Bryan Maldonado

R&D Staff, Oak Ridge National Laboratory

1 Bethel Valley Road
Oak Ridge, TN 37831
maldonadopbp@ornl.gov
bryan-p-maldonado
ORNL Profile (click)

Interests

My research focuses on model-based and model-free identification, estimation, and control of complex, dynamic systems with an emphasis on optimal control techniques, machine learning algorithms, and uncertainty quantification methods. I am committed to mentoring STEM students, passionate about promoting scientific literacy, and an advocate for sustainable technology solutions for a more environmentally friendly society.

Education

2019 **PhD, Mechanical Engineering**, *University of Michigan*, Ann Arbor, MI
Thesis: Stochastic Analysis and Control of EGR-Diluted Combustion in Spark Ignition Engines at Nominal and Misfire-Limited Conditions
Advisor: Prof. Anna Stefanopoulou

2014 **BS, Mechanical Engineering**, *Universidad San Francisco de Quito*, Quito, Ecuador
Thesis: The Curvature Method Applied to Thermal Spray Coatings: Analytic Linear Elastic Analysis
Advisor: Prof. Alfredo Valarezo

2013 **BS, Mathematics**, *Universidad San Francisco de Quito*, Quito, Ecuador
Thesis: The Fundamental Group of a Group Acting on a Topological Space
Advisor: Prof. John Skukalek

Research Experience

Apr. 2024 to present **Oak Ridge National Laboratory**, *R&D Staff*, Oak Ridge, TN
- Lead investigator at the Advanced Construction Lab (Building Technologies Research and Integration Center)
- Controls and machine learning expert from improved accelerator performance at the Spallation Neutron Source
- Non-linear stochastic control expert for advanced combustion at the National Transportation Research Center

Oct. 2021 to Mar. 2024 **Oak Ridge National Laboratory**, *R&D Associate Staff*, Oak Ridge, TN
Developed novel technologies to advance the construction industry using AI-based controls and robotics. Deployed machine learning and control methods to improve accelerator performance at the Spallation Neutron Source

Jan. 2020 to Sep. 2021 **Oak Ridge National Laboratory**, *Postdoctoral Research Associate*, Knoxville, TN
Developed AI-based methods for next-cycle control of spark-ignition dilute combustion variability; implemented model-free learning and control strategies using edge computing applied to propulsion systems

Sep. 2015 to Dec. 2019 **Powertrain Control Laboratory**, *Graduate Research Assistant*, Ann Arbor, MI
Developed a feedback combustion controller for spark-ignition engines to achieve high fuel efficiency where combustion instability is an issue; used Simulink on a field programmable gate array for the implementation

Jan. 2019 to Dec. 2019 **Army Research Laboratory, Center for UAS Propulsion**, *Journeyman Fellow*, Ann Arbor, MI
Developed a feedback combustion control strategy for variable energy-assisted compression-ignition engine for multifuel operation capability by adjusting the injection profile and glow plug temperature

Summer 2018 **Argonne National Laboratory**, *Graduate Student Research Aide*, Lemont, IL
Characterized cycle-to-cycle combustion variability at highly exhaust gas recirculation–diluted conditions; looked for cycle-to-cycle and/or statistical metrics that can be used for combustion control

Summer 2014 **European Organization for Nuclear Research (CERN)**, *Research Assistant*, Geneva, Switzerland
Performed algorithm optimization using parallel programming for the path reconstruction algorithm in the inner detector of the ATLAS experiment; implemented the algorithm using C++11

Summer 2012 **Coordinated Science Laboratory, University of Illinois**, *Undergrad. Research Assistant*, Urbana, IL
Developed an orbital estimation algorithm for satellite tracking using stochastic differential equations on Python

Teaching Experience

Fall 2016, Fall 2017, and Fall 2019 — **University of Michigan**, *Graduate Student Instructor*, Ann Arbor, MI
Held office hours for the graduate course ME 569 (Advanced Powertrain Control) with an enrollment of ∼70 students per semester (Fall 2016, 2017, and 2019); presented recitation sessions and guest lectures on topics related to idle speed control, air-to-fuel ratio control, and ignition control. Student evaluations (median): 4.8/5

Aug. 2014 to Aug. 2015 — **Universidad San Francisco de Quito**, *Lecturer*, Quito, Ecuador
Taught introductory mathematics classes "Pre-calculus for Science" and "Pre-calculus for Administration"; taught "Technical Drawing" in the Mechanical Engineering Department; oversaw homework, exam, and projects

Aug. 2012 to May 2014 — **Universidad San Francisco de Quito**, *Teaching Assistant*, Quito, Ecuador
Taught introductory mathematics classes; performed lecture design, exam design, and grading

Selected Honors and Awards

2024 **40 Under 40**, *Knox News*
Leaders and innovators in East Tennessee, presented by Lincoln Memorial University School of Business

2024 **R&D 100 Award**, *R&D World*
Invention: Real-Time Evaluator for Fast and Accurate Installation of Prefabricated Components.

