Robert N. Saunders, PhD

Website: robert-saunders.info (703) 982-0588
Email: info@robert-saunders.info Active DoD TS//SCI w/ CI polygraph

OBJECTIVE

My vision is to become a DoD/IC leader in the maturing and transitioning of advanced capabilities across the technology development "valley of death". My mission is to implement innovative strategies to develop, acquire, and transition evolutionary and revolutionary capabilities that support the Warfighter, maintain the battlespace advantage, and inspire/mentor the next generation of engineers and scientists. I value growth, competence, and self-discipline in my pursuit to become better every day. I am seeking opportunities as a program manager/director (GS-14/15 equivalent) with responsibilities such as leading and managing personnel and programs; oversight of strategic directions; creation and execution of acquisition strategies; and/or management and integration of risk, requirements, and resources.

EDUCATION

Doctor of Philosophy, Industrial Engineering (Aug 2018 – Aug 2022)
Texas A&M University, College Station, TX
Thesis Topic: *Metal Additive Manufacturing Process-Structure-Property Relational Linkages Using Gaussian Process Surrogates*
Advisors: Dr. Alaa Elwany, Dr. Dimitris C. Lagoudas

Certificate in Applied Statistics, Statistics (Aug 2018 – July 2022)
Texas A&M University, College Station, TX

Master of Science, Aerospace Engineering (Aug 2013 – Aug 2015)
Texas A&M University, College Station, TX
Thesis Topic: *Modeling of Inductive Heating on Shape Memory Alloy Components*
Advisors: Dr. Dimitris C. Lagoudas, Dr. James G. Boyd

Bachelor of Science, Aerospace Engineering (Aug 2009 – May 2013)
Virginia Tech, Blacksburg, VA
Minor – Mathematics

PROFESSIONAL EXPERIENCE

Deputy Branch Chief, Launch Management Division (Sept 2023 – present)
Mission Manager, Launch Management Division (Feb 2023 – Sept 2023)
Office of Space Launch, National Reconnaissance Office, Chantilly, VA

- Lead/supervisor a team of civilian, military, and contractor support staff to acquire and deliver future launch solutions and offer flexible/tailorable launch support services.
- Identify, research, develop, and transition advanced launch and on-orbit capabilities via FAR and non-FAR based acquisitions.
- Facilitate and coordinate internal and external strategic outreach with industry and government partners to identify and program for customer requirements.
- Execute non-NSSL missions through partnerships and procurement of small launch vehicles and rideshares.
- Coordinate inputs from stakeholders and track progress for the program, planning, budgeting, and execution (PPBE) process.

Mechanical Engineer (Sept 2016 – Feb 2023)
Materials Science & Technology Division, U.S. Naval Research Laboratory, Washington D.C.

- Surrogate modeling based on multi-fidelity physics-based simulations and experiments for metal additive manufacturing.

- Microstructure modeling of features induced by powder additively manufacturing.
- Development of strategies to prevent and protect from injuries due to blast events.
- Computational modeling of room temperature aerosol deposition of nano-crystalline thick films.

Jr. Biomechanics Engineer (June 2015 – Sept 2016)
Leidos Inc. c/o U.S. Naval Research Laboratory, Washington D.C.
- Development of strategies to prevent and protect from injuries due to blast events.
- Creation of correspondence rules to predict traumatic brain injury in humans.
- Image-based finite element modeling of human and porcine subjects.
- Development of a methodology for assessing combat helmets.
- Constitutive model calibration of hyper-viscoelastic biological materials.

Air Force Research Lab Scholars Program (May 2014 – Aug 2014)
Kirtland AFB, Albuquerque NM
- Design and construction of a deployable tensioned helical structure using composite pultrusions.

Medical Device Consulting (Jan 2014 – May 2014)
College Station TX
- Finite element modeling of shape memory alloy based biomedical devices.

