Robert N. Saunders, PhD

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Active DoD TS/SCI w/ CI polygraph

OBJECTIVE

Accelerate the development, acquisition, and fielding of innovative technologies that enhance Warfighter operational effectiveness, ensuring they have the tools and capabilities needed to succeed in rapidly evolving environments and maintain the battlespace advantage.

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*

Graduate 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*

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

PROFESSIONAL EXPERIENCE

Deputy Chief Engineer (GG-14, 0801)   (Sept 2024 – present)
Acting **Chief Engineer (GG-15, 0801)**   (Jan 2025 – May 2025)
Signals Intelligence (SIGINT) Systems Acquisition Directorate
National Reconnaissance Office, Chantilly, VA
- Lead systems engineering for the multi-billion dollar next-generation overhead SIGINT architecture, consisting of >10 interdependent MSAs, to ensure end-to-end closure.
- Employ and coordinate digital systems engineering (DE) practices across SIGINT to accelerate system acquisitions and ensure seamless cross-collection system operations.
- Serve as the PM/COTR for an industry consortium - driving the maturation of architecture-wide standards.
- Represent SIGINT PEO equities at NRO forums and coordinate across the DoD/IC to foster collaboration and partnership with SIGINT users.
- Lead SIGINT international partnership efforts to strengthen NRO capabilities and promote collaboration among FVEY partners.

Deputy Branch Chief (GG-13, 0801, supervisory)   (Sept 2023 – Sept 2024)
Mission Manager (GG-13, 0801)   (Feb 2023 – Sept 2023)
Office of Space Launch – Launch Management Division
National Reconnaissance Office, Chantilly, VA
- Led a diverse team of military, civilians, and contractors in executing launch missions, conducting advanced capability studies, and engaging in strategic partner outreach.
- Oversaw the supervision of both civilian and military staff, managing hiring processes, onboarding programs, and providing ongoing mentorship.
- Identified, developed, and rapidly acquired advanced launch and on-orbit capabilities utilizing both FAR and non-FAR methods.
- Facilitated and coordinated strategic outreach initiatives with industry and government partners to effectively identify and address customer requirements.

- Managed stakeholder inputs and tracked progress throughout the Planning, Programming, Budgeting, and Execution process to ensure alignment and accountability.

Mechanical Engineer (NP-03, 0830) (Sept 2016 – Feb 2023)
Materials Science & Technology Division
U.S. Naval Research Laboratory, Washington D.C.
- Provided critical insight and guidance using subject matter expertise in metal additive manufacturing (AM) and machine learning (ML).
- Created an ML-based model for the AM process – leading to a 50% improvement in the performance and quality of AM parts while significantly reducing material waste costs.
- Co-principal investigator for multiple DoD programs in AM and traumatic brain injury (TBI), involving Tri-Service participation, with total funding exceeding $30 million.
- Authored technical briefs for senior leaders, subject matter experts, program managers, and non-technical audiences on complex scientific topics.

Biomechanics Engineer (June 2015 – Sept 2016)
Leidos Inc. c/o U.S. Naval Research Laboratory, Washington D.C.
- Developed comprehensive strategies to analyze blast injuries sustained during weapons training and combat, resulting in enhanced protection for Warfighters.
- Identified TBI relationships between various animal species and humans to improve diagnosis and treatment of TBI in Warfighters.
- Created image-based finite element models of humans and other species using medical imaging data for realistic simulations and accurate TBI assessments.
- Established a method to evaluate combat helmets against over 300k potential ballistic threats and performed statistical analysis to identify areas lacking protection.
- Implemented a material model calibration framework for biological materials to enhance the prediction accuracy of material properties by up to 60%.

Research Associate (Aug 2013 – May 2015)
Aerospace Engineering Department
Texas A&M University, College Station, TX.
- Development of a modelling framework for inductive heating of shape memory alloy components to achieve an order-of-magnitude increase in actuation rates.
- Led a student team to design, model, and fabricate a composite twisting wing utilizing SMA torque tubes.
- Simulation and optimization of self-folding reprogrammable sheets using shape memory alloy and shape memory polymer composites.

OTHER EXPERIENCE

Visiting Scholar (May 2014 – Aug 2014)
Air Force Research Laboratory, Albuquerque NM
- Prototyped a deployable composite structure for overhead GEOINT optic baffles.

Medical Device Consulting (Jan 2014 – May 2014)
College Station TX
- Provided expert insights and analysis of shape memory alloy biomedical devices.

Undergraduate Research Assistant (June 2011 – July 2013)
Aerospace Engineering Department, Virginia Tech, Blacksburg VA.
- 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.
- Investigation and flight test of a moving mass actuator control system for small satellites.

AWARDS/TRAINING/CERTIFICATIONS

Awards
- 'Outstanding' (5) rating in every year of service since EOD*
  ‡ Or equivalent rating resulting in a merit/step increase
- NRO Innovation & Achievement awards (6 total)
- NRO Office of Space Launch Senior Technical Civilian – 3QFY23
- NRO Office of Space Launch Innovation in Launch Team Award - 2QFY24

Training
- DoD Executive Leadership Development Program (Cohort 37)
  ‡ Sole, competitively selected NRO employee chosen for 10-month DoD/IC-wide leadership training
- Naval Research Laboratory Edison Memorial Graduate Training Program Recipient
  ‡ Multi-year competitively awarded graduate education program
- NRO Leadership Launch for Supervisors
  ‡ 1-week in-residence, intensive leadership training

Certifications
- NRO Contracting Officer Technical Representative (COTR)
- DAWIA Practitioner Certification in Engineering & Technical Management
- DAWIA Foundational Certification in Test & Evaluation
- DAWIA Credentials in:
  ‡ Technology Project Management
  ‡ Digital Engineering
  ‡ Risk, Issue, and Opportunity Management
  ‡ Resilience
  ‡ Acquisition Intelligence
  ‡ AI Foundations for the DoD
- 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

- 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 speaker, organizer, and chair
- Recurring mentor for interns, students, and new hires
- Invited speaker/panelist at academic, leadership, and professional forums
- Represent senior leaders at multi-agency forums and working groups
- Collaborate across the DoD/IC, USG, and international partners in support of the mission

SKILLS

- Computer Languages – Fortran, Python, R, Matlab
- Software – Abaqus, COMSOL, Solidworks, Mathematica, Microsoft Office
- Machine learning, digital engineering, and model-based systems engineering

- Machine shop, mechanical testing, and field testing experience
- Windows, Linux, Unix experience
- Programing, planning, budgeting, and executing (PPBE)
- Acquisition strategy and contracting
- Time, Project, and Personnel Management inc. supervision of civilian & military workforce

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.