Dillon Colt Hall

Ph.D. Candidate, Aerospace Engineering
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EDUCATION

2018 – Present **Texas A&M University**, College Station, TX
Ph.D., Aerospace Engineering
- Dissertation: *Pressurized Multilayer EVA Space Suits: Development of Finite Element Analyses (FEA) Models for Design/Fit Sensitivity Analyses and Prediction of Performance*
- GPA: 3.62
- Expected Graduation Date: December 2022

2014 – 2018 **University of Mississippi**, Oxford, MS
B.S., Mechanical Engineering
- Emphasis: Manufacturing
- GPA: 3.92

WORK EXPERIENCE

Sept 2018 – Present **Graduate Research Assistant**
Aerospace Human Systems Laboratory (AHSL)
Texas A&M University, College Station, TX
- Utilized static laser scanning, 3D photogrammetric motion capture scanning, and infrared camera systems to analyze various anthropometric and biomechanical metrics and study their effect on human-integrated space systems such as space suits and crew cockpits.
- Developed a methodology which integrates 3D body scanning technology with anthropometric analysis software to analyze the effect of spacesuits on maximum arm reach volumes and other range of motion metrics.
- Created a framework for analyzing fit and performance of an EVA lower arm assembly design through the utilization of dynamic/explicit finite element analyses.
- Designed and modified garment patterns with commercial simulation software to customize garments to the dimensions of a scanned subject.
- Led the student research group from June 2021 – Dec 2022.

June 2020 – Aug 2020 **Human Factors Intern**
Anthropometry and Biomechanics Facility (ABF), NASA-JSC, Houston, TX
- Developed a research project focused on using machine learning tools such as Principal Component Analysis (PCA), Singular Value Decomposition (SVD), Iterative Closest-Point (ICP)

algorithm, and Denavit-Hartenberg (DH) parameters to align a virtual Mark III suit model with Vicon motion-capture data from archived Mark III gait analysis experiments such as ARGOS and IST.

- Created an analysis framework to decompose aligned motion capture data to principal components that could more simply describe the 3D motion. This analysis allows suit designers to compare and improve 1/6-g analogue experiments for suited gait.

July 2017 – Aug 2017	**Process Engineering Intern** Tecumseh Products, Verona, MS

- Created a newly designed system of work instructions that outline a clear and concise method of assembly for more than 5oo cooling unit products made at the Verona facility.
- Developed isolated product line improvements that streamlined workflow, simplified operator workloads, and reduced waste.
- Developed a new product line layout to maximize product output with minimized space, error, and labor.

May 2016 – Aug 2016	**Senior Engineering Intern** Orbital ATK, Iuka, MS

- Analyzed the manufacturing processes used to create complex composite structures that can handle the intense stresses of space travel
- Reconciled anomalies between the materials bought and consumed by the facility team to make rocket components and worked with quality and engineering divisions to simplify, correct, and create technician work instructions

HONORS

Texas A&M University Achievements, Awards, and Scholarships

- Aerospace Engineering Graduate Excellence Fellowship Award (2020, 2021)
- Aerospace Engineering PhD Graduate Excellence Fellowship Award (2021)
- Awarded 1st Place Overall Poster Presentation for "Modeling of Extravehicular Activity (EVA) Suits Using Vitronics® Vitus Laser Scanning Coupled with CAD/Vidya Software for Fabric Behaviors" at the 49th International Conference on Environmental Systems (ICES) Student Poster Competition (2019)
    - $500 cash prize included with award

University of Mississippi Achievements, Awards, and Scholarships

- Graduate with Highest Distinction (Summa Cum Laude)
- Graduate of the Center for Manufacturing Excellence (CME) Program
- Graduate of the Sally McDonnell Barksdale Honors College (SMBHC)
    - Honors Thesis: *Product Realization and Lean Manufacturability of Home Docking Station*

- Toyota-Haley Barbour Scholarship Award (2014-2018)
- University of Mississippi Academic Excellence Scholarship Award (2014-2018)
- Bledsoe Scholarship Award (2014-2018)
- Senior Who's Who Award (2018)
- Inaugural Engineering Student Body Engineering Impact Award (2018)

PROJECTS AND ORGANIZATIONS

2014 – Present   **American Institute of Aeronautics and Astronautics (AIAA)**
- Contributed to the reactivation of the University of Mississippi branch of AIAA (2017)
- Served as Vice Chair of reactivated University of Mississippi branch (2017-2018)
- Current Member

2016 – 2018   **University of Mississippi Rocket Team**
- Primary student founder of the University of Mississippi's first rocket team
- Two-year team leader that managed the following responsibilities:
  - Recruitment and management of motivated engineering and business students
  - Development of team infrastructure, assets, and budgets for all team projects
  - Fabrication of safe, effective, and cost-efficient high-powered rockets (L & M class motors) that met mission-specific requirements
  - Delegation of team responsibilities towards project tasks
  - Compilation of all technical reports and presentations
- Competitor in the University Student Launch Initiative (USLI; 2016-2017)
- Competitor in the Spaceport America Cup (SA Cup; 2018)

2014 – 2018   **Engineers Without Borders (EWB) – Design Committee**
- Collaborated with engineering students to develop a deep-water well distribution system in Akoumape, Togo, Africa
- Selected as an on-site student engineer for a two-week assessment trip to Akoumape, Togo, Africa (2016)
  - Traveled to the proposed dig site in Akoumape and assisted in the completion of a rock layer assessment of the proposed water system design location

2011   **Boy Scouts of America**
- Received Eagle Scout rank (2011)

SKILLS, CERTIFICATIONS, AND PROFICIENCES

- PADI Scuba, Advanced Open Water Certification (September 2020)
- Private Pilot License in progress (