2024 **LDRD Early Career Competition winner**, *Oak Ridge National Laboratory*
Invited to be part of the cohort in ORNL's FY 2024 Early Career Development Program (ECDP). The cohort comprises the 2023 and early 2024 Distinguished Staff Fellows, 2023 DOE Early Career Research Program awardees, and 2024 Laboratory Directed Research and Development (LDRD) Early Career Competition awardees.

2023 **Early Career Research Accomplishment Award**, *UT-Battelle*
For distinguished technical achievements as an early career researcher bridging multiple applied energy research fields through the development and application of novel artificial intelligence–based controls for building technologies, internal combustion engines, and in support of the operation of ORNL's Spallation Neutron Source

2023 **Most Promising Scientist–PhD in National Laboratories**, *Great Minds in STEM (GMiS)*
Selected by the Award Selection Committees and the Deans of Engineering from USC and CSULA, recognized at the 2023 Hispanic Engineer National Achievement Awards Conference (HENAAC) in Pasadena, CA.

2023 **Cradle to Commerce Cohort**, *Lawrence Berkeley National Laboratory*
Selected for the 2023 Cradle to Commerce Cohort to partner with entrepreneurs and accelerate the commercialization of intellectual property (IP) developed by national laboratories (Auto-CuBES in my case)

2022 **Duane P. Jordan Early Career Award**, *The American Society of Mechanical Engineers*
Citation: for leadership in bridging ASME's Internal Combustion Engine and Dynamic Systems and Control divisions, mentoring STEM students, and improving science communication and outreach

2020 **"Your Science in a Nutshell" Lightning Talk winner**, *Oak Ridge National Laboratory*
Awarded for the 2-minute talk "Learning from Chaos: Controlling Combustion Events in Gasoline Engines"

2019 **ORAU Journeyman Fellowship**, *US Army Research Laboratory*
$42,000 fellowship to perform research for the project *Variable Energy Assisted Compression Ignition*

2018 **Tau Beta Pi Michigan Gamma Scholarship**, *Tau Beta Pi Engineering Honor Society*
$500 awarded to students in engineering who demonstrate exemplary character, integrity, and excellence

2016 **Rackham Summer Award**, *Rackham Graduate School, University of Michigan*
$8,000 fellowship stipend to perform research during the summer at the Powertrain Control Laboratory

2014 **SENESCYT Scholarship**, *National Secretary of Science and Technology*, Ecuador
$5,000 awarded to students involved in institutions of high prestige as research assistants (CERN, in my case)

2010 and 2012 **Honorable Mention**, *Iberoamerican Mathematics Olympiad Committee*
- 4th Iberoamerican Mathematics Olympiad, Guanajuato, Mexico
- Iberoamerican University Mathematics Olympiad, Rio de Janeiro, Brazil

2008 **Newton Scholarship**, *College of Engineering, Universidad San Francisco de Quito*
Awarded to senior high school students with excellence academic records to lower college tuition costs

Funding History

2024 **Cradle-to-Commerce Innovation Engine**, $50,000
Cooperative Research and Development Agreement (CRADA) to conduct hard tech development on thermal-LiDAR devices with Hearth Labs Solutions, Inc. Selected from the Cradle to Commerce (C2C) 2023 Cohort.

2024 **Pipeline for Affordable, energy efficient, and Time-saving Housing retrofits (PATH)**, $300,000 for 2 years
This project will develop a digital tool that streamlines multiple automated stages of the building envelope retrofitting process using overclad panels, culminating in an optimized PATH that can accelerate the decarbonization of the building sector to meet DOE net-zero goal by 2050.

2023 **Spiking neural networks for the optimization of diesel-ammonia dual-fuel combustion for rapid decarbonization of marine transportation**, $300,000 for 2 years
To decarbonize heavy-duty marine shipping, low-lifecycle-carbon fuels (LLCF) such as ammonia are crucial. The project will use advanced machine learning algorithms with online learning based on neuromorphic computing to adjust fuel injection parameters and enable stable diesel-pilot ammonia combustion in a dual-fuel approach.

