
DOUGLAS L. ALLAIRE

Associate Professor and Sallie and Don Davis '61 Faculty Fellow,
J. Mike Walker '66 Department of Mechanical Engineering, Texas A&M University
3123 Texas A&M University, College Station, TX 77843-3123
dallaire@tamu.edu, 979.458.9889

ACADEMIC APPOINTMENTS

Associate Professor

J. Mike Walker '66 Department of Mechanical Engineering, Sep 2020 – Present
Texas A&M University, College Station, TX

Assistant Professor

J. Mike Walker '66 Department of Mechanical Engineering, Jan 2014 – Aug 2020
Texas A&M University, College Station, TX

Research Interests: Simulation-based Design and Analysis, Multidisciplinary Design Analysis and Optimization, Uncertainty Quantification, Multifidelity Methods, Machine Learning, Data Driven Analysis and Design

Teaching Interests: Numerical Methods for Engineers, Multidisciplinary Design Optimization, Applied Linear Algebra, Machine Learning, Uncertainty Quantification, Fluid Mechanics

Visiting Scholar

Department of Aeronautics and Astronautics, Jan 2014 – Present
Massachusetts Institute of Technology, Cambridge, MA

EDUCATION

Massachusetts Institute of Technology Cambridge, MA

Ph.D., Aerospace Engineering June 2009
Dissertation: Uncertainty Assessment of Complex Models with Application to Aviation
Environmental Systems
Advisor: Karen E. Willcox

M.S., Aerospace Engineering June 2006
Thesis: A Physics-Based Emissions Model for Aircraft Gas Turbine Combustors
Advisors: Karen E. Willcox and Ian A. Waitz

B.S., Aerospace Engineering June 2004

RESEARCH AND TEACHING EXPERIENCE

Associate Professor, Texas A&M University, College Station, TX 2020 – Present
Assistant Professor, Texas A&M University, College Station, TX 2014 – 2020
Research Scientist, MIT, Cambridge, MA 2011 – 2013

Lecturer, MIT, Cambridge, MA	2012
Postdoctoral Associate, MIT, Cambridge, MA	2009 – 2011
Research Assistant, MIT, Cambridge, MA	2004 – 2009

RESEARCH ACTIVITIES

Publications

Journal Articles (* indicates current or former student at TAMU, † indicates corresponding author if declared)

43. Couperthwaite, R., Khatamsaz*, D., Molkeri, A., James*, J., Srivastava, A., Allaire, D., and Arroyave, R., “The BAREFOOT Optimization Framework,” *Integrating Materials and Manufacturing Innovation*, <https://doi.org/10.1007/s40192-021-00235-2>, 2021.
42. Molkeri, A., Khatamsaz*, D., Couperthwaite, R., James*, J., Arroyave, R., Allaire, D., and Srivastava, A., “On the Importance of Microstructure Information in Materials Design: PSP vs PP,” *Acta Materialia*, 223:117471, <https://doi.org/10.1016/j.actamat.2021.117471>, 2021.
41. Khatamsaz*, D., Molkeri, A., Couperthwaite, R., James*, J., Arroyave, R., Srivastava, A., and Allaire, D., “Adaptive Active Subspace-Based Efficient Multifidelity Materials Design,” *Materials & Design*, 209:110001, <https://doi.org/10.1016/j.matdes.2021.110001>, 2021.
40. Khatamsaz*, D., Peddareddygari*, L., Friedman*, S., and Allaire, D., “Bayesian Optimization of Multi Objective Functions Using Multiple Information Sources,” *AIAA Journal*, 59(6), <https://doi.org/10.2514/1.J059803>, 2021.
39. Khatamsaz*, D., Molkeri, A., Couperthwaite, R., James*, J., Arroyave, R., Allaire, D., and Srivastava, A., “Efficiently Exploiting Process-Structure-Property Relationships in Material Design by Multi-Information Source Fusion,” *Acta Materialia*, 206:116619, <https://doi.org/10.1016/j.actamat.2020.116619>, 2021.
38. Couperthwaite, R., Allaire, D., and Arroyave, R., “Utilizing Gaussian Processes to Fit High Dimension Thermodynamic Data That Includes Estimated Variability,” *Computational Materials Science*, 188:110133, <https://doi.org/10.1016/j.commatsci.2020.110133>, 2021.
37. Zhang*, G., Allaire, D., and Cagan, J., “Taking the Guess Work Out of the Initial Guess: A Solution Interval Method for Least Squares Parameter Estimation in Nonlinear Models,” *(ASME) Journal of Computing and Information Science in Engineering*, 21(2):021011, 2021.
36. Couperthwaite, R., Molkeri, A., Khatamsaz*, D., Srivastava, A., Allaire, D., and Arroyave, R., “Materials Design through Batch Bayesian Optimization with Multisource Information Fusion,” *JOM*, 72:4431-4443, 2020.
35. Sanabria-Borbón, A., Soto-Aguilar, S., Estrada-López, J., Allaire, D., and Sanchez-Sinécio, E., “Gaussian-Process-based Surrogate for Optimization-aided and Process-variations-aware Analog Circuit Design,” *Electronics* 9(4), 685, 2020.
34. Ghosh, S., Seede, R., James*, J., Karaman, I., Elwany, A., Allaire, D., Arroyave, R., “Statistical Modeling of Microsegregation in Laser Powder Bed Fusion,” *Philosophical Magazine Letters* 100 (6), pp. 271-282, 2020.
33. Burrows*, B. and Allaire, D., “Nonlinear Kalman filtering via measure change,” *American Society of Mechanical Engineers (ASME) Journal of Dynamic Systems, Measurement, and Control* 142(2):021006, 2020.
32. Attari, V., Honarmandi, P., Duong, T., Saucedo, D., Allaire, D., and Arroyave, R. “Uncertainty Propagation in a Multiscale CALPHAD-Reinforced Elastochemical Phase-field Model,” *Acta Materialia*, 183:452-470, 2020.
31. McAdams, D., Zhang*, G., Morris, E., and Allaire, D., “Research Opportunities and Challenges in Engineering System Evolution,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, pp. 1-75, 2020.

