Anh Vuong Tran

Personal Information

Job title:	(Limited-term) Senior Member of Technical Staff
Department:	Optimization and Uncertainty Quantification Department
Affiliation:	Sandia National Laboratories
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Employment History

Senior Member of Technical Staff	Sandia National Laboratories	Sep 2020 – Present
Postdoctoral Appointee	Sandia National Laboratories	Jan 2019 – Sep 2020
Technical Consultant	KSB/GIW Industries, Inc.	Jan 2019 – Dec 2019
Graduate Research Assistant	Georgia Institute of Technology	Aug 2014 – Dec 2018
Engineering Intern	KSB/GIW Industries, Inc.	May 2013 – Dec 2018
Graduate Teaching Assistant	Georgia Southern University	Aug 2012 – May 2014

Education

Ph.D. **Georgia Institute of Technology**, Atlanta, GA
December 2018 | Mechanical Engineering
Dissertation: Multiscale uncertainty quantification for physics-based data-driven materials design and optimization
Committee members: Prof. Yan Wang (Chair), Prof. David McDowell, Prof. Hongyuan Zha, Prof. Chaitanya Deo, Dr. Xin Sun (ORNL)
Qualification subjects: Computer-aided Engineering, Mechanics of Materials, Applied Mathematics.

M.S. **Georgia Institute of Technology**, Atlanta, GA
May 2018 | Mechanical Engineering

M.S. **Georgia Southern University**, Statesboro, GA
May 2014 | Applied Mathematics
Thesis: Adaptive state feedback control of Lorenz systems to its non-trivial equilibrium
Advisor: Prof. Yan Wu

B.S. **Georgia Institute of Technology**, Atlanta, GA
December 2011 | Mechanical Engineering

Awards and Honors

2020	ASME IDETC/CIE 2020 - Computer and Information in Engineering (CIE) Best Paper Award
2019	ASME IDETC/CIE 2019 - Advanced Modeling and Simulation (AMS) Best Paper Award
2019	Travel Awards (MUMS Transition Workshop and SPUQ – May 2019)
2010	Finalist Awards (top 1%) in the Mathematical Contest in Modeling (MCM/COMAP) MCM Problem A. Link to Press Release Contest results on April 1, 2010 available here
2010	6^{th} place in US National Collegiate Mathematics Championship Pittsburgh, PA. August 7, 2010
2009 – 2010	Recipient of Gulfstream Aerospace scholarship. August 2009 – May 2010
2008 – 2009	Champions in Departmental Mathematical Problem Solving Contest. Georgia Southern University
2009	Putnam Exam (19 points) (link).

Projects, grants, and roles

1. Jan 2021 – present: DAKOTA Model-form error. PI: Kathryn Maupin. Role: Developer. Dalbey, K., Eldred, M. S., Geraci, G., Jakeman, J. D., Maupin, K. A., Monschke, J. A., Seidl, D. T., Swiler, L. P., Tran, A., Menhorn, F., et al. DAKOTA A Multilevel Parallel Object-Oriented Framework for Design Optimization Parameter Estimation Uncertainty Quantification and Sensitivity Analysis: Version 6.12 Theory Manual. Tech. rep., Sandia National Lab.(SNL-NM), Albuquerque, NM (United States), 2020. Funded by DOE / NNSA / ASC. 0.25 FTE.

2. Dec 2020 – present: Towards Z-Next. PI: Kathryn Maupin. Role: Team member. Funded by Sandia LDRD. 0.20 FTE.

3. Oct 2020 – present: RISE-SciAI: RISE of the Machines: Robust, interpretable, scalable, efficient methods for digital twins. PI: Karen Willcox (UT-Austin), Co-PI: Lars Rhutto (Emory U), Bart G van Bloemen Waanders (Sandia National Lab). Role: Augmented Staff. Funded by DOE ASCR. 0.25 FTE.

4. Nov 2019 – present: DAKOTA Upstream Research. Role: Developer. Dalbey, K., Eldred, M. S., Geraci, G., Jakeman, J. D., Maupin, K. A., Monschke, J. A., Seidl, D. T., Swiler, L. P., Tran, A., Menhorn, F., et al. DAKOTA A Multilevel Parallel Object-Oriented Framework for Design Optimization Parameter Estimation Uncertainty Quantification and Sensitivity Analysis: Version 6.12 Theory Manual. Tech. rep., Sandia National Lab.(SNL-NM), Albuquerque, NM (United States), 2020. Funded by DOE / NNSA / ASC Verification & Validation. 0.25 FTE.

