Hannah Stroud

Last update on December 21, 2020

Research Experience

M²AESTRO Lab, Texas A&M University — College Station, Texas
Graduate Student Researcher — *Aug '18 – present*

Lead for bioabsorbable metals research effort, developing a multiphysical modeling tool for degrading materials under flow. Lead for smart textiles project, developing and experimentally validating structural model incorporating shape memory alloy (SMA) material model for SMA knitted structures.

- Developed representative volume elements (RVEs) for knit stitch architectures and performed finite element analysis (FEA) to determine structural response.
- Experience in: material model development and implementation, FEA, Matlab, Excel, Python, mechanical load testing, and water tunnel testing.

NUA²NCED Lab, Texas A&M University — College Station, Texas
Graduate Student Researcher — *Aug '18 – present*

Graduate student lead for REvolutionizing Diversity Of Engineering (REDO-E) project. Develop senior level design class focused on applying aerospace engineering to unconventional fields (e.g. biomedical, civil infrastructure). Create engaging STEM activities for students of all levels.

- Advised three undergraduate students in developing an interactive game module to engage with K-12 students.
- Designed a class that directly broadened senior student's job prospects upon graduation.

M²AESTRO Lab, Texas A&M University — College Station, Texas
Undergraduate Student Researcher — *Aug '16 – May '18*

Manufacturing expert for avian-inspired morphing wing project.

- Manufactured three iterations of avian-inspired wing using 3D printing, fibreglass-epoxy composites, and polymer-SMA composites.
- Performed wind tunnel experiments on morphing wing using novel, in-situ multiphysical characterization methods.
- Experience in: manufacturing, fixture development, mechanical load testing, wind tunnel testing, and in-situ thermomechanical 3D-DIC IR characterization.

Aerospace Engineering Department, Texas A&M University — College Station, Texas
***CASMART Project* Student Researcher** — *Sep '15 – Dec '15*

Designed an experimental satellite using shape memory alloys as an actuation system for solar panels to replace hydraulic actuation systems typically utilized in satellites with a team of four. Modeled SMA torque tube angle vs. temperature in Matlab. Wrote design papers in the Consortium for the Advancement of Shape Memory Alloy Research and Technology (CASMART) and the ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS).

- Won 1st place in first CASMART student competition, confirming Texas A&M as leading institution in SMA field.
- Worked with a team of four other students developing design and writing technical paper.

Industry Experience

Fort Wayne Metals — Fort Wayne, Indiana
Research and Development Intern — *Jun '18 – Aug '18*

Develop and test processing techniques for non-binary shape memory alloy materials. Characterize processed materials and evaluate material properties.

- Designed data processing tools in Matlab to efficiently extract key material properties.
- Drew difficult ternary shape memory alloy wire down below ten mil sizes.

Insitu, Inc. — Hood River, Oregon
Advanced Development Intern — *May '17 – Aug '17*

Calculate structural loads for developmental aircraft fuselage. Design structural test to validate structural integrity of fuselage under component loads. Design and manufacture custom fixtures for use during testing. Perform fuselage structural testing, take data, and analyze results. Use wing loading profile to develop whiffletree parameters and construct whiffletree fixtures. Develop design of experiment and perform adhesive bond strength tests and recommend an adhesive for the airframe in development. Assist engineers with projects as needed.

- Designed and modeled in Solidworks an additively manufactured part in use on Scan Eagle 3.
- Oversaw full lifecycle of fuselage structural test from load development, to fixture design, to test.
- Developed component load analysis tool in Excel.

Mechanical Design and Flight Sciences Intern *May '16 – Aug '16*

Learn traditional machining methods including water jet, CNC and manual mill, and TIG welding. Design and manufacture prototype parts and test fixtures. Assist engineers with component design and design for machinability.

- Led team in developing tool control procedure, helping teammate earn Six Sigma white belt.
- Machined and processed tool control parts deployed to sites in Afghanistan.
- Designed and machined fixtures for Advanced Development, leading to subsequent employment.

Mechanical Engineering Department, Texas A&M University College Station, Texas

Additive Manufacturing Lab Technician *Sep '15 – Dec '15*

Develop and plan concept student additive manufacturing lab. Recommend 3D printers based on experience in field. Set up, calibrate, and operate 3D printers. Develop printer guidelines for student use.

Buffalo Manufacturing Works Buffalo, New York

Engineering Intern *Jun '15 – Aug '15*

Develop innovative uses for manufacturing techniques, particularly additive manufacturing and robotics. Perform material analysis for materials used in the additive manufacturing process. Design and print parts for project work.

- Developed framework for future internship program (as company's first intern) that is still in use.
- Designed week-long mini-internship program for high school students and "hired" three interns.
- Earned forklift certification.

Education Work Experience

Unconventional Applications of Aerospace Engineering (AERO 489), Texas A&M University College Station, Texas

Course Developer and Teaching Assistant *Aug '18 – Dec '18*

Develop course syllabus and material for class assignments. Organize final project requirements and develop project options.

Pitch Up! Competition, Texas A&M University College Station, Texas

Competition Developer and Presentation Mentor *Apr '19*

Develop and implement presentation competition for undergraduate students. Host practice sessions for students and provide feedback on presentation quality and style. Coordinate judges, develop judging criteria, and advertise competition.

Engineering Activities and Student Affairs, Texas A&M University College Station, Texas

Teaching Assistant *Sep '15 – Dec '15*

Develop lesson plans and teach recitation sessions for Precalculus for Engineers. Design engineering-based "real world" math activities. Host office hours for one-on-one mentoring. Grade assignments and assist professor.