30. Ghoreishi*, S.F., Thomison*, W.D., and Allaire, D., “Sequential Information-Theoretic and Reification-Based Approach for Querying Multi-Information Sources,” *American Institute of Aeronautics and Astronautics (AIAA) Journal of Aerospace Information Systems*, 16(12): 575-587, 2019.
29. Ghoreishi*, S.F., Molkeri, A., Arroyave, R., Allaire, D., and Srivastava†, A., “Efficient Use of Multiple Information Sources in Material Design,” *Acta Materialia*, 180: 260-271, 2019.
28. Talapatra, A., Boluki, S., Honarmandi, P., Solomou, A., Ghoreishi*, S.F., Molkeri, A., Allaire, D., Srivastava, A., Qian, X., Dougherty, E., Lagoudas, D., and Arroyave, R., “Experiment design frameworks for accelerated discovery of targeted materials across scales,” *Frontiers in Materials*, 6:82, 2019.
27. Zhang*, G., Allaire, D., Shankar, V., and McAdams, D., “A case against the trickle-down effect in technology ecosystems,” *PLoS ONE*, 14(6):e0218370, 2019.
26. Ghoreishi*, S.F., Friedman*, S., and Allaire, D., “Adaptive dimensionality reduction for fast sequential optimization with Gaussian processes,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 141(7):071404, 2019.
25. Swischuk*, R. and Allaire, D., “A machine learning approach to aircraft sensor error detection and correction,” *American Society of Mechanical Engineers (ASME) Journal of Computing and Information Science in Engineering*, 19(4):041009, 2019.
24. Ghosh, S., Mahmoudi, M., Johnson, L., Elwany, A., Arroyave, R., and Allaire, D., “Uncertainty management of microsegregation during laser powder bed fusion,” *Modelling and Simulation in Materials Science and Engineering*, 27(3):034002, 2019.
23. Isaac*, B. and Allaire†, D., “Expensive black-box optimization via a gold rush policy,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 141(3):031401, 2019. Also published in the Proceedings of the American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, IDETC2018-85881, Quebec City, Quebec, Canada, August 2018. **[Design Automation Conference (DAC) 2018 best paper]**
22. Honarmandi†, P., Duong, T.C., Ghoreishi*, S.F., Allaire, D., and Arroyave, R., “Bayesian uncertainty quantification and information fusion in CALPHAD-based thermodynamic modeling,” *Acta Materialia*, 164, pp. 636-647, 2019.
21. Allen*, R.C., Allaire†, D., and El-Halwagi, M., “Capacity planning for modular and transportable infrastructure for shale gas production and processing,” *Industrial & Engineering Chemistry Research*, 10.1021/acs.iecr.8b04255, 2018.
20. Zhang*, G., Allaire, D., Shankar, V., and McAdams†, D., “System evolution prediction and manipulation using a Lotka-Volterra ecosystem model,” *Design Studies*, Vol. 60, pp. 103-138, 2019.
19. Ghoreishi*, S.F., and Allaire, D., “Multi-information source constrained Bayesian optimization,” *Structural and Multidisciplinary Optimization*, <https://doi.org/10.1007/s00158-018-2115-z>, 2018.
18. Zhang*, G., Allaire, D., McAdams†, D., and Shankar, V., “Generating technology evolution prediction intervals using a bootstrap method”, *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 141(6):061401, 2019. Also published in the Proceedings of the American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, IDETC2018-85259, Quebec City, Quebec, Canada, August 2018.
17. Ghoreishi*, S.F., Molkeri, A., Srivastava, A., Arroyave, R., and Allaire†, D., “Multi-information source fusion and optimization to realize ICME: application to dual phase materials,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 140(11): 111409, 2018.
16. Arroyave, R., Shields, S., Chang, C., Fowler, D., Malak, R., and Allaire†, D., “Interdisciplinary research on designing engineering material systems: results from a National Science Foundation workshop,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 140(11): 110801, 2018.