2023 **Deep learning for Point cloud Building Envelope Segmentation (DeeP-CuBES)**, $275,000 for 2 years
Accurate building dimensioning reduces assembly time and errors, leading to improved thermal performance for retrofits. The project will develop DeeP-CuBES to automatically extract window/door rough opening dimensions and locations for precise building measurements, aiming for a real-time digital twinning of building envelopes.

2023 **Machine Learning for Improving Accelerator and Target Performance**, $2,400,000 for 3 years
This project will integrate machine learning techniques into the online monitoring and control systems of the Spallation Neutron Source accelerator and target to prevent equipment failures, reduce radioactivation of beamline areas, and detect target system anomalies to increase the scientific output of the DOE facility.

2022 **Fast, Accurate, and Minimally Intrusive (FAMI) Installation System for Panelized Envelopes**, $1,050,000 for 3 years
Current installation methods for overclad panels for envelope retrofits of multistory buildings are too costly, slow, disruptive, and/or impractical. To overcome these retrofit hurdles, this project will develop a fast, accurate, and minimally intrusive installation system that autonomously places the panels at the designed locations.

2021 **Online Learning of Combustion Dynamics with Spiking Neural Networks**, $190,000
Laboratory Directed Research and Development Seed Funding was awarded by Oak Ridge National Laboratory to develop a portable edge CPU and an engine control strategy based on spiking neural networks to achieve model-free online learning of combustion cycle-to-cycle dynamics.

Mentoring Experience

K-12

2021 to present **Volunteer**, *Tennessee Science Bowl*, Knoxville, TN
Supported the execution of the Tennessee Science Bowl by volunteering as scorekeeper; interacted with high schoolers through motivational conversations related to science and engineering careers

Undergraduate

2025 **Science Undergraduate Laboratory Internships (SULI) Mentor**, *Oak Ridge National Laboratory*
Project: Oak Ridge National Laboratory Building Envelope Library (ORNOBEL)
Student: Sergio Cervantes, Texas A&M University

2017 to 2018 **Undergraduate Student Mentor**, *University of Michigan*, Ann Arbor, MI
Project: Implementation of LSPI Detection Algorithm on a Real-Time Rapid Prototyping Engine Control Unit
Student: Alexander Eskenazi-Gold, 2018 ASME ICEF Undergraduate Student Presentation Competition winner

Graduate

2024 to present **Research Mentor**, *Oak Ridge National Laboratory*, Oak Ridge, TN
Project: Deep learning for Point cloud Building Envelope Segmentation (DeeP-CuBES)
Student: Balaji Selvakumar, University of Maryland

2025 **JUMP into STEM Research Mentor**, *Oak Ridge National Laboratory*, Oak Ridge, TN
PROJECT: Oak Ridge National Laboratory Building Envelope Library (ORNOBEL)
STUDENT: Amit Deb Nath, University of Wyoming

2024 **Research Mentor**, *Oak Ridge National Laboratory*, Oak Ridge, TN
PROJECT: Pipeline for Affordable, energy efficient, and Time-saving Housing retrofits (PATH)
STUDENT: Nisha Deborah Philips, University of Texas at Dallas

2024 **Thesis Committee Member**, *University of Michigan*, Ann Arbor, MI
THESIS: Multivariable Combustion Control for Engines Operating Near High-Variability Limits
Member of the thesis committee for PhD candidate Omar Ahmed

2021 **External Thesis Committee Member**, *Universitat Politècnica de València*, Valencia, Spain
THESIS: Development of Indicators for Control of Multi-Fuel Engines Based on New Combustion Concepts
International member of the thesis committee for PhD candidate Irina Jimenez

Postdoctoral

2023 to present **Research Mentor**, *Oak Ridge National Laboratory*, Oak Ridge, TN
PROJECT: Fast, Accurate, and Minimally Intrusive (FAMI) Installation System for Panelized Envelopes
Mentor for postdoctoral research associate Yifang Liu

Communication Skills

Podcast

July 2021 to July 2023 **ASME Dynamic Systems and Control Division podcast**, *cohost*
Interviewed researchers in the area of control theory

Plenary Talks

June 2024 **International Symposium on Automation and Robotics in Construction**, Lille, France
TITLE: Optimization of prefabricated component installation using a real-time evaluator (RTE) connection locating system

July 2023 **International Symposium on Automation and Robotics in Construction**, Chennai, India
TITLE: Automatic point Cloud Building Envelope Segmentation (Auto-CuBES) using Machine Learning