5. Nov 2019 – Sep 2020: Sandia Exploratory Express LDRD: $100,000. Role: PI, Tim Widley (Co-PI), Theron Rodgers (Co-PI): Physics-informed deep learning for fast and accurate multiscale simulations in computational solid mechanics. 0.50 FTE.

6. Jan 2019 - Sep 2020: DOE Early Career Award: $2.5M over 5 years: Tim Wildey (PI). Role: Post-doctoral researcher: Enabling beyond forward simulation for predictive multiscale modeling. 1.00 FTE.

7. NSF CDS&E-1306996: NSF link. PI: Yan Wang. Role: Graduate research assistant. Reliable atomistic simulation under uncertainties.

8. NSF Career Award CMMI-1001040: NSF link. PI: Yan Wang. Role: Graduate research assistant. CAREER: Geometric modeling for computer aided nano design.

Current research interests

- Uncertainty quantification in high-dimensional space: In uncertainty quantification research, I developed and utilized both statistical and non-statistical methods to quantify the error bar in the numerical prediction. Techniques include generalized intervals (also known as Kaucher interval arithmetic) for imprecise probability, polynomial chaos expansion in concert with sparse grid, and Bayesian approaches such as Gaussian process, depending on the specific applications. I also have research interests in Monte Carlo approaches, including multi-level Monte Carlo and multi-fidelity Monte Carlo, which scale independently with the dimensionality of the problems.
- Bayesian optimization: In this research direction, I aim to fully extend the classical Bayesian optimization framework to a versatile Bayesian optimization framework that can have a much wider range and capability in solving real-world problems. Extensions include constrained (both known and hidden), mixed-integer, multi-fidelity, asynchronous parallel, multi-objective, scalable, gradient-enhanced, time-series, latent variable, and stochastic optimization problems. Some of the extensions have been fully developed and deployed successfully in solving real-world problems, where others remain as future work.
- Multiscale modeling and simulation: This research area focus on the development of different software packages, from macro-scale (finite element, computational fluid dynamics), micro-scale (phase-field simulation, crystal-plasticity finite element, kinetic Monte Carlo), to nano-scale (molecular dynamics simulation, density functional theory or quantum mechanics) that accurately capture the physical behaviors. In order to design novel materials with tailored properties, one needs to make an accurate forward predict the properties of interest within acceptable tolerance. A direct approach is to use computational models with calibrated model parameters. Developing and refining models that simulate the real physics, i.e. simulation results are sufficiently close and highly correlated to experimental data, is considered as one of the fundamental building blocks of the computational paradigm in computational solid and fluid mechanics.
- Machine learning and deep learning applications in materials science: Machine learning, particularly deep learning, provides a powerful set of toolboxes in many fields, including materials science. However, this comes with a severe limitation as deep learning is well-known to be data hungry, and experimental data, for example, in materials science, is naturally resource-intensive, in terms of money, time, and human labor. Yet, there is a very demanding need in reducing the materials development time, and machine learning techniques are capable of bringing down the computational cost, if used correctly. The aim of this research direction is to bridge the research gaps of bringing such powerful machine learning techniques to engineering domains, where data is scarce.

Beside these areas, I also have a secondary interest in designs of parallel algorithms for heterogeneous high-performance computing architecture, which is one of the key factors for scientific computations, particularly through multi-core architecture, GPU acceleration, as well as heterogeneous computing, for improving the effectiveness and efficiency of any modeling and simulation. There is also a second interest in image processing applications for materials science. Potential funding agencies for the prescribed research theme include, but is not limited to, the Department of Energy (DOE)/Office of Science – Advanced Science Computing Research (ASCR) and Basic Energy Sciences (BES) offices, the National Science Foundation (NSF), and the Department of Defense (DOD).

Publications

Please see my Google Scholar and/or ORCID and/or Research Gate for a full and updated list of publication.