15. Curran[†], Q., Allaire, D., and Willcox, K., “Sensitivity analysis methods for mitigating uncertainty in engineering system design,” *Journal of Systems Engineering*, 21: 191-209, 2018.
14. Burrows*, B., Isaac*, B., and Allaire, D., “A conjunctive filtering approach to multi-task aircraft capability estimation in dynamic data-driven application systems,” *American Institute of Aeronautics and Astronautics (AIAA) Journal of Aerospace Information Systems*, Vol. 14, No. 12, pp. 625-636, 2017.
13. Ghoreishi*, S.F., and Allaire, D., “Adaptive uncertainty propagation for coupled multidisciplinary systems,” *American Institute of Aeronautics and Astronautics (AIAA) Journal*, Vol. 55, No. 11, pp. 3940-3950, 2017.
12. Amaral, S., Allaire, D., de la Rosa Blanco, E., and Willcox[†], K. “A decomposition-based uncertainty quantification approach for environmental impacts of aviation technology and operation,” *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, 31(3):251-264, 2017.
11. Ulker, F., Allaire[†], D., and Willcox, K., “Sensitivity-guided decision-making for wind farm micro-siting,” *International Journal for Numerical Methods in Fluids*, 83(1): 57-72, 2017.
10. Amaral[†], S., Allaire, D., and Willcox, K., “Optimal L₂-norm empirical importance weights for the change of probability measure,” *Statistics and Computing*, 27(3), pp. 625-643, 2017.
9. Opgenoord[†], M., Allaire, D., and Willcox, K., “Variance-based sensitivity analysis to support simulation-based design under uncertainty,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 138(11): 111410-111421, 2016.
8. Lecerf, M., Allaire, D., and Willcox, K., “Methodology for dynamic data-driven online flight capability estimation,” *American Institute of Aeronautics and Astronautics (AIAA) Journal*, 53(10):3073-3087, 2015.
7. Amaral, S., Allaire, D., and Willcox[†], K., “A decomposition-based approach to uncertainty analysis of multicomponent systems,” *International Journal for Numerical Methods in Engineering*, 100:982-1005, 2014.
6. Allaire[†], D. and Willcox, K., “Uncertainty assessment of complex models with application to aviation environmental policy-making,” *Transport Policy*, 34:109-113,2014.
5. Allaire, D., Willcox[†], K., Noel, G., and Cointin, R., “Uncertainty quantification of an aviation environmental toolsuite,” *Reliability Engineering & System Safety*, 126:14-24, 2014.
4. Allaire[†], D. and Willcox, K., “A mathematical and computational framework for multifidelity design and analysis with computer models,” *International Journal for Uncertainty Quantification*, 4(1):1-20, 2014.
3. Allaire[†], D., He, Q., Deyst, J., and Willcox, K., “An information-theoretic metric of system complexity with application to engineering system design,” *American Society of Mechanical Engineers (ASME) Journal of Mechanical Design*, 134:100906-1-100906-10, 2012.
2. Allaire[†], D. and Willcox, K., “A variance-based sensitivity index function for factor prioritization,” *Reliability Engineering & System Safety*, 107: 107-114, 2012.
1. Allaire, D. and Willcox, K., “Surrogate modeling for uncertainty assessment with application to aviation environmental system models,” *American Institute of Aeronautics and Astronautics (AIAA) Journal*, 48(8):1791-1803, 2010.

Peer Reviewed Conference Papers (* indicates current or former student at TAMU or ** at MIT)

36. Khatamsaz*, D. Arroyave, R., and Allaire, D., “Materials Design using an Active Subspace-based Batch Bayesian Optimization Approach,” American Institute of Aeronautics and Astronautics (AIAA) SciTech Forum, accepted for publication, 2021.
35. Singh*, A. and Allaire, D. “Dynamic Data-Driven Sensor Placement for Enabling Capability Estimation of Self-aware Aerospace Vehicles,” American Institute of Aeronautics and Astronautics (AIAA) Aviation Forum, AIAA-2021-3096, <https://doi.org/10.2514/6.2021-3096>, 2021.

34. Peddareddygari*, L., and Allaire, D., “Time to Failure Prognosis of a Gas Turbine Engine Using Predictive Analytics,” American Institute of Aeronautics and Astronautics (AIAA) SciTech Forum, 2021-1355, <https://doi.org/10.2514/6.2021-1355>, 2021.
33. Khatamsaz*, D., and Allaire, D., “A Comparison of Reification and CoKriging for Sequential Multi-Information Source Fusion,” American Institute of Aeronautics and Astronautics (AIAA) SciTech Forum, 2021-1477, <https://doi.org/10.2514/6.2021-1477>, 2021.
32. Zhang*, G., Allaire, D., and Cagan, J., “Initial Guess Free Method for Least Squares Parameter Estimation in Nonlinear Models,” Proceedings of the ASME 2020 IDETC-CIE, St. Louis, MO, 2020.
31. Khatamsaz*, D., Peddareddygari*, L., Friedmam*, S., and Allaire, D., “Efficient Multi-Information Source Multiobjective Bayesian Optimization,” American Institute of Aeronautics and Astronautics (AIAA) SciTech Forum, AIAA-2127-2020, Orlando, FL, 2020.
30. Burrows*, B., and Allaire, D. “Analysis of uncertainty quantification techniques for vehicle capability in damaged composite aircraft”, American Institute of Aeronautics and Astronautics (AIAA) Aviation Forum, AIAA-3663-2019, Dallas, TX, 2019.
29. Imani, M., Ghoreishi*, S.F., Allaire, D., and Brago-Neto, U., “MFBO-SSM: Multi-fidelity Bayesian optimization for fast inference in state-space models,” Association for the Advancement of Artificial Intelligence (AAAI), Volume 33, pp. 7858-7865, 2019. [**16.2% acceptance**]
28. Sanghvi*, M., Honarmandi, P., Attari, V., Duong, T., Arryoave, R. and Allaire, D., “Uncertainty propagation via probability measure optimized importance weights with application to parametric materials models,” American Institute of Aeronautics and Astronautics (AIAA) SciTech Forum, AIAA-0967-2019, San Diego, CA, January, 2019.
27. Chang, C. N, Lavadia, C., Fowler, D., Allaire, D., and Arroyave, R. “Assessing Student Interdisciplinarity: Results from an Interdisciplinary Graduate Program in Science and Engineering Fields,” in proceedings of the American Society for Engineering Education (ASEE) Annual Conference & Exposition, Salt Lake City, UT, June, 2018.
26. Ghoreishi*, S.F. and Allaire, D., “Gaussian process regression for Bayesian fusion of multi-fidelity information sources,” American Institute of Aeronautics and Astronautics (AIAA) Aviation Forum, AIAA-4176-2018, Atlanta, GA, June, 2018.
25. Isaac*, B., Friedman*, S., and Allaire, D., “Efficient approximation of coupling variable fixed point sets for decoupling multidisciplinary systems,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-1908-2018, Kissimmee, FL, January, 2018.
24. Friedman*, S., Isaac*, B., Ghoreishi*, S.F., and Allaire, D., “Efficient decoupling of multiphysics systems for uncertainty propagation,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-1661-2018, Kissimmee, FL, January, 2018.
23. Swischuk*, R. and Allaire, D., “A machine learning approach to aircraft sensor error detection and correction,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-1164-2018, Kissimmee, FL, January, 2018.
22. Ghoreishi*, S.F. and Allaire, D., “A fusion-based multi-information source optimization approach using knowledge gradient policies,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-1159-2018, Kissimmee, FL, January, 2018.
21. Burrows*, B. and Allaire, D., “A comparison of naïve Bayes’ classifiers with applications to self-aware aerospace vehicles,” American Institute of Aeronautics and Astronautics (AIAA) Aviation Forum, AIAA-3819-2018, Denver, CO, June, 2017.
20. Friedman*, S., Ghoreishi*, S.F., and Allaire, D., “Quantifying the impact of different model discrepancy formulations in coupled multidisciplinary systems,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-1950-2017, Grapevine, TX, January, 2017.