Mentorship Experience

Encourage Her, Encouraging Women Across All Borders (EWAAB) — College Station, Texas
Primary Mentor — *Jul '20 – present*

Guide freshmen students Jessica Williams, Milada Zatkalik, Santhosh Prasad, and Sofia Wynn through Encourage Her curriculum. Create a safe environment for women to feel supported, and foster interpersonal and professional relationships between students.

M^2AESTRO Lab, Texas A&M University — College Station, Texas
Undergraduate Research Mentor — *Jan '20 – present*

Mentor student Grant Nolette in performing experimental and computational research tasks. Guide student Brady Allen through manufacturing tasks related to water tunnel modifications.

NUA^{2}NCED Lab, Texas A&M University — College Station, Texas
Undergraduate Research Mentor — *Apr '19 – present*

Mentor students Cristina Morilla, Fernando Sesma, and Eghosasere Alao in developing educational activities aimed at students K-12. Guide same students through technical paper writing process.

Informal Lean-In Group, Texas A&M University — College Station, Texas
Coordinator — *Aug '20 – present*

Set up meetings and develop meeting themes for women's support group.

CASMART Design Competition, Texas A&M University — College Station, Texas
Research Mentor — *Aug '18 – May '19*

Mentor students Brady Allen, Cody Shelton, and Parker Reaume in designing and testing a shape memory alloy tourniquet device. Guide same students through poster presentation process at international competition.

Please refer to my Linked-in profile for a more complete list of work experiences along with recommendations.

Education

Texas A&M University — College Station, Texas
Doctor of Philosophy in Aerospace Engineering — *2020 – Present*
GPA: 4.0

Focus: Multiphysical modeling of materials degrading under flow.

Texas A&M University — College Station, Texas
Master of Science in Aerospace Engineering — *2018 – 2020*
GPA: 3.80

Thesis topic: Structural modeling of shape memory alloy knitted structures.

Texas A&M University — College Station, Texas
Bachelor of Science in Aerospace Engineering — *2014 – 2018*
Undergraduate GPA: 3.48
Major GPA: 3.44

Publications

Peer Reviewed Publications:

Shape memory alloy torsional actuators: A review of applications, experimental investigations, modeling, and design
H. Stroud, D. Hartl
Smart Materials and Structures, 2020

In Conference Proceedings:

Exploring Concepts of Space Traffic Through Real-World Examples: Bringing Aerospace to K-12 Students in a Novel Way
H. Stroud, C. Morilla, F. Sesma, E. Alao, K. Shryock
ASCEND Conference, Virtual, 2020

Hands-on Exposure to Unconventional Applications of Aerospace at the High School Level
H. Stroud, K. Schryock
American Society of Engineering Education Annual Conference, Tampa, 2019

Unconventional Applications of Aerospace Engineering: Effects of a Design Elective on Perception of Aerospace
H. Stroud, K. Shryock, D. Hartl, I. Sabat, K. Dray
American Society of Engineering Education Annual Conference, Tampa, 2019

Experimental multiphysical characterization of an SMA driven, camber morphing owl wing section
H. Stroud, P.B.C. Leal, D. Hartl
SPIE Smart Structures and Nondestructive Evaluation, Denver, 2018

Skin-based camber morphing utilizing shape memory alloy composite actuators in a wind tunnel environment
P.B.C. Leal, H. Stroud, D. Hartl
2018 AIAA/AHS Adaptive Structures Conference, 0799

Design and fabrication of a shape memory-based bio-inspired morphing wing
P.B.C. Leal, H. Stroud, D. Hartl
VIII ECCOMAS Thematic Conference on Smart Structures and Materials SMART 2017

Design of a reconfigurable sma-based solar array deployment mechanism
R. Wheeler, R. Saunders, K. Pickett, C. Eckert, H. Stroud, T. Fink, K.Gakhar, J. Boyd, D. Lagoudas
ASME 2015 Conference on Smart Materials, Adaptive Structures and Intelligent Systems

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Presentations

Session Chair:

Technical Presentation Session: Education, K-12
H. Stroud
ASCEND Conference, Virtual, 2020

STEAM Session: Space Traffic Jam!
H. Stroud
ASCEND Conference, Virtual, 2020

Conference Presentations:

Experimental multiphysical characterization of an SMA driven, camber morphing owl wing section
H. Stroud, P.B.C. Leal, D. Hartl
SPIE Smart Structures and Nondestructive Evaluation, Denver, 2018

Poster Presentations:

Incorporation of Shape-Memory Alloys in an Emergency Response Tourniquet
B. Allen, P. Reaume, C. Shelton, H. Stroud, D. Hartl
Shape Memory and Superelastic Technologies, Konstanz, Germany, 2019

Superelastic SMA Structures for Robust Urban UAS
M. Mikkelsen, H. Stroud, D. Hartl
C-UAS Summit, College Station, 2019

Multiphysical Characterization of Avian Inspired Morphing Wing Section
H. Stroud, P. Leal, S. Murley, H. Jerdon, D. Hartl
ASME Southwest Division, College Station, 2018

Awards & Fellowships

NSF Graduate Research Fellowship Program
National Science Foundation *2020 – Present*

Aerospace Graduate Excellence Fellowship
Texas A&M University, Department of Aerospace Engineering *2020*

Texas A&M University Graduate Diversity Fellowship
Texas A&M University *2018 – Present*

Maryann and Gordon Gibson '55 Scholarship
Texas A&M University, Department of Aerospace Engineering *2017 – 2018*

Joann and Edward "Pete" Aldridge '60 Scholarship
Texas A&M University, Department of Aerospace Engineering *2014 – 2016*