7.1 Referred Journal Articles

1. Tran, A., McCann, S., Furlan, J. M., Pagalthivarthi, K. V., Visintainer, R. J., Wildey, T., and Eldred, M. aphBO-2GP-3B: A budgeted asynchronous-parallel multi-acquisition for known/unknown constrained Bayesian optimization on high-performing computing architecture. *arXiv preprint arXiv:2003.09436* (2020) (submitted to Knowledge-based Systems)

2. Tran, A., Eldred, M., Wang, Y., and McCann, S. srMO-BO-3GP: A sequential regularized multi-objective constrained Bayesian optimization for design applications. *Journal of Mechanical Design* (submitted to ASME JMD)

3. Tran, A., and Wildey, T. Solving stochastic inverse problems for property-structure linkages using data-consistent inversion and machine learning. *JOM* (2020)

4. Tran, A., Tranchida, J., Wildey, T., and Thompson, A. P. Multi-fidelity machine-learning with uncertainty quantification and Bayesian optimization for materials design: Application to ternary random alloys. *The Journal of Chemical Physics 153* (2020), 074705

5. Tran, A., Mitchell, J. A., Swiler, L. P., and Wildey, T. An active-learning high-throughput microstructure calibration framework for process-structure linkage in materials informatics. *Acta Materialia 194* (2020), 80–92

6. Ngai, S.-M., Tang, W., Tran, A., and Yuan, S. Orthogonal polynomials defined by self-similar measures with overlaps. *Experimental Mathematics* (2020), 1–13

7. Tran, A., Wildey, T., and McCann, S. sMF-BO-2CoGP: A sequential multi-fidelity constrained Bayesian optimization for design applications. *Journal of Computing and Information Science in Engineering 20*, 3 (2020), 1–15

8. Travaglino, S., Murdock, K., Tran, A., Martin, C., Liang, L., Wang, Y., and Sun, W. Computational optimization study of transcatheter aortic valve leaflet design using porcine and bovine leaflets. *Journal of Biomechanical Engineering 142* (2020)

9. Tran, A., and Tran, H. Data-driven high-fidelity 2D microstructure reconstruction via non-local patch-based image inpainting. *Acta Materialia 178* (2019), 207–218

10. Tran, A. V., Liu, D., Tran, H. A., and Wang, Y. Quantifying uncertainty in the process-structure relationship for Al-Cu solidification. *Modelling and Simulation in Materials Science and Engineering 27*, 6 (2019), 064005

11. Tran, A., Tran, M., and Wang, Y. Constrained mixed-integer Gaussian mixture Bayesian optimization and its applications in designing fractal and auxetic metamaterials. *Structural and Multidisciplinary Optimization* (2019), 1–24

12. Tran, A., Sun, J., Furlan, J. M., Pagalthivarthi, K. V., Visintainer, R. J., and Wang, Y. pBO-2GP-3B: A batch parallel known/unknown constrained Bayesian optimization with feasibility classification and its applications in computational fluid dynamics. *Computer Methods in Applied Mechanics and Engineering 347* (2019), 827–852

13. Tran, A., Furlan, J. M., Pagalthivarthi, K. V., Visintainer, R. J., Wildey, T., and Wang, Y. WearGP: A computationally efficient machine learning framework for local erosive

wear predictions via nodal Gaussian processes. *Wear 422* (2019), 9–26

14. Tran, A., He, L., and Wang, Y. An efficient first-principles saddle point searching method based on distributed kriging metamodels. *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering 4*, 1 (2018), 011006

15. Tran, A., and Wang, Y. Reliable Molecular Dynamics: Uncertainty quantification using interval analysis in molecular dynamics simulation. *Computational Materials Science 127* (2017), 141–160

16. McCann, S., Ostrowicki, G. T., Tran, A., Huang, T., Bernhard, T., Tummala, R. R., and Sitaraman, S. K. Determination of energy release rate through sequential crack extension. *Journal of Electronic Packaging 139*, 4 (2017), 041003

7.2 Referred Book Chapters

1. Sestito, J. M., Liu, D., Lu, Y., Song, J.-H., Tran, A. V., Kempner, M. J., Harris, T. A., Ahn, S.-H., and Wang, Y. Multiscale process modeling of shape memory alloy fabrication with directed energy deposition. In *Additive Manufacturing of Multi-Functional Structures* (2018), Springer (accepted to Additive Manufacturing of Multi-Functional Structures)