19. Thomison*, W.D. and Allaire, D., “A model reification approach to fusing information from multifidelity information sources,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-1949-2017, Grapevine, TX, January, 2017.
18. Burrows*, B., Isaac*, B., and Allaire, D., “A dynamic data-driven approach to multiple task capability estimation for self-aware aerospace vehicles,” American Institute of Aeronautics and Astronautics (AIAA) Aviation Forum, AIAA-2016-4125, Washington, D.C., June, 2016.
17. Korobenko, A., Pigazzini, M., Singh, V., Kim, H., Allaire, D., Willcox, K., Marsden, A., and Bazilevs, Y., “Dynamic data-driven damage prediction in aerospace composite structures,” American Institute of Aeronautics and Astronautics (AIAA) Aviation Forum, AIAA-2016-4126, Washington, D.C., June, 2016.
16. Li*, K., and Allaire, D., “A compressed sensing approach to uncertainty propagation for approximately additive functions,” American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, IDETC2016-60195, Charlotte, N.C., August, 2016.
15. Rooney*, W., and Allaire, D., “Mitigating project schedule overruns due to misinterpretation of task instructions: an information-theoretic case for newspeak,” American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, IDETC2016-59677, August, 2016.
14. Friedman*, S., and Allaire, D., “Quantifying model discrepancy in coupled multi-physics systems,” American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, IDETC2016-59948, August, 2016.
13. Ghoreishi*, S., and Allaire, D., “Compositional uncertainty analysis via importance weighted Gibbs sampling for coupled multidisciplinary systems,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-2016-1443, San Diego, CA, January, 2016.
12. Isaac*, B., and Allaire, D., “A dynamic data-driven approach to optimal offline learning for online flight capability estimation,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-2016-1444, San Diego, CA, January, 2016.
11. Lam, R., Allaire, D., and Willcox, K., “Multifidelity optimization using statistical surrogate modeling for non-hierarchical information sources,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-2015-0143, Kissimmee, FL, January, 2015.
10. Allaire, D., Kordonowy, D., Lecerf, M., Mainini, L., and Willcox, K., “Multifidelity DDDAS methods with application to a self-aware aerospace vehicles,” *Procedia Computer Science*, 29:1182-1192, 2014.
9. Lecerf, M., Allaire, D., Kordonowy, D., and Willcox, K., “A dynamic data driven approach to online flight envelope updating for self aware aerospace vehicles,” American Institute of Aeronautics and Astronautics (AIAA) Science and Technology Forum, AIAA-2014-1175, National Harbor, MD, January, 2014.
8. Allaire, D., Kordonowy, D., Cowlagi, R., Chambers, J., Mainini, L., Ulker, F., Lecerf, M., and Willcox, K., “An offline/online dynamic data-driven capability for self-aware aerospace vehicles,” *Procedia Computer Science*, 18:1959-1968, 2013.
7. Allaire, D. and Willcox, K., “Fusing information from multifidelity computer models of physical systems,” 15th International Conference on Information Fusion, Fusion12-P-0231, 2012.
6. Amaral, S., Allaire, D., and Willcox, K., “A decomposition approach to uncertainty analysis of multidisciplinary systems,” 14th American Institute of Aeronautics and Astronautics/International Society for Structural and Multidisciplinary Optimization (AIAA/ISSMO) Multidisciplinary Analysis and Optimization Conference, AIAA-2012-5563, 2012.
5. He, Q., Allaire, D., Deyst, J., and Willcox, K., “A Bayesian framework for uncertainty quantification in the design of complex systems,” 14th American Institute of Aeronautics and

- Astronautics/International Society for Structural and Multidisciplinary Optimization (AIAA/ISSMO) Multidisciplinary Analysis and Optimization Conference AIAA-2012-5479, 2012.
4. Allaire, D., Toupet, O., and Willcox, K., “A Bayesian-based approach to multifidelity multidisciplinary design optimization,” 13th American Institute of Aeronautics and Astronautics/International Society for Structural and Multidisciplinary Optimization (AIAA/ISSMO) Multidisciplinary Analysis and Optimization Conference, AIAA-2010-9183, 2010.
 3. Noel, G., Allaire, D., Jacobson, S., Willcox, K. and Cointin, R., “Assessing the uncertainty in the FAA’s noise and emissions compliance model,” Institute of Noise Control Engineering, INTER-NOISE 2009 Paper IN09-516.
 2. Noel, G., Allaire, D., Jacobson, S., Willcox, K., and Cointin, R., “Assessment of the aviation environmental design tool,” 8th USA/Europe Air Traffic Management Research and Development Conference, 2009.
 1. Allaire, D., Waitz, I. and Willcox, K., “A Comparison of Two Methods for Predicting Emissions from Aircraft Gas Turbine Combustors,” American Society of Mechanical Engineers Turbo Expo 2007: Power for Land, Sea, and Air, GT2007-28346.