May 2021 **Universidad San Francisco de Quito, Departamento de Ingeniería Mecánica**, *Quito*, Ecuador
TITLE: El rol de la inteligencia artificial en el consumo energético del sector de transporte
Presented at as part of the "Mech-Talks: Avances de la Ingeniería en Ecuador"

Invited Talks

Oct. 2024 **Building Technologies Office (BTO) Peer Review**, *Arlington*, VA
TITLE: Deep learning for Point Cloud Building Envelope Segmentation

Sept. 2024 **University of Michigan's Control Seminar**, *Ann Arbor*, MI
TITLE: Enabling automatic building envelope retrofits using controls and machine learning

July 2023 **SIAM Conference on Control and Its Applications**, *Philadelphia*, PA
Invited speaker as part of the mini-symposium "Data-Driven Decision Control for Complex Systems." The talk focused on recent results on control techniques applied to optimize accelerator power at the SNS

Feb. 2023 **California State University, Los Angeles**, *Virtual*
Speaker for the Seminar in Interdisciplinary STEM Research series. TITLE: Advanced Overclad Building Envelope Retrofits: An Interdisciplinary Approach Including Material Science, Machine Vision, Controls, and Robotics

Oct. 2022 **Modeling, Estimation, and Control Conference**, *Jersey City*, NJ
Invited speaker as part of the special session "Industry Stories in Controls." The talk focused on how practical problems identified in industry can also inspire and develop new academic research topics and areas

Apr. 2022 **Caterpillar Inc.**, *Virtual*
TITLE: Online Adaptive Control Strategies for Optimizing Internal Combustion Engines

Nov. 2021 **Edge AI Summit**, *Virtual*
Keynote speaker at the fourth annual Edge AI Summit as part of a series of case studies about edge AI applications.
TITLE: Spiking Neural Network–Based Control for Improving Gasoline Engine Efficiency

June 2019 **Universitat Politècnica de València, CMT-Motores Térmicos**, *Valencia*, Spain
TITLE: Satisfying Unstable EGR Combustion Limits in SI Engines: A Learning Reference Governor Approach

Oct. 2014 **Stony Brook University, Center for Thermal Spray Research**, *Stony Brook*, NY
TITLE: The Curvature Method Applied to Thermal Spray Coatings

Conference Talks

Aug. 2024	IEEE Conference on Control Technology and Applications (CCTA)	*Newcastle, United Kingdom*
June 2024	International Symposium on Automation and Robotics in Construction (ISARC)	*Lille, France*
July 2023	International Federation of Automatic Control (IFAC) World Congress	*Yokohama, Japan*
July 2023	International Symposium on Automation and Robotics in Construction (ISARC)	*Chennai, India*
Dec. 2022	ASHRAE Buildings XV Conference	*Clearwater, FL*
Apr. 2022	SAE International World Congress Experience (WCX)	*Detroit, MI*
Oct. 2021	ASME Internal Combustion Engine Fall Technical Conference (ICEF)	*Virtual*
May 2021	American Control Conference (ACC)	*Virtual*
Apr. 2021	SAE International World Congress Experience (WCX)	*Virtual*
Oct. 2020	ASME Dynamic Systems and Control Conference (DSCC)	*Virtual*
Oct. 2019	ASME Internal Combustion Engine Fall Technical Conference (ICEF)	*Chicago, IL*
June 2019	Symposium for Combustion Control	*Aachen, Germany*
Nov. 2018	ASME Internal Combustion Engine Fall Technical Conference (ICEF)	*San Diego, CA*
Sept. 2018	IFAC Conference on Powertrain Control, Simulation, and Modeling	*Changchun, China*
June 2018	American Control Conference (ACC)	*Milwaukee, WI*
Oct. 2017	ASME Internal Combustion Engine Fall Technical Conference (ICEF)	*Seattle, WA*
May 2017	American Control Conference (ACC)	*Seattle, WA*

Academic Service

Reviewer

- *IAARC Automation in Construction*
- *IEEE Transactions on Control Systems Technology*
- *IEEE/ASME Transactions on Mechatronics*
- ASME *Journal of Dynamic Systems, Measurement and Control*
- *International Journal of Engine Research*
- IFAC *Control Engineering Practice*
- IAARC International Symposium on Automation and Robotics in Construction
- IEEE American Control Conference
- ASME Internal Combustion Engine Fall Technical Conference
- ASME Dynamic Systems and Control Conference
- IFAC International Symposium on Advances in Automotive Control