2. Tran, A., and Wang, Y. Reliable Molecular Dynamics (R-MD) simulations for intrusive uncertainty quantification using generalized interval analysis. In *Uncertainty Quantification in Multiscale Materials Modeling* (2020), Elsevier

3. Tran, A., Liu, D., He-Bitoun, L., and Wang, Y. Data-driven acceleration of first-principles saddle point and local minimum search based on Gaussian processes. In *Uncertainty Quantification in Multiscale Materials Modeling* (2020), Elsevier

7.3 Referred Conference Proceedings

1. Tran, A., and Tran, H. 2D microstructure reconstruction for SEM via non-local patch-based image inpainting. In *TMS 2021 150th Annual Meeting & Exhibition* (2021), Springer, pp. 1–8

2. Tran, A., and Wildey, T. Solving stochastic inverse problems for property-structure linkages using data-consistent inversion. In *TMS 2021 150th Annual Meeting & Exhibition* (2021), Springer, pp. 1–8

3. Tran, A., and Wildey, T. Solving inverse problems for process-structure linkages using asynchronous parallel Bayesian optimization. In *TMS 2021 150th Annual Meeting & Exhibition* (2021), Springer, pp. 1–8

4. Tran, A., Eldred, M., Wang, Y., and McCann, S. srMO-BO-3GP: A sequential regularized multi-objective constrained Bayesian optimization for design applications. In *Proceedings of the ASME 2020 IDETC/CIE* (08 2020), vol. Volume 1: 40th Computers and Information in Engineering Conference of *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers – **ASME CIE/IDETC 2020 – CIE Best Paper Award**

5. Tran, A., Wang, Y., Furlan, J., Pagalthivarthi, K. V., Garman, M., Cutright, A., and Visintainer, R. J. WearGP: A UQ/ML wear prediction framework for slurry pump impellers and casings. In *ASME 2020 Fluids Engineering Division Summer Meeting* (2020), American Society of Mechanical Engineers

6. Tran, A., Wildey, T., and McCann, S. sBF-BO-2CoGP: A sequential bi-fidelity constrained Bayesian optimization for design applications. In *Proceedings of the ASME 2019 IDETC/CIE* (08 2019), vol. Volume 1: 39th Computers and Information in Engineering Conference of *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, American Society of Mechanical Engineers. V001T02A073 – **ASME CIE/IDETC 2019 – AMS Best Paper Award**

7. Tran, A., and Wang, Y. Molecular dynamics simulation with interval-valued interatomic potentials. In *Proceedings of the ASME 2016 International Design Engineering Technical Conference & Computers and Information in Engineering Conference IDETC/CIE* (2016), American Society of Mechanical Engineers

8. Tran, A. V., and Wang, Y. Quantifying model-form uncertainty in molecular dynamics simulation. In *TMS 2016 145th Annual Meeting & Exhibition* (2016), Springer, pp. 283–292

9. Tran, A., and Wang, Y. A molecular dynamics simulation mechanism with imprecise interatomic potentials. In *Proceedings of the 3rd World Congress on Integrated Computational Materials Engineering (ICME)* (2015), John Wiley & Sons, pp. 131–138

7.4 Presentations

1. Tran, A., Eldred, M., Wang, Y., and McCann, S. srMO-BO-3GP: A sequential regularized multi-objective constrained Bayesian optimization for design applications. International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Virtual Conference, St. Louis, MO, August 17–19, 2020 – **ASME CIE/IDETC 2020 – CIE Best Paper Award**.

2. Tran, A., Wildey, T., Rodgers, T., Kalidindi, S., and Yabansu, Y. On supervised and unsupervised deep learning applications for materials informatics. Sandia Machine Learning and Deep Learning Workshop 2020, Sandia National Laboratories, Albuquerque, NM, August 3–6, 2020.

3. Tranchida, J., Thompson, A., Tran, A., and Wildey, T. Multi-fidelity machine learning with uncertainty quantification and Bayesian optimization for materials design: Application to ternary random alloys. Sandia Machine Learning and Deep Learning Workshop 2020, Sandia National Laboratories, Albuquerque, NM, August 3–6, 2020.

4. Tran, A., Wang, Y., Furlan, J., Pagalthivarthi, K., Garman, M., Cutright, A., and Visintainer, R. WearGP: A UQ/ML wear prediction framework for slurry impellers and casings. Virtual Conference. Fluids Engineering Division Summer Meeting, Orlando, FL, July 13–15, 2020.