International Invited Talks

7. “Prescriptive Analytics for Asset Management via Machine Learning,” Petronas PROTEAN Workshop, Kuala Lumpur, Malaysia (July, 2019).
6. “What Next? Sequentially value-optimal engineering tasking for analysis and design,” Computational Methods for Design and Control of Next-Generation Engineered Systems Workshop, Singapore University of Technology and Design (SUTD), Singapore (May, 2018).
5. “Offline/online data-driven approaches to engineering analysis,” National University of Singapore, Department of Mechanical Engineering Seminar Series, Singapore (May, 2016).
4. “Compositional uncertainty quantification for coupled multiphysics systems,” Society for Industrial and Applied Mathematics (SIAM) Uncertainty Quantification (UQ) Conference, Lausanne, Switzerland (April, 2016).
3. “Robustness, prevention, and resilience: design under uncertainty for complex engineering systems,” Complex Systems Digital Campus (CS-DC) World e-conference (October, 2015).
2. “A Bayesian-based approach to multifidelity multidisciplinary design optimization,” Uncertainty Quantification Workshop, International Centre for Mathematical Sciences (ICMS), Edinburgh, Scotland (May, 2010).
1. “Application of the Sobol’ method to large-scale aviation environmental policy-making,” The 5th Summer School on Sensitivity Analysis of Model Output, Venice, Italy (September, 2008).

National Invited Talks

20. “Efficient uncertainty propagation for coupled systems,” Army Research Laboratory Seminar, Aberdeen Proving Grounds, MD (September, 2018).
19. “Global sensitivity analysis via transductive measure transformation,” Society for Industrial and Applied Mathematics (SIAM) Annual Meeting, Portland, OR (July, 2018).
18. “Towards efficient value-gradient querying via subspace optimization,” Air Force Research Laboratory, Dayton, OH (June, 2018).
17. “Design for dynamic data-driven self-aware systems,” American Society of Mechanical Engineers International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE), 43rd Design Automation Conference **KEYNOTE** on Data-Driven Engineering Design, Cleveland, OH (August, 2017).

16. “A model reification approach to fusing information from multifidelity information sources,” Society for Industrial and Applied Mathematics (SIAM) Computational Science and Engineering (CSE), Atlanta, GA (February, 2017).
15. “Dynamic data-driven methods for self-aware aerospace vehicles,” Air Force Office of Scientific Research (AFOSR) Dynamic Data Driven Application Systems (DDDAS) Program Review, Arlington, VA (January, 2016).
14. “Offline learning for dynamic data-driven capability estimation for self-aware aerospace vehicles,” The Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Philadelphia, PA (November, 2015).
13. “An offline/online compositional approach to uncertainty quantification for coupled multidisciplinary systems,” Texas A&M University, Department of Mathematics, Numerical Analysis Seminar (October, 2015).
12. “A scalable compositional approach to uncertainty quantification for the optimization under uncertainty of multi-physics systems,” Society for Industrial and Applied Mathematics (SIAM) Computational Science and Engineering (CSE), Salt Lake City, UT (March, 2015).
11. “Offline libraries and online classification for enabling a dynamic data-driven self-aware aerospace vehicle,” American Society of Mechanical Engineers International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE): Dynamic Data-Driven Application Systems Panel Session, Buffalo, NY (August, 2014).
10. “An offline/online approach to enabling a dynamic data-driven self-aware aerospace vehicle”, Massachusetts Institute of Technology, Dynamic Data Driven Application Systems Workshop, Cambridge, MA (May, 2014).
9. “A composition-based approach to uncertainty analysis with application to multi-information source optimization,” Information Science and Technology Institute, Los Alamos National Laboratory, Los Alamos, NM (April, 2014).
8. “Multi-information source optimization: resource allocation,” Materials by Design Workshop, Los Alamos National Laboratory, Los Alamos, NM (July, 2013).
7. “Multifidelity model management for conceptual design,” Air Force Research Laboratory, Multidisciplinary Science and Technology Center Technical Interchange Meeting on Multifidelity Methods, Dayton, OH (February, 2013).
6. “Sensitivity analysis for model management and model fusion for design and analysis,” Multi-Sampler Optimization Workshop, Santa Fe, NM (July, 2012).
5. “An information-theoretic metric of system complexity with application to engineering design,” 7th Consortium for Multidisciplinary Design Optimization, West Lafayette, IN (July, 2012); 2012 Spring Research Conference: Enabling the Interface Between Statistics and Engineering, Cambridge, MA (June, 2012); 8th AIAA Multidisciplinary Design Optimization Specialist Conference, Honolulu, HI (April, 2012).
4. “An entropy-based uncertainty measure and importance indicator,” Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Charlotte, NC (November, 2011).
3. “A multifidelity multidisciplinary conceptual design methodology,” 6th Consortium for Multidisciplinary Design Optimization, Ann Arbor, MI (July, 2011).
2. “Stochastic process decision methods for complex cyber-physical system design and development,” MIT Computer Science and Artificial Intelligence Laboratory (CSAIL), Cambridge, MA (November, 2010).
1. “A Bayesian-based approach to fidelity management for multidisciplinary design optimization,” Air Force Research Laboratory Seminar, Dayton, OH (April, 2010).