Technical Society Involvement

ASME Dynamic Systems and Control Division — *Energy Systems Technical Committee*
ASME Journal of Dynamic Systems, Measurement, and Control — *Associate Editor*

Professional Society Affiliations

Since 2018	IEEE	*Senior Member*
Since 2017	ASME	*Lifetime Member*
Since 2021	Hispanic and Latino Organization for Leadership and Awareness (HOLA)	*President in 2024*
Since 2016	Tau Beta Pi (engineering honor society)	*Social cochair in 2017*
Since 2015	Society of Hispanic Professional Engineers	*Professional development chair in 2016*

Inventions

Patents

[P1] **B. P. Maldonado**, B. C. Kaul, C. D. Schuman, J. P. Mitchell, and S. R. Young. Dilute Combustion Control Using Spiking Neural Networks. US Patent US11655775B1, May 2023.

[P2] **B. P. Maldonado**, N. W. Hayes, and D. Hun. Automatic point Cloud Building Envelope Segmentation (Auto-CuBES) using Machine Learning. US Patent US 2025/0054267 A1, Feb 2025.

Proprietary Software (Copyrighted)

[S1] **B. P. Maldonado**. Automatic Point Cloud Building Envelope Segmentation (AutoCuBES). Computer Software. Registration Number: TXu002412058, Dec 2023. doi:10.11578/dc.20231214.1.

Patent Applications

[PA1] D. Hun, P. Wang, N. W. Hayes, **B. P. Maldonado**, P. R. Boudreaux, and S. M. Killough. Real-Time Evaluator to Optimize Prefab Retrofit Panel Installation, Application No. 63/425,823, 11 2022.

Publications (343 citations, h-index = 12, i10-index = 17)

Book Chapters

[B1] **B. P. Maldonado**, A. G. Stefanopoulou, and B. C. Kaul. Artificial-intelligence-based prediction and control of combustion instabilities in spark-ignition engines. In J. Badra, P. Pal, Y. Pei, and S. Som, editors, *Artificial Intelligence and Data Driven Optimization of Internal Combustion Engines*, pages 185–212. Elsevier, 2022. doi:10.1016/B978-0-323-88457-0.00006-0.

Data Sets

[D1] **B. P. Maldonado**, D. Winder, P. Ramuhalli, and W. Blokland. Process and control variables from the SNS's cryogenic moderator system, 2024. URL: https://doi.ccs.ornl.gov/dataset/c2445793-f6a3-5379-b0ee-fd4ec3a6890f, doi:10.13139/OLCF/2441156.

[D2] **B. P. Maldonado**, D. Winder, P. Ramuhalli, and W. Blokland. Process and control variables from the mercury loop at the SNS's mercury target, 2024. URL: https://doi.ccs.ornl.gov/dataset/4d6c8aa5-c92c-576c-a4f8-da07689d345b, doi:10.13139/OLCF/2441154.

Journal Publications

[J1] Y. Liu and **B. P. Maldonado**. Dynamic Modeling, Trajectory Optimization, and Linear Control of Cable-Driven Parallel Robots for Automated Panelized Building Retrofits. *Buildings*, 15(9), 2025. doi:10.3390/buildings15091517.

[J2] **B. P. Maldonado**, B. C. Kaul, C. D. Schuman, and S. R. Young. Reinforcement learning applied to dilute combustion control for increased fuel efficiency. *International Journal of Engine Research*, 25(6):1157–1173, 2024. doi:10.1177/14680874241226580.

[J3] **B. P. Maldonado**, F. Liu, N. Goth, P. Ramuhalli, M. Howell, R. Maekawa, and S. Cousineau. Data-Driven Modeling of a High Capacity Cryogenic System for Control Optimization. *IFAC-PapersOnLine*, 56(2):3986–3993, 2023. doi:10.1016/j.ifacol.2023.10.1365.

[J4] **B. P. Maldonado**, B. C. Kaul, C. D. Schuman, S. R. Young, and J. P. Mitchell. Next-Cycle Optimal Dilute Combustion Control via Online Learning of Cycle-to-Cycle Variability using Kernel

Density Estimators. *IEEE Transactions on Control Systems Technology*, 30(6):2433–2449, 2022. doi:10.1109/TCST.2022.3149423.

[J5] **B. P. Maldonado** and B. C. Kaul. Evaluation of Residual Gas Fraction Estimation Methods for Cycle-to-Cycle Combustion Variability Analysis and Modeling. *International Journal of Engine Research*, 23(2):198–213, 2022. doi:10.1177/1468087420983087.