5. Tran, A. Linking process-structure-property via physics-based and data-driven approaches: Beyond forward computational materials science. Department of Mechanical & Industrial Engineering, Louisiana State University, Baton Rouge, LA, February 17, 2020.

6. Wildey, T. M., Bruder, L., Bui-Thanh, T., Butler, T., Jakeman, J. D., Marvin, B., Tran, A., and Walsh, S. Moving beyond forward simulation to enable data-informed physics-based predictions. Tech. rep., Sandia National Lab.(SNL-NM), Albuquerque, NM (United States), 2019.

7. Tran, A., and Wildey, T. Materials informatics: data-driven, materials design, and uncertainty quantification perspectives. Sandia 13th Annual Postdoc Technical Showcase, Albuquerque, NM, December 18, 2019.

8. Tran, A., Wildey, T., and McCann, S. sBF-BO-2CoGP: A sequential bi-fidelity constrained Bayesian optimization for design applications. International Design Engineering Technical Conferences and Computers and Information in Engineering Conference,, Anaheim, CA, August 18–21, 2019 – **ASME CIE/IDETC 2019 – AMS Best Paper Award**.

9. Wildey, T., and Tran, A. Using high performance computing to enable data-informed multiscale modeling with applications to additive materials. Engineering Mechanics Institute Conference, California Institute of Technology, Pasadena, CA, June 18-21, 2019.

10. Tran, A., Wang, Y., and Wildey, T. A step towards a versatile Bayesian optimization: Constrained, asynchronous batch-parallel, multi-fidelity, and mixed-integer extensions. NSF SAMSI - MUMS Transition Workshop and SPUQ, May 14-17, 2019 – **Travel Award by NSF**.

11. Tran, A. Towards a versatile Bayesian optimization. NSF SAMSI - UQ for Materials Working Group, Mar 13, 2019 .

12. Tran, A., and Wang, Y. Design optimization of fractal metamaterials with distributed Gaussian process. The ACS/AIST/ASM/TMS Materials Science & Technology, Pittsburgh, PA, Oct 8-12, 2017 – **Invited**.

13. Tran, A., and Wang, Y. Sensitivity assessment of interatomic potentials on-the-fly in molecular dynamics. The Engineering Mechanics Institute Conference 2016 (EMI 2016) and the Probabilistic Mechanics & Reliability Conference 2016 (PMC 2016), Vanderbilt University, Nashville, TN, May 22-25, 2016 .

14. Kreeger, R., Vargas, M., Tran, A., Wang, Y., Palacios, J., and Hadley, K. Multiscale materials design for inflight icing mitigation. The 39th Annual Meeting of the Adhesion Society, San Antonio, TX, Feb 21-24, 2016.

15. Tran, A., and Wang, Y. Quantifying model-form uncertainty in molecular dynamics simulation. The 145th TMS Annual Meeting & Exhibition (TMS) 2016, Nashville, Tennessee, February 14-18, 2016.

16. Tran, A., and Wang, Y. A molecular dynamics simulation mechanism with imprecise interatomic potentials. The 3rd TMS World Congress on Integrated Computational Materials Engineering (ICME 2015), Colorado Springs, CO, May 31 - June 4, 2015.

17. Tran, A., and Shuai, Y. Bernoulli convolutions associated with golden ratio: 3-term recurrences and computational results. SIAM Southeastern Atlantic Section, Florida Institute of Technology, Melbourne, FL, March 29-30 2014.

18. Tran, A. 3-terms recurrence coefficients of a special orthogonal family. AMS Southeastern Sectional Meeting, Tennessee Tech University, Cookeville, TN, March 14-15, 2014.

19. Tran, A. Adaptive control of Lorenz system to non-trivial equislibrium points. AMS Southeastern Sectional Meeting, Winthrop University, Rockhill, SC, March 15-16, 2013.

20. Tran, A., and Mynard, F. Hindman's finite sum theorem. AMS Southeastern Sectional Meeting, Elon University, Elon, NC, March 26-27, 2010.

21. Tran, A., and Mynard, F. Structure of spaces of ultrafilters and combinatorial applications. AMS Southeastern Sectional Meeting, Belmont University, Nashville, TN, March 13-14, 2009.