ADVISING ACTIVITIES

Ph.D. Students Advised

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>
8	Joseph Wagner	Dynamic Integration of Gradient Information in Multi-Information Source Optimization	Fall 2021 – Present
7	Shawanee' Patrick	Improving Design Metrics of Walking Assistive Devices – Co-Chair	Spring 2021 – Fall 2021
6	Danial Khatamsaz	Optimal Learning for Decision-Making in Engineering Analysis and Design	Spring 2019 – Present
5	Samuel Friedman	Quantifying Model Discrepancy in Coupled Multi-Physics Systems	Spring 2019 – Present
4	Jaylen James	Using Reification to Model the Behavior of High Strength Alloys – Co-Chair	Spring 2018 – Present
3	Benson Isaac	Optimal Offline Learning for Self-Aware Unmanned Aerial Vehicles	Fall 2014 – Present
2	S. Fatemeh Ghoreishi	Value of Information-based Multi-Information Source Optimization of Multi-Physics Systems	Summer 2016 – May 2019
1	Brian Burrows	Information Gathering and Multi-Task Learning for Self-Aware Unmanned Aerial Vehicles	Spring 2015 – May 2019

M.S. Students Advised

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>
12	Chaitra Sharma	Application of Resource Aware Bayesian Optimization to Multidisciplinary Design Optimization	Spring 2022 – Present
11	John Brinkley	Optimal Batch Sampling for Uncertainty Quantification with Gaussian Processes	Spring 2020 – Present
10	Alex Whittier	Product Design for Optimal Logistics Cost	Fall 2019 – Present
9	Lalith Peddyreddygari	Offline/Online Dynamic Data-Driven Self-Aware Unmanned Aerial Vehicle Capability Estimation	Spring 2019 – Summer 2020
8	Arjun Singh	Fusion of Heterogeneous Sensing Capabilities for Self-Aware Unmanned Aerial Vehicles	Spring 2019 – Fall 2020
7	Meet Sanghvi	Uncertainty Propagation via Probability Measure Optimized Importance Weights	Spring 2018 – Fall 2019
6	Samuel Friedman	Quantifying Model Discrepancy in Coupled Multi-Physics Systems	Fall 2015 – Spring 2019
5	R. Cory Allen	A Novel Approach for Multi-Facility	Fall 2017 – Spring

		Capacity Expansion and Contraction Problems Under Uncertainty	2018
4	W. Dillon Thomison	A Model Reification Approach to Fusing Information from Multifidelity Information Sources	Fall 2015 – Spring 2017
3	Warren Rooney	Mitigating Schedule Overruns Caused by Misinterpretation	Fall 2015 – Fall 2016
2	Kaiyu Li	A Compressed Sensing Approach to Uncertainty Propagation for Approximately Additive Functions	Fall 2014 – Fall 2016
1	S. Fatemeh Ghoreishi	Uncertainty Analysis for Coupled Multidisciplinary Systems using Sequential Importance Resampling	Fall 2014 – Summer 2016

Undergraduate Research Scholars Advised

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>
1	Renee Swischuk	A Machine Learning Approach to Pitot-Static Error Detection and Correction	Fall 2016 – Spring 2017

Post-Docs Advised

	<i>Name</i>	<i>Topic</i>	<i>Dates</i>
1	Supriyo Ghosh	Uncertainty quantification for additive manufacturing processes	Spring 2017 – Spring 2019

EXTERNAL FUNDING HISTORY (\$1,694,016 pro-rated)

9. **Title:** CDS&E: Efficient Uncertainty Analysis in Multi-physics Phase Field Models of Microstructure Evolution, **Sponsor:** National Science Foundation, **Principal Investigator:** Raymundo Arroyave, **Co-Principal Investigator:** Douglas Allaire, **Start Date:** 01/01/2021, **Total Amount:** \$301,620, **Pro-rated Dollar Value:** \$159,785.
8. **Title:** Batch-wise improvement in reduced design space using a holistic optimization technique, **Sponsor:** U.S. Department of Energy ARPA-E, **Principal Investigator:** Raymundo Arroyave, **Co-Principal Investigators:** Douglas Allaire, Alaa Elwany, Ibrahim Karaman, Miladin Radovic, and Ankit Srivastava, **Start Date:** April 26, 2021, **Total Amount:** \$492,543, **Pro-rated Dollar Value:** \$62,846.
7. **Title:** Uncertainty Propagation and Quantification in Multiscale Approaches to Materials Design, **Sponsor:** U.S. Army Research Laboratory through contract GF70017 with the University of North Texas under master award W911NF-132-0018, **Principal Investigator:** Raymundo Arroyave, **Co-Principal Investigator:** Douglas Allaire, **Start Date:** 04/2017, **Total Dollar Value:** \$107,845, **Pro-rated Dollar Value:** \$53,922.
6. **Title:** AFRL/TAMU Data-Enabled Discovery and Design of Materials (D³M), **Sponsor:** Air Force Research Laboratory, **Senior Personnel:** 16 total, including Douglas Allaire, **Start Date:** 12/2017, **Total Dollar Value:** \$400,000. **Pro-Rated Dollar Value:** \$25,000.
5. **Title:** Multi-Information Source Value of Information Based Design of Multi-Phase Structural Materials, **Sponsor:** National Science Foundation Design of Engineering Materials Systems Program, **Principal Investigator:** Douglas Allaire, **Co-Principal Investigators:** Raymundo

