhD AuE), TBD, May 2025, (Advisor).
- Kumar, M., (PhD AuE), TBD, May 2026, (Advisor).
- Vedpathak, K., (PhD AuE), TBD, May 2026, (Advisor).

- Datar, A., (PhD AuE), TBD, May 2026, (Advisor).
- Koirala, P., (MS AuE), TBD, May 2024, (Advisor).

Post-Doctoral Research Advisees

- Gainey, B., “New Two-Cylinder Prototype Demonstration and Concept Design of a Next Generation Opposed Piston Engine,” (2021- 2023).
- Yan, Z., “Investigation of the effects of thermal barrier coatings on gasoline compression ignition combustion,” (2021-2022).
- Rahimi Boldaji, M., “Establishing a CFD Research Focus at Clemson’s Automotive Engineering Department for IC Engines,” (2019-2020).

High School Student Mentoring

- See below in “Other Service”

TEACHING

Courses Taught

Beginning Spring 2015

- AuE 6080 / 6081, Vehicle Testing and Characterization (Clemson University), S22 (19 students).
- AuE 4080 / 4081, Vehicle Testing and Characterization (Clemson University), S22 (1 student).
- ME 6610, Advanced and Electrified Powertrains (Clemson University), F21 (2 students), F22 (5 students).
- ME 4610, Advanced and Electrified Powertrains (Clemson University), F21 (27 students), F22 (14 students).
- AuE 8160 / 8161, Engine Combustion and Emissions (Clemson University), S21 (24 students), S23 (24 students).
- AuE 4020 (converted to 4610), Advanced and Electrified Powertrains (Clemson University), S20 (7 students), F20 (9 students).
- AuE 6930 (converted to 6020, then to 6610), Advanced and Electrified Powertrains (Clemson University), S20 (35 students), F20 (17 students), F21 (46 students), F22 (45 students).
- MEC 475, Undergraduate Teaching Practicum (Stony Brook University), S18 (1 student), S19 (1 student).
- MEC 537, Combustion Research Laboratory (Stony Brook University), F15 (17 students), F16 (14 students), F17 (26 students), F18 (10 students).
- MEC 596, Projects in Mechanical Engineering (Stony Brook University), F15 (3 students), S16 (3 students), Su16 (2 student), F16 (5 students), S17 (4 students), F17 (1 student), S18 (2 students).
- MEC 499, Research in Mechanical Engineering (Stony Brook University), Su15 (3 students), S16 (3 students), Su16 (1 student), F16 (2 students), S17 (2 students), F17 (2 students), S18 (8 students), F18 (3 students), S19 (1 student).
- MEC 320, Numerical Methods in Engineering (Stony Brook University), S15 (co-taught, 99 students), S16 (140 students), S17 (146 students), S18 (160 students), S19 (161 students).

New Course Development

- AuE 6930 (converted to AuE 6020 for F20, then to 6610 for F21), Advanced and Electrified Powertrains, S20 (expanded an undergraduate elective course from our certificate program to be cross-listed as a graduate-level course, and cross-listed as an ME course in F21), 2019.
- MEC 537, Combustion Research Laboratory (Stony Brook University), 2015.

UNIVERSITY AND PUBLIC SERVICE

Committees (Group according to department, college, university.)

Department

- Chair / Member, AuE Graduate Research and Curriculum (GRC) Committee (Member: 2020– , Chair: 2022– , Clemson University) In our department, the chair of the GRC serves as the Graduate Program Coordinator
- Member, AuE Inclusive Excellence Committee (2020 – 2022, Clemson University)
- Member, AuE Invited Seminar Series (2020 – 2023, Clemson University)
- Member, Undergraduate Program Committee (2015 – 2019, Stony Brook University)

College

- Co-chair, School of Mechanical and Automotive Engineering (SMAE) Bylaws Committee (2022 – 2023, Clemson University)
- College Curriculum Committee, Automotive Engineering Representative (2021 – 2022, Clemson University)

University

- Search Committee, Office of Proposal Development Proposal Development Specialist (2018, Stony Brook University)
- Search Committee, Office of Proposal Development Research Development Specialist (2018, Stony Brook University)
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Other Service

- Invited Guest Editor of a Special Issue in the journal *Energies* titled “Second-Generation Low Temperature Combustion Concepts for Internal Combustion Engines” (2020-2022)
- Faculty Advisor, Pi Tau Sigma, Student Chapter (2015 – 2019, Stony Brook University)
- Faculty Advisor, 15 senior design groups (2015 – 2019, Stony Brook University)
- Designed and implemented a PowerPoint template for posters and presentation for the Mechanical Engineering Department at Stony Brook University (2015)
- Mentored Collegiate Science and Technology Entry Program (CSTEP) Student working in my research lab – CSTEP is a New York State Education Department-funded program designed to increase the numbers of underrepresented minority and income-eligible college students pursuing degrees in scientific and technological fields of study (2018 – 2019).
- Mentored a large number of undergraduate researchers, two of whom (Jennifer Lembeck, San Diego 2018, and Patrick O'Donnell, Chicago 2019) have recently been award the ASME Internal Combustion Engine Division Undergraduate Student Competition Award (2015 - 2019)
- Assisted with departmental teaching responsibilities by teaching 4 lectures in AuE 8810 and 2 lectures in AuE 8190 (2019 -)
- Reviewer for numerous conferences and journals including Applied Thermal Engineering, ASME Internal Combustion Engine Division Technical Conferences, ASME Journal of Gas Turbines and Power, Energy and Fuels, Fuel, International Combustion Symposium, International Journal of Engine Research, Journal of Hydrogen Energy, Proceedings of the Combustion Institute, Society of Automotive Engineers, and others (2014 -)
- Mentored 3 Brazilian exchange students working in my research laboratory (2015)
- Mentored 6 high school students in my research lab as they conducted research projects, one of whom, Massimiliano de Sa, won a state-wide high school research competition in New York (<https://www.ccsd.ws/district/departments/public-information/highlights/2018-2019/march-v2/science-research>) and is now an undergraduate student in Mechanical Engineering at UC Berkeley (2015 – 2019)

Updated on 5/18/2023.