[J6] **B. P. Maldonado**, B. C. Kaul, C. D. Schuman, S. R. Young, and J. P. Mitchell. Next-Cycle Optimal Fuel Control for Cycle-to-Cycle Variability Reduction in EGR-Diluted Combustion. *IEEE Control Systems Letters*, 5(6):2204–2209, 2021. doi:10.1109/LCSYS.2020.3046433.

[J7] Y. Luo, **B. P. Maldonado**, S. Liu, C. Solbrig, D. Adair, and A. Stefanopoulou. Portable In-Cylinder Pressure Measurement and Signal Processing System for Real-Time Combustion Analysis and Engine Control. *SAE Int. J. Adv. & Curr. Prac. in Mobility*, 2(6):3432–3441, 2020. doi:10.4271/2020-01-1144.

[J8] **B. P. Maldonado**, N. Li, I. Kolmanovsky, and A. G. Stefanopoulou. Learning reference governor for cycle-to-cycle combustion control with misfire avoidance in spark-ignition engines at high exhaust gas recirculation–diluted conditions. *International Journal of Engine Research*, 21(10):1819–1834, 2020. doi:10.1177/1468087420929109.

[J9] **B. P. Maldonado**, K. Zaseck, E. Kitagawa, and A. G. Stefanopoulou. Closed-Loop Control of Combustion Initiation and Combustion Duration. *IEEE Transactions on Control Systems Technology*, 28(3):936–950, 2020. doi:10.1109/TCST.2019.2898849.

[J10] **B. P. Maldonado**, M. Bieniek, J. Hoard, A. G. Stefanopoulou, B. Fulton, and M. Van Nieuwstadt. Modelling and estimation of combustion variability for fast light-off of diesel aftertreatment. *International Journal of Powertrains*, 9(1-2):98–121, 2020. doi:10.1504/IJPT.2020.108423.

[J11] M. Bieniek, A. Stefanopoulou, J. Hoard, **B. P. Maldonado**, B. Fulton, and M. Van Nieuwstadt. Retard to the Limit: Closed-Loop COVIMEP Control for Aggressive Exhaust Heating. *IFAC-PapersOnLine*, 52(5):624–629, 2019. doi:10.1016/j.ifacol.2019.09.099.

[J12] **B. P. Maldonado** and A. G. Stefanopoulou. Linear Stochastic Modeling and Control of Diluted Combustion for SI Engines. *IFAC-PapersOnLine*, 51(31):99–104, 2018. doi:10.1016/j.ifacol.2018.10.019.

[J13] **B. P. Maldonado** and A. G. Stefanopoulou. Cycle-to-Cycle Feedback for Combustion Control of Spark Advance at the Misfire Limit. *Journal of Engineering for Gas Turbines and Power*, 140(10):102812–102812–8, 2018. doi:10.1115/1.4039728.

[J14] H. Lian, J. B. Martz, **B. P. Maldonado**, A. G. Stefanopoulou, K. Zaseck, J. Wilkie, O. Nitulescu, and M. Ehara. Prediction of Flame Burning Velocity at Early Flame Development Time With High Exhaust Gas Recirculation and Spark Advance. *Journal of Engineering for Gas Turbines and Power*, 139(8):082801–082801–9, 2017. doi:10.1115/1.4035849.

[J15] **B. P. Maldonado** and J. R. Skukalek. The Fundamental Group of a Group Acting on a Topological Space. *Avances en Ciencias e Ingenierías*, 6(1):A10–A18, 2014. doi:10.18272/aci.v6i1.148.

Conference Publications

[C1] K. Patel, E. Maness, T. Nitzsche, E. G. Brown, B. Witherspoon, A. Young, **B. P. Maldonado**, B. Kaul, J. S. Plank, and C. D. Schuman. Evolution at the Edge: Real-Time Evolution for Neuromorphic Engine Control. In *2025 Neuro Inspired Computational Elements (NICE)*, pages 1–8, 2025. doi:10.1109/NICE65350.2025.11065602.

[C2] **B. P. Maldonado**, F. Liu, and P. Ramuhalli. Evaluation of AI-based Methods for Time-Series Modeling of Measurement Data of a Complex Cryogenic System. In *Proceedings of the AAAI 2025 Workshop on Artificial Intelligence for Time Series (AI4TS)*. AAAI, 2025. URL: https://github.com/AI4TS/AI4TS.github.io/blob/main/Camera_Ready_AAAI2025/20%5CCameraReady%5Caaai2025_ai4ts%20(1).pdf.