- Arróyave, Ibrahim Karaman, Ankit Srivastava, **Start Date:** 6/2017, **Total Dollar Value:** \$692,859, **Pro-rated Dollar Value:** \$226,499.
4. **Title:** Workshop: Interdisciplinary Frontiers of Designing Engineering Material Systems, **Sponsor:** National Science Foundation Design of Engineering Material Systems Program, **Principal Investigator:** Richard Malak, **Co-Principal Investigators:** Douglas Allaire, Raymundo Arróyave, Debra Fowler, **Start Date:** 5/2016, **Total Dollar Value:** \$49,999, **Pro-rated Dollar Value:** \$20,595.
 3. **Title:** NRT-DESE: Data-enabled discovery and design of energy materials (D³EM), **Sponsor:** National Science Foundation National Research Traineeship Program, **Principal Investigator:** Raymundo Arróyave, **Co-Principal Investigators:** Douglas Allaire, Edward Dougherty, Debra Fowler, Jodie Lutkenhaus, Richard Malak, Miladin Radovic, Joseph Ross, Hongcai Zhou, **Start Date:** 1/2016, **Total Dollar Value:** \$2,976,937: **Pro-rated Dollar Value:** \$92,285, **Graduate Students Supported:** Up to ~40 1 year support fellowships.
 2. **Title:** A Unified Mathematical and Algorithmic Framework for Managing Multiple Information Sources of Multi-Physics Systems, **Sponsor:** Air Force Office of Scientific Research, **Principal Investigator:** Karen Willcox, **Co-Principal Investigators:** Douglas Allaire, Peter Frazier, Joaquim Martins, Youssef Marzouk, Marc Mignolet, David Wolpert, **Start Date:** 7/2014, **Total Dollar Value:** \$7,173,195, **Pro-rated Dollar Value:** \$753,084.
 1. **Title:** Dynamic Data-Driven Methods for Self-Aware Aerospace Vehicles, **Sponsor:** Air Force Office of Scientific Research, **Principal Investigator:** Karen Willcox, **Co-Principal Investigators:** Douglas Allaire, Cory Kays, **Start Date:** 6/2016, **Total Dollar Value:** \$1,200,000, **Pro-rated Dollar Value:** \$300,000.

EDUCATIONAL ACTIVITIES

Courses Taught

- 20 total sections taught as instructor of record
- 5 different courses
- 1,029 students total (516 undergraduate and 513 graduate)

	<i>Course</i>	<i>Description</i>	<i>Terms & No. of Students</i>
1	MEEN 423: Machine Learning for Mechanical Engineers	New undergraduate course on machine learning with application to mechanical systems (Co-Creator)	Spring 2020(14)
2	MEEN 683: Multidisciplinary System Analysis and Design Optimization	Graduate course on multidisciplinary design optimization techniques (Creator)	Spring 2015(10), Spring 2016(8), Spring 2017(29), Spring 2018(41), Spring 2019(45), Spring 2020(57)
3	MEEN 602: Modeling and Analysis of Mechanical Systems	Graduate course in mathematical modeling and analysis (Co-Creator)	Fall 2016(49), Fall 2017(48), Fall 2018(59), Fall 2019(55), Fall 2020(52), Fall 2021(60)
4	MEEN 357: Engineering Analysis for Mechanical Engineers	Required undergraduate course in numerical analysis and computational methods (Course Coordinator)	Spring 2014(45), Fall 2014(96), Fall 2016(100), Fall 2018(89), Fall 2019(93), Fall 2021(69)
5	MEEN 401: Intro to Mechanical Engineering Design	Studio section of capstone undergraduate design course sequence	Fall 2015(10)

Course Development

MEEN 423: Machine Learning for Mechanical Engineers

- Newly developed undergraduate course Co-Created with Dr. Richard Malak.
- Topics include: linear regression and classification; logistic regression; artificial neural networks; support vector machines; random forests; k-nearest neighbors; clustering; feature reduction; principal component analysis; applications to mechanical systems.
- Developed lecture and evaluation materials for course.

MEEN 602: Modeling and Analysis of Mechanical Systems

- Newly developed graduate course.
- Topics include: Solution of linear mechanical systems; difference equations; differential equations; eigenvalue analysis of dynamical systems; minimum principles; and equilibrium of mechanical systems.
- Developed lecture and evaluation materials for course.

MEEN 683: Multidisciplinary System Analysis and Design Optimization

- Newly developed graduate course.
- Topics include: engineering systems modeling for analysis, design, and optimization; selection of design variables, objective functions, and constraints; subsystem identification, development, and interface design; review of optimization formulations; approximation methods; multiobjective optimization and Pareto optimality.
- Developed lecture and evaluation materials for course.

LEADERSHIP AND SERVICE ACTIVITIES

National and International Service

National Science Foundation

- Proposal review panel (4) & ad-hoc reviewer (1)

American Society of Mechanical Engineers (ASME)

- Panelist, ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE) Conference, Buffalo, NY, 2014.

American Institute of Aeronautics and Astronautics (AIAA)

- Elected Member, Multidisciplinary Design Optimization Technical Committee. May 2015 – present. Chair of Publications Sub-Committee, May 2018 – May 2020
- Panelist, Complex Aerospace Systems Exchange Conference, Los Angeles, CA, 2013.

Journals

- Associate Editor, AIAA Journal of Aerospace Information Systems, January 2020 – present.