Graduate Research Assistant (Aug 2013 – May 2015)
Aerospace Engineering Department, Texas A&M University, College Station, TX.
- Development of a framework to model inductive heating of shape memory alloy components.
- Design, modeling, and fabrication of a composite twisting wing using shape memory alloy torque tubes.
- Simulation and optimization of self-folding reprogrammable sheets using shape memory alloy and shape memory polymer.

OTHER EXPERIENCE

Naval Research Laboratory Student Mentor (Jun 2015 – Dec 2022)
- Served as a technical mentor for 2-4 summer students each year.

CASMART Design Challenge Advisor (Jan 2015 – May 2015)
- Design of a shape memory alloy based deployable solar array.
- Served as an advisor to a group of 5 undergraduates working on the project.

Undergraduate Research Assistant (June 2011 – July 2013)
Aerospace Engineering Department, Virginia Tech, Blacksburg VA.
Supervisor: Dr. Gary Seidel
- 1-D modeling and testing of shape memory alloys springs.

Virginia Tech Microgravity Research Team (Aug 2010 – July 2013)
Aerospace Engineering Department, Virginia Tech, Blacksburg VA.
Supervisor: Dr. Troy Henderson
- Investigation of a moving mass actuator control system for re-entry vehicles and small satellites.
- Chosen two consecutive years to participate in NASAs Reduced Gravity Flight Education Program.

TRAINING/CERTIFICATIONS/AWARDS

- Naval Research Laboratory Edison Memorial Graduate Training Program Recipient
  ‡ Multi-year competitively awarded graduate education program
- NRO Office of Space Launch Senior Technical Civilian – 3QFY23
- NRO Leadership Launch for Supervisors
  ‡ 1-week in-residence, intensive leadership training

- NRO Contracting Officer Technical Representative (COTR)
- DAWIA Foundational Certification in Engineering & Technical Management
- DAWIA Credentials in:
  - ‡ Technology Project Management
  - ‡ Digital Engineering
  - ‡ Risk, Issue, and Opportunity Management
- Coursera certificates in:
  - ‡ Project Management & Other Tools for Career Development specialization
  - ‡ Deep Learning specialization
  - ‡ DeepLearning.AI TensorFlow Developer specialization
  - ‡ Generative Adversarial Networks (GANs) specialization
  - ‡ AI For Everyone course
  - ‡ Machine Learning course
  - ‡ Bayesian Methods for Machine Learning course (with honors)

PROFESSIONAL ACTIVITIES

- American Society of Mechanical Engineers, Member
- Journal Reviewer
  - ‡ Journal of DoD Research and Engineering
  - ‡ Journal of Intelligent Material Systems and Engineering
  - ‡ Materials Today
  - ‡ Finite Elements in Analysis and Design
  - ‡ Defence Technology
- Technical conference session/symposium organizer and chair

SKILLS

- Computer Languages – Fortran, Python, R, Matlab
- Software – Abaqus, COMSOL, ScanIP, Solidworks, Mathematica, Microsoft Office
- Basic machine shop and mechanical testing experience
- Windows, Linux, Unix experience
- Programing, planning, budgeting, and executing (PPBE)
- Acquisition strategy and contracting
- Time and Personnel Management
- Finite Element Modeling, Mechanics of Materials, Machine Learning, Statistical/Surrogate Modeling

PUBLICATIONS

Book Chapters

1. J. Michopoulos, A. Iliopoulos, J. Steuben, A. Birnbaum, N. Apetre, J. Song, Y. Fu, A. Achuthan, **R. Saunders**, A. Bagchi, R. Fonda, D. Rowenhorst, S. Olig, F. Martin, J. Moran, A. Ntiros, *Multiphysics Integrated Computational Materials Engineering Linking Additive Manufacturing Process Parameters with Part Performance*, In "Advances in Computers and Information in Engineering Research Vol. 2", ASME (2021).