[C3] **B. P. Maldonado**, F. Liu, N. Goth, P. Ramuhalli, M. Howell, R. Maekawa, B. Degraff, and S. Cousineau. Transient Optimization of the Cryogenic Moderator System Controller at the Spallation Neutron Source

for Improved Performance. In *2024 IEEE Conference on Control Technology and Applications (CCTA)*, pages 446–451, Newcastle upon Tyne, United Kingdom, 08 2024. doi:10.1109/CCTA60707.2024.10666628.

[C4] Y. Liu, R. Zhang, N. W. Hayes, D. Hun, and **B. P. Maldonado**. Cable-Driven Parallel Robot (CDPR) for Panelized Envelope Retrofits: Feasible Workspace Analysis. In *Proceedings of the 41th International Symposium on Automation and Robotics in Construction*, pages 1081–1088, Lille, France, 06 2024. International Association for Automation and Robotics in Construction (IAARC). doi:10.22260/ISARC2024/0140.

[C5] N. W. Hayes, **B. P. Maldonado**, M. Tang, P. Wang, and D. Hun. Optimization of prefabricated component installation using a real-time evaluator (RTE) connection locating system. In *Proceedings of the 41st International Symposium on Automation and Robotics in Construction*, pages 65–72, Lille, France, 06 2024. International Association for Automation and Robotics in Construction (IAARC). doi:10.22260/ISARC2024/0010.

[C6] N. W. Hayes, **B. P. Maldonado**, M. Tang, and D. Hun. Flat and Level Analysis Tool (FLAT) for real-time automated segmentation and analysis of concrete slab point clouds. In *Proceedings of the 41th International Symposium on Automation and Robotics in Construction*, pages 838–846, Lille, France, 06 2024. International Association for Automation and Robotics in Construction (IAARC). doi:10.22260/ISARC2024/0109.

[C7] M. Tang, N. W. Hayes, **B. P. Maldonado**, and D. Hun. Component pose reconstruction using a single robotic total station for panelized building envelopes. In *Proceedings of the 41th International Symposium on Automation and Robotics in Construction*, pages 105–112, Lille, France, 06 2024. International Association for Automation and Robotics in Construction (IAARC). doi:10.22260/ISARC2024/0015.

[C8] N. Goth, F. Liu, **B. P. Maldonado**, P. Ramuhalli, M. Howell, R. Maekawa, and S. Cousineau. Dynamic systems modeling of the spallation neutron source cryogenic moderator system to optimize transient control and prepare for power upgrades. In *Cryogenic Engineering Conference and International Cryogenic Materials Conference*, volume 1301, page 012088. IOP Publishing, 05 2024. doi:10.1088/1757-899X/1301/1/012088.

[C9] B. Kaul, **B. P. Maldonado**, A. Michlberger, and S. Halley. Analysis of Real-World Preignition Data Using Neural Networks. *SAE Technical Paper 2023-01-1614*, 08 2023. doi:10.4271/2023-01-1614.

[C10] X. Zhao, **B. P. Maldonado**, S. Liu, S. H. Lim, W. Gurecky, D. Lu, M. Howell, F. Liu, W. William, and P. Ramuhalli. Knowledge-Informed Uncertainty-Aware Machine Learning for Time Series Forecasting of Dynamical Engineered Systems. In *13th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human-Machine Interface Technologies*, 07 2023. doi:10.13182/NPICHMIT23-41039.

[C11] **B. P. Maldonado**, N. W. Hayes, and D. Hun. Automatic point Cloud Building Envelope Segmentation (Auto-CuBES) using Machine Learning. In *Proceedings of the 40th International Symposium on Automation and Robotics in Construction*, pages 48–55, Chennai, India, 07 2023. International Association for Automation and Robotics in Construction (IAARC). doi:10.22260/ISARC2023/0009.

[C12] N. W. Hayes, **B. P. Maldonado**, D. Hun, and P. Wang. Real-time evaluator to optimize and automate crane installation of prefabricated components. In *Proceedings of the 40th International Symposium on Automation and Robotics in Construction*, pages 192–199, Chennai, India, 07 2023. International Association for Automation and Robotics in Construction (IAARC). doi:10.22260/ISARC2023/0028.

[C13] **B. P. Maldonado**, N. W. Hayes, D. Howard, and D. Hun. Automatic Segmentation of Building Envelope Point Cloud Data Using Machine Learning. In *15th International Conference on Thermal Performance of the Exterior Envelopes of Whole Buildings*, page 520 – 527, Clearwater Beach, FL, USA, 12 2022.