Conference Organizing Committees

- Technical Chair, Multidisciplinary Analysis and Optimization Conference at the AIAA Aviation Forum, June 2018 – June 2019.
- Technical Co-Chair, Multidisciplinary Analysis and Optimization Conference at the AIAA Aviation Forum, June 2017 – June 2018.
- Symposium Organizer, ASME Systems Engineering Information and Knowledge Management (SEIKM) as part of the ASME IDETC/CIE Conference, 2015, 2016, 2017, 2018, 2019.
- Organizer, Mini-symposium on Multi-Information Source Optimization, held at 2013 Society for Industrial and Applied Mathematics (SIAM) Computational Science and Engineering (CSE) Conference, Boston, MA.

Conference Session Chair

- AIAA Aviation, Dallas, TX, June 2019.
- AIAA SciTech, San Diego, CA, January 2019.
- AIAA Aviation, Atlanta, GA, June 2018.
- AIAA SciTech, Kissimmee, FL, January 2018.
- ASME IDETC, Cleveland, OH, August 2017.
- AIAA Aviation, Denver, CO, June 2017.
- AIAA SciTech, Grapevine, TX, January 2017.
- ASME IDETC, Charlotte, N.C., August 2016.
- SIAM Annual Meeting, Boston, MA, July 2016.
- AIAA Aviation, Washington, D.C., June 2016.
- AIAA SciTech, San Diego, CA, January, 2016.

Workshop Organizing Committees

- American Society of Mechanical Engineers Workshop: Technology Forecasting for Engineering Design, Anaheim, CA, August, 2019.
- American Institute of Aeronautics and Astronautics Workshop: Multifidelity Modeling in Support of Design and Uncertainty Quantification, Dallas, TX, June, 2019.
- National Science Foundation Workshop: Interdisciplinary Frontiers of Designing Engineering Material Systems, College Station, TX, July, 2017.

Departmental and University Service

- Member of the MEEN Tenure and Promotion Committee, Spring 2022 – Present.
- Member of the MEEN Educational Development Committee, Fall 2021 – Present.
- Academy for Future Faculty Mentor, Fall 2019 – Spring 2020.
- TEES Turbomachinery Laboratory Fellowship Committee, Spring 2020.
- Graduate Diversity Excellence Fellowship Reviewer, February 2020.
- Mentor in the Texas A&M University First-Generation Engineering Students Mentoring Program, Spring 2017 – Spring 2020.
- Member of the MEEN Faculty Search Committee, Sept. 2019 – Aug. 2020.

- Member of the MEEN Graduate Studies and Research Committee, Sept. 2014 – Aug. 2020. Appointed 2014, Elected 2015.
- Member of the MEEN Qualifying Exam Committee, Sept. 2017 – Aug. 2021.
- Member of ad-hoc committee on developing new MEEN 602 graduate course on modeling and analysis of mechanical systems, Jan. 2015 – May 2015.
- Judge, Mechanical Engineering Leadership Council (MELC) poster competition, Fall 2015.
- Member of the MEEN Seminar Committee, Jan. 2014 – Dec. 2015.
- Serving or have served on the Ph.D. or M.S. committees of 20 students in the Texas A&M College of Engineering. This does not include my own students.

Peer Review Activities

Research Proposals (cumulative: 28)

- Air Force Office of Scientific Research, 6 proposals
- European Research Council, 1 proposal
- National Science Foundation, 21 proposals

Journal Articles (cumulative: 73)

- Aerospace Science and Technology (2)
- AIAA Journal (8)
- AIAA Journal of Aerospace Information Systems (16)
- AIAA Journal of Aircraft (1)
- Applications in Engineering Science (1)
- Applied Mathematical Modeling (1)
- ASME Journal of Computing and Information Science in Engineering (1)
- ASME Journal of Risk and Uncertainty in Engineering Systems (3)
- ASME Journal of Mechanical Design (15)
- ASME Journal of Verification, Validation, and Uncertainty Quantification (2)
- Artificial Intelligence for Engineering Design, Analysis, and Manufacturing (2)
- Computers and Mathematics with Applications (1)
- European Journal of Operational Research (1)
- International Journal of Aerospace Engineering (2)
- International Journal of Production Research (2)
- International Journal for Uncertainty Quantification (2)
- Journal of Applied Statistics (1)
- Reliability Engineering & System Safety (1)
- SIAM Journal on Uncertainty Quantification (1)
- SIAM Journal on Scientific Computing (1)
- Structural and Multidisciplinary Design Optimization (8)
- Systems Engineering (1)

Conferences (cumulative: 70)

- ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC/CIE) (21)
- AIAA SciTech and Aviation Conferences (49)

HONORS AND AWARDS

- ASME Journal of Mechanical Design Editors' Choice Award Honorable Mention, 2020.
- Texas A&M University J. Mike Walker '66 Department of Mechanical Engineering Sallie and Don Davis '61 Faculty Fellow I Assistant Professor, 2020.
- ASME Design Automation Conference Best Paper Award, 2018.
- ASME Computers and Information in Engineering Young Engineer Award, 2018.
- Texas A&M University Dean of Engineering Excellence Award, 2017.
- Texas A&M University J. Mike Walker '66 Department of Mechanical Engineering James J. Cain Graduate Teaching Award, 2017.
- Texas A&M University J. Mike Walker '66 Department of Mechanical Engineering Sallie and Don Davis '61 Faculty Fellow I Assistant Professor, 2017.

PROFESSIONAL AFFILIATIONS

American Institute of Aeronautics and Astronautics (AIAA), Senior Member
American Society of Mechanical Engineers (ASME), Member
Society for Industrial and Applied Mathematics (SIAM), Member
SIAM Activity Group on Uncertainty Quantification, Member
SIAM Activity Group on Computational Science and Engineering, Member