Journal Articles

1. **R. Saunders**, K. Teferra, J. Michopoulos, D. Lagoudas, A. Elwany, *Metal AM Process-Structure-Property Relational Linkages using Gaussian Process Surrogates*. Additive Manufacturing (2023).
2. **R. Saunders**, A. Rawlings, A. Birnbaum, A. Iliopoulos, J. Michopoulos, D. Lagoudas, A. Elwany, *Additive Manufacturing Melt Pool Prediction and Classification via Multifidelity Gaussian Process Surrogates*. Integrating Materials and Manufacturing Innovation (2022).

3. **R. Saunders**, C. Butler, J. Michopoulos, D. Lagoudas, A. Elwany, A. Bagchi, *Mechanical Behavior Predictions of Additively Manufactured Microstructures Using Functional Gaussian Process Surrogates*. npj Computational Materials (2021).
4. **R. Saunders**, S. Johnson, D. Schwer, E. Patterson, H. Ryou, E. Gorzkowski, *A Self-Consistent Scheme for Understanding Particle Impact and Adhesion in the Aerosol Deposition Process*. Journal of Thermal Spray Technology (2021).
   ‡ Volume 30 best paper honorable mention
5. **R. Saunders**, X. G. Tan, A. Bagchi, *On the Development of Interspecies Traumatic Brain Injury Correspondence Rules*. Military Medicine (2019).
6. **R. Saunders**, A. Moser, P. Matic, *A Computationally Efficient Computer Aided Design Strategy for Iterative Combat Helmet Design and Analysis*. Journal of Engineering Science in Medical Diagnostics and Therapy (2019).
7. **R. Saunders**, X.G. Tan, S. Qidwai, A. Bagchi, *Towards Identification of Correspondence Rules to Relate Traumatic Brain Injury in Different Species*. Annals of Biomedical Engineering (2018).
8. **R. Saunders**, J. Boyd, F. Calkins, D. Lagoudas, *A Simplified Numerical Model for Induction Heating of Shape Memory Alloy Tubes*. Journal of Intelligent Materials Systems and Structures (2017).
9. **R. Saunders**, D. Hartl, J. Boyd, J. Brown, F. Calkins, D. Lagoudas, *A Validated Model for Induction Heating of Shape Memory Alloy Actuators*. Smart Materials and Structures (2016).

Refereed Conference Proceedings

1. A. Iliopoulos, J. Thomas, J. Steuben, **R. Saunders**, J. Michopoulos, A. Bagchi, A. Birnbaum, *Statistical Analysis of Tensile Test Performed on 316L Specimens Manufactured by Directed Energy Deposition*. In Proceedings of ASME 2020 International Design Engineering Technical Conferences, St. Louis MO, August 16-19 2020.
2. Y. Chen, D. Horner, M. Doherty, **R. Saunders**, A. Bagchi, T. O'Shaughnessy, *Shockwave Pressure Transmission through the Ear Canal with Hearing Protection*. In Proceedings of Personnel Armour Systems Symposium 2018, Washington DC, October 1-5 2018.
3. X.G. Tan, **R. Saunders**, A. Bagchi, *Computational analysis of performance of combat helmet to mitigate blast induced traumatic brain injury*. In Proceedings of Personnel Armour Systems Symposium 2018, Washington DC, October 1-5 2018.
4. P. Matic, **R. Saunders**, *Characterization of Combat Helmet Design Trade Spaces Accounting for Ballistic Threats, Brain Functional Areas, and Injury Considerations*. In Proceedings of Personnel Armour Systems Symposium (PASS), Washington DC, October 1-5 2018.
5. **R. Saunders**, A. Achuthan, A. Iliopoulos, J. Michopoulos, A. Bagchi, *Influence of Grain Size and Shape on Mechanical Properties of Metal AM Materials*. In Proceedings of Solid Freeform Fabrication Symposium, Austin, TX, Aug 13-15 2018.
6. X.G. Tan, **R. Saunders**, P. Matic, *Combat Helmet Pad Suspension Performance for Anthropomorphic Fit Designs, Brain Functional Areas and Injury Considerations*. In Proceedings of ASME International Mechanical Engineering Congress & Exposition (IMECE), Tampa, FL, Nov. 3-9, 2017.
7. **R. Saunders**, A. Achuthan, A. Bagchi, *A Method to Determine Local Stress Fields in Microstructure Features Produced by Additive Manufacturing*. In Proceedings of ASME International Mechanical Engineering Congress & Exposition (IMECE), Tampa, FL, Nov. 3-9, 2017.