[C14] **B. P. Maldonado**, B. C. Kaul, and J. Szybist. Artificial Neural Networks for In-Cycle Prediction of Knock Events. *SAE Technical Paper 2022-01-0478*, 03 2022. doi:10.4271/2022-01-0478.

[C15] C. D. Schuman, S. R. Young, **B. P. Maldonado**, and B. C. Kaul. Real-Time Evolution and Deployment of Neuromorphic Computing at the Edge. In *12th International Green and Sustainable Computing*

Workshop (IGSC), pages 1–8, Pullman, WA, USA, 10 2021. doi:10.1109/IGSC54211.2021.9651607.

[C16] **B. P. Maldonado**, B. C. Kaul, C. D. Schuman, S. R. Young, and J. P. Mitchell. Dilute Combustion Control Using Spiking Neural Networks. *SAE Technical Paper 2021-01-0534*, 03 2021. doi:10.4271/2021-01-0534.

[C17] C. D. Schuman, S. R. Young, J. P. Mitchell, J. T. Johnston, D. Rose, **B. P. Maldonado**, and B. C. Kaul. Low Size, Weight, and Power Neuromorphic Computing to Improve Combustion Engine Efficiency. In *11th International Green and Sustainable Computing Workshop (IGSC)*, pages 1–8, Pullman, WA, USA, 10 2020. doi:10.1109/IGSC51522.2020.9291228.

[C18] **B. P. Maldonado** and B. C. Kaul. Control-oriented modeling of cycle-to-cycle combustion variability at the misfire limit in si engines. In *Proceedings of the ASME 2020 Dynamic Systems and Control Conference*, page V002T26A001, Virtual, Online, 10 2020. doi:10.1115/DSCC2020-3255.

[C19] M. Bieniek, **B. P. Maldonado**, A. G. Stefanopoulou, and J. Hoard. Online Control of Process Variance Using Feedback. In *2020 American Control Conference (ACC)*, pages 3589–3594, Denver, CO, USA, 07 2020. doi:10.23919/ACC45564.2020.9147900.

[C20] E. R. Amezcua, **B. P. Maldonado**, D. Rothamer, K. Kim, C. Kweon, and A. G. Stefanopoulou. Accelerometer-Based Estimation of Combustion Features for Engine Feedback Control of Compression-Ignition Direct-Injection Engines. *SAE Technical Paper 2020-01-1147*, 2020. doi:10.4271/2020-01-1147.

[C21] **B. P. Maldonado**, A. G. Stefanopoulou, R. Scarcelli, and S. Som. Characteristics of Cycle-to-Cycle Combustion Variability at Partial-Burn Limited and Misfire Limited Spark Timing Under Highly Diluted Conditions. In *ASME 2019 Internal Combustion Engine Division Fall Technical Conference*, page V001T03A018, Chicago, IL, USA, 10 2019. doi:10.1115/ICEF2019-7256.

[C22] **B. P. Maldonado**, C. E. Solbrig, and A. G. Stefanopoulou. Feasibility and Calibration Considerations for Selection of Combustion Control Features. In *2019 IEEE Conference on Control Technology and Applications (CCTA)*, pages 412–417, Hong Kong, China, 08 2019. doi:10.1109/CCTA.2019.8920631.

[C23] **B. P. Maldonado** and A. G. Stefanopoulou. Non-Equiprobable Statistical Analysis of Misfires and Partial Burns for Cycle-to-Cycle Control of Combustion Variability. In *ASME 2018 Internal Combustion Engine Division Fall Technical Conference*, page V002T05A003, San Diego, CA, USA, 11 2018. doi:10.1115/ICEF2018-9540.

[C24] **B. P. Maldonado**, J. S. Freudenberg, and A. G. Stefanopoulou. Stochastic Feedback Combustion Control at High Dilution Limit. In *2018 Annual American Control Conference (ACC)*, pages 1598–1603, Milwaukee, WI, USA, 06 2018. doi:10.23919/ACC.2018.8431020.

[C25] **B. P. Maldonado**, H. Lian, J. B. Martz, A. G. Stefanopoulou, K. Zaseck, and E. Kitagawa. Combustion shaping using multivariable feedback control. In *2017 American Control Conference (ACC)*, pages 4760–4765, Seattle, WA, USA, 05 2017. doi:10.23919/ACC.2017.7963691.