7.5 Software

1. van Bloemen Waanders, B., Willcox, K., and Lars, R. RISE of the Machines: Robust, interpretable, scalable, efficient methods for digital twins. https://github.com/bartvbw/RISE, 2020. Funded by DOE AI and Decision Support for Complex Systems program
2. Dalbey, K., Eldred, M. S., Geraci, G., Jakeman, J. D., Maupin, K. A., Monschke, J. A., Seidl, D. T., Swiler, L. P., Tran, A., Menhorn, F., et al. DAKOTA A Multilevel Parallel Object-Oriented Framework for Design Optimization Parameter Estimation Uncertainty Quantification and Sensitivity Analysis: Version 6.12 Theory Manual. Tech. rep., Sandia National Lab.(SNL-NM), Albuquerque, NM (United States), 2020
3. Wildey, T., and van Bloemen Waanders, B. MILO: Multiscale/Multiphysics Interfaces for Large-scale Optimization. https://github.com/bartvbw/MILO, 2019
4. Tran, A. Asynchronous batch-parallel versatile Bayesian optimiaztion for constrained, multi-objective, and multi-fidelity problems in MATLAB, 2018
5. Tran, A., and Wang, Y. RMD: Reliable molecular dynamics. https://github.com/GeorgiaTechMSSE/ReliableMD, 2017

7.6 In preparation

1. Tran, A., Sun, J., Liu, D., Wildey, T., and Wang, Y. Stochastic reduced-order model with temporal upscaling for uncertainty propagation in materials modeling. *Computational Materials Science* (2020) (in preparation for Computational Materials Science)

Teaching Experience

- Fall 2018: **Graduate Teaching Assistant**
  Experimental methods (ME 3057)
  - Guide students throughout the course for conducting experiment and data acquisition.
  - Set up experimental apparatus for students.
  - Evaluate student performance through weekly/biweekly lab reports.
- Spring 2018: **Graduate Teaching Assistant**
  Creative decisions and design (ME 2110)
  - Assist the studio instructor in teaching the students.
  - Assist in evaluating the student performance.
  - Assist in staging the final competition.
  - Maintain the cleanliness and functionality of the design studio, the machine shop, and mechatronics inventory.
- Fall 2017: **Instructor**
  Statics (COE 2001)
  - Design and teach an undergraduate course for cross-disciplinary engineering students.
  - Course topics include fundamental concepts of statics in engineering, e.g. 2D and 3D equilibrium, moments, friction, 2D and 3D truss, frame and machine.

  - Evaluate student performance through homework, quizzes, and exams.

- Fall 2016: **Graduate Teaching Assistant**
  Computer-aided design (graduate) (ME 6104)
  - Assist instructor in grading homework and answer course-related materials.
  - Deliver guest lectures.
  - Grade homework.
- Fall 2012 - Spring 2014: **Graduate Assistant**
  Pre-calculus, Calculus I, II, III (MATH 1113, 1441, 2242, 2243)
  - Assist undergraduate students in Math Lab for Calculus I, II, III, and Pre-calculus.
  - Recite calculus classes weekly; design quizzes for calculus; supervise quizzes and exams.

Research Experience

Jan 2019 – Sep 2020	Postdoctorial Appointee Optimization and Uncertainty Quantification Department (01463) Sandia National Laboratories, Albuquerque, NM • Mentored by Dr. Tim Wildey. • Develop framework for multiscale multi-fidelity materials informatics. • Demonstrate the efficiency and effectiveness to ICME applications.
August 2014 – May 2018	Graduate Research Assistant Georgia Institute of Technology, Atlanta, GA • Conduct research and explore topics in materials informatics. • Develop code and perform large-scale simulation.
August 2012 – May 2014	Graduate Assistant Georgia Southern University, Statesboro, GA • Develop a stability theory for Lorenz system. • Simulate the controlled trajectories of Lorenz system.
May – December 2011	Undergraduate Research Assistant Georgia Institute of Technology, Atlanta, GA • Develop demo movement for humanoid robot. • Research about stitching panoramic images.