8. X.G. Tan, **R. Saunders**, A. Bagchi, *Validation of a Full Porcine Finite Element Model for Blast Induced TBI Using a Coupled Eulerian-Lagrangian Approach*. In Proceedings of ASME International Mechanical Engineering Congress & Exposition (IMECE), Tampa, FL, Nov. 3-9, 2017.
9. A. Achuthan, A. Iliopoulos, J. Michopoulos, **R. Saunders**, A. Bagchi, *Towards a Constitutive Model That Encapsulates Microstructural Features Induced By Powder Additive Manufacturing*. In Proceedings of ASME International Design Engineering Technical Conference & Computers and Information in Engineering Conference (IDETC/CIE), Cleveland, OH, Aug. 6-9, 2017.
10. P. Matic, A. Moser, **R. Saunders**, *Combat Helmet Design Incorporating Multiple Ballistic Threats, Brain Functional Areas and Injury Considerations*. In Proceedings of ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, Nov. 13-19, 2016.
11. P. Matic, A. Moser, **R. Saunders**, *A Combat Helmet Computer Aided Design Strategy Incorporating Ballistic Threat, Brain Functional Areas and Injury Considerations*. In Proceedings of Personal Armour Systems Symposium (PASS), Amsterdam, NL, Sep. 19-23, 2016.
12. R. Wheeler, **R. Saunders**, K. Pickett, C. Eckert, H. Stroud, T. Fink, K. Gakhar, J. Boyd, D. Lagoudas, *Design of a Reconfigurable SMA-Based Solar Array Deployment Mechanism*. In Proceedings of ASME Smart Materials Adaptive Structures and Intelligent Systems Conference (SMASIS), Colorado Springs, CO, Sep. 21–23, 2015.
    ‡ 1st place in CASMART Student Design Competition
13. **R. Saunders**, J. Herrington, L. Hodge, D. Hartl, J. Mabe, *Optimization of a Composite Morphing Wing with Shape Memory Alloy Torsional Actuators*. In Proceedings of ASME Smart Materials Adaptive Structures and Intelligent Systems Conference (SMASIS), Newport, RI, Sept. 8–10, 2014.
    ‡ Finalist in Best Student Hardware Competition
14. **R. Saunders**, D. Hartl, R. Malak, D. Lagoudas, *Design and Analysis of a Self-Folding SMA-SMP Composite Laminate*. In Proceedings of ASME International Design Engineering Technical Conference & Computers and Information in Engineering Conference (IDETC/CIE), Buffalo, NY, Aug. 17-20, 2014.

Contributed Conference Proceedings

1. X.G. Tan, **R. Saunders**, A. Bagchi, *Coupled Modeling for Investigation of Blast Induced Traumatic Brain Injury*. In Proceedings of International Conference on Computational Methods for Coupled Problems in Science and Engineering, Rhodes Island, Greece, June 12-14, 2017.
2. **R. Saunders**, D. Hartl, J. Boyd, D. Lagoudas, *Modeling and Development of a Twisting Wing Using Inductively Heated Shape Memory Alloy Actuators*. In Proceedings of SPIE Smart Structures and Non-Destructive Evaluation Conference, San Diego, CA, Mar. 8–12, 2015.
3. J. Herrington, L. Hodge, C. Stein, **R. Saunders**, D. Hartl, J. Mabe, *Development of a Twisting Wing Powered by an Shape Memory Actuator*. In Proceedings of AIAA SciTech 2015, Kissammee, FL, Jan. 5–9, 2014.

Technical Reports

1. **R. Saunders**, A. Achuthan, A. Iliopoulos, J. Michopoulos, A. Bagchi, *Effects of the Microstructural Grain Size and Aspect Ratio on the Mechanical Properties of Additively Manufactured Parts via Computational Analysis*. Defense Technical Information Center Report, Distribution A, NRL/FR/6353--20-10,411, 2020.

2. **R. Saunders**, *Metamaterials Using Additive Manufacturing Technologies*. Defense Technical Information Center Report, Distribution A, NRL/MR/6353--10,057, 2020.
3. **R. Saunders**, N. Kota, A. Bagchi, S. Qidwai, *On Challenges in Developing a High-Fidelity Human Head for Traumatic Brain Injury Prediction*. Defense Technical Information Center Report, Distribution A, NRL/MR/6350--9807, 2018.
4. P. Brewick, **R. Saunders**, A. Bagchi, *Biomechanical Modeling of the Human Head*. Defense Technical Information Center Report, Distribution A, NRL/FR/6350--17-10, 304, 2017.

Conference and Seminar Presentations

1. **R. Saunders**, A. Elwany, D. Lagoudas, A. Bagchi, *Mechanical Property Predictions of Additive Manufactured Microstructures via Surrogate Modeling*. 2020/2021 World Congress on Computational Mechanics (WCCM), COVID-19 Virtual Conference, January 11-15, 2021.
2. **R. Saunders**, *Mechanical Property Predictions of Additively Manufactured Microstructures Via Surrogate Modeling*. Simpleware Case Study Webinar. October 7, 2020. https://www.synopsys.com/simpleware/resources/case-studies/microstructure.html
3. **R. Saunders**, C. Butler, K. Genc, R. Cotton, P. Young, A. Elwany, D. Lagoudas, A. Bagchi, *Towards High Throughput Simulations of Microstructure Mechanical Behavior in AM*. 2020 Conference on Advancing Analysis & Simulation in Engineering (CAASE), COVID-19 Virtual Conference, June 16-18, 2020.
4. **R. Saunders**, *Statistical Analysis of Fractional Anisotropy Effects on Traumatic Brain Injury*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Salt Lake City, UT, November 11, 2019.
5. **R. Saunders**, R. Osborne, T. Martin, S. Johnson, E. Gorzkowski, *Mechanical Simulations of the Aerosol Deposition Process*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Salt Lake City, UT, November 11, 2019.
6. **R. Saunders**, J. Mancias, A. Arroyave, I. Karaman, D. Lagoudas, A. Bagchi, A. Elwany, *Melt Pool Size Prediction via a Multi-Fidelity Gaussian Process Surrogate Model.* Solid Freeform Fabrication Symposium (SFF), Austin, TX, August 12-14, 2019.
7. **R. Saunders**, X. G. Tan, A. Bagchi, *Developing Correspondence Rules for Traumatic Brain Injury in Different Species.* International Forum on Brain Injury Countermeasures (IFBIC), McLean, VA, May 8, 2019.
8. **R. Saunders**, A. Achuthan, A. Iliopoulos, J. Michopoulos, A. Bagchi, *The Influence of Grain Size and Shape on Mechanical Properties of Metal AM Materials.* Solid Freeform Fabrication Symposium (SFF), Austin, TX, August 13-15, 2018.
9. **R. Saunders**, A. Achuthan, A. Iliopoulos, J. Michopoulos, A. Bagchi, *The Influence of Grain Size and Shape on the Mechanical Properties of AM Parts.* World Congress on Computational Mechanics (WCCM), New York, NY, July 22-28, 2018.
10. **R. Saunders**, X. G. Tan, A. Bagchi, *Advancements in Simulation of TBI to Develop Interspecies Correspondence Rules*. National Capital Area TBI Research Symposium, Bethesda, MD, March 7, 2018.
11. **R. Saunders**, A. Achuthan, A. Iliopoulos, J. Michopoulos, A. Bagchi, *A Method to Determine Local Stress Fields in Microstructure Features Produced By Additive Manufacturing*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Tampa, FL, November 3-9, 2017.
12. **R. Saunders**, X. G. Tan, A. Bagchi, *Correspondence Rules to Correlate Interspecies Traumatic Brain Injury*. XXVI Congress of the International Society of Biomechanics, Brisbane, Australia, July 23-27, 2017.