Industry Experience

Jan 2019 – Dec 2019	Technical consultant, GIW Industries, Grovetown, GA • Develop and implement large-scale machine learning framework (WearGP) for wear prediction based on computational and experimental results • Support design engineers and sales engineers • Devise a computational geometry framework for impeller design
May 2013 – Dec 2018	Hydraulic research intern, GIW Industries, Grovetown, GA • Develop and prototype machine learning algorithm for wear prediction based on computational fluid dynamics results • Perform uncertainty quantification analysis for different pump operating conditions • Conduct large-scale design optimization using Bayesian optimization and Fortran in-house Fortran wear codes • Perform computational fluid dynamics and heat transfer analysis using Star-CCM+ and in-house Fortran wear codes • Develop in-house code for automating computational fluid dynamics simulation in large-scale • Characterize wear behavior of different types of alloys and slurries
Jan 2012 – May 2012	General Assistant, Georgia Institute of Technology, Atlanta, GA • Convert books from Latex to ePub format for ebooks in iOS/iBooks • Embed interactive objects, e.g. figures, movies, 3D CAD to ePub for ebooks in iOS/iBooks

University and Community Service

11.1 Organizer

Co-organizer	Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology September 26–29, 2021 - Hyatt Regency Mission Bay, San Diego, CA
Co-organizer	USNCCM 16 (16th U.S. National Congress on Computational Mechanics) July 25–29, 2021, Chicago, IL
Secretary	ASME CIE/AMS Technical committee, 2020
Member-at-large	ASME CIE/AMS Technical committee, 2019
Mentor	2020 ASME-IMECE Hackathon: Identifying, Extracting, Analyzing Value from Large Unstructured Data Sets in Mechanical Engineering Virtual, Online
Mentor	2020 ASME-CIE Hackathon: Identifying, Extracting, Analyzing Value from Large Unstructured Data Sets in Mechanical Engineering Virtual, Online
Co-organizer	ASME 2020 CIE/IDETC conference, UQVV Symposium August 17–19, 2020, St. Louis, MO
Co-organizer	ASME 2019 CIE/IDETC conference, UQVV Symposium August 18–21, 2019, Anaheim, CA

11.2 Review Board

Review Board Member	Crystals (MDPI)

11.3 Reviewer

Guest Reviewer	npj Computational Materials
Guest Reviewer	Acta Materialia
Guest Reviewer	Wear of Materials
Guest Reviewer	Journal of Machine Learning for Modeling and Computation
Guest Reviewer	Computational Materials Science
Guest Reviewer	Mechanical Systems and Signal Processing
Guest Reviewer	Journal of Manufacturing Systems
Guest Reviewer	Structural and Multidisciplinary Optimization
Guest Reviewer	Engineering Reports
Guest Reviewer	International Journal of Uncertainty Quantification
Guest Reviewer	Computer Methods in Applied Mechanics and Engineering
Guest Reviewer	Journal of Computing and Information Science in Engineering
Guest Reviewer	Journal of Mechanical Design
Guest Reviewer	Journal of Risk and Uncertainty in Engineering Systems Part B: Mechanical Engineering
Guest Reviewer	ASME CIE/IDETC conference 2016-2020
Grant reviewer	2014-2018 (Georgia Institute of Technology) Undergraduate Research Opportunities Program (PURA) Budget: $1,500 salary and $1,000 travel award

11.4 Mentorship for undergraduate and graduate students

1. Stefano Travaglino: Spring 2018. Research project: Travaglino, S., Murdock, K., Tran, A., Martin, C., Liang, L., Wang, Y., and Sun, W. Computational optimization study of transcatheter aortic valve leaflet design using porcine and bovine leaflets. *Journal of Biomechanical Engineering 142* (2020)

2. Yoo Dong (Justin) Yeon: Fall 2018 Yoo, D. Y. Simulation based design of lithium ion battery configuration using Bayesian optimization, 2018

3. Minh Tran: Spring 2016. Research project: Tran, A., Tran, M., and Wang, Y. Constrained mixed-integer Gaussian mixture Bayesian optimization and its applications in designing fractal and auxetic metamaterials. *Structural and Multidisciplinary Optimization* (2019), 1–24

4. Trent Callcott: Summer 2016. Research project: Geometric modeling for fractal metamaterials in ABAQUS FEM using Python.

5. Amy Li: Fall 2018. Research project: Modeling buildup of calcium and fat deposits on heart valves via ABAQUS Python API.

Professional Associations

The Minerals, Metals & Materials Society (TMS)
The American Society of Mechanical Engineers (ASME)
Society for Industrial and Applied Mathematics (SIAM)