13. **R. Saunders**, A. Romano, *A Parametric Study of Fractional Anisotropy and the Effects on Brain Injury Prediction*. XXVI Congress of the International Society of Biomechanics, Brisbane, Australia, July 23-27, 2017.

14. **R. Saunders**, X. G. Tan, A. Bagchi, *On the Development of Interspecies Traumatic Brain Injury Correspondence Rules*. National Capital Area TBI Research Symposium, Bethesda, MD, Mar. 8-9, 2017.

15. **R. Saunders**, A. Romano, *The Effects of Fractional Anisotropy on Traumatic Brain Injury Prediction*. National Capital Area TBI Research Symposium, Bethesda, MD, Mar. 8-9, 2017.

16. **R. Saunders**, S. Qidwai, A. Bagchi, *Validation of Two Porcine Models Against Low and High Rate Data*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, Nov. 11–17, 2016.

17. **R. Saunders**, S. Qidwai, *A Computational Study to Correlate Traumatic Brain Injury in Humans and Pigs*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, Nov. 11–17, 2016.

18. **R. Saunders**, S. Qidwai, A. Bagchi, *A Parametric Study of Fractional Anisotropic Representation in the Brain*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, Nov. 11–17, 2016.

19. S. Krishnamoorthi, A. Bagchi, S. Qidwai, **R. Saunders**, *Registration, Regional Identification and Transfer of data from MRI to finite element models*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, Nov. 11–17, 2016.

20. S. Qidwai, **R. Saunders**, S. Krishnamoorthi, A. Bagchi, *Development of Traumatic Brain Injury Scaling Rules between Humans and Pigs*. World Congress on Computational Mechanics (WCCM), Seoul, Korea, July 24 – July 29, 2016.

21. S. Krishnamoorthi, **R. Saunders**, S. Qidwai, *Registration, Regional Identification, and Transfer of Data from MRI Scans to Finite Element Models*. Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C), National Harbor, MD, June 29 – July 2, 2016.

22. **R. Saunders**, S. Qidwai, *Validation of a Porcine Head and Upper Torso Model*. Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C), National Harbor, MD, June 29 – July 2, 2016.

23. S. Qidwai, **R. Saunders**, *Scaling Rules between Human and Porcine Models for Traumatic Brain Injury*. Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C), National Harbor, MD, June 29 – July 2, 2016.

24. **R. Saunders**, N. Kota, A. Bagchi, S. Qidwai, *Development and Validation of a Porcine Head and Upper Torso Model*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Houston, TX, Nov. 15–19, 2015.

25. S. Qidwai, **R. Saunders**, N. Kota, A. Bagchi, *On the Use of Human and Pig Head Models for Traumatic Brain Injury*. ASME International Mechanical Engineering Congress & Exposition (IMECE), Houston, TX, Nov. 15–19, 2015.

26. S. Qidwai, **R. Saunders**, N. Kota, A. Bagchi, *Towards Building Correspondence Rules between Human and Pig Head Models for Traumatic Brain Injury*. 13th US National Congress on Computational Mechanics (USNCCM), San Diego, CA, July 26-30, 2015.

27. **R. Saunders**, D. Hartl, J. Boyd, D. Lagoudas, *Modeling and Development of a Twisting Wing Using Inductively Heated Shape Memory Alloy Actuators*. SPIE Smart Structures and Non-Destructive Evaluation Conference, San Diego, CA, Mar. 8–12, 2015.

28. **R. Saunders**, J. Herrington, L. Hodge, D. Hartl, J. Mabe, *Optimization of a Composite Morphing Wing with Shape Memory Alloy Torsional Actuators*. ASME Smart Materials Adaptive Structures and Intelligent Systems Conference (SMASIS), Newport, RI, Sept. 8–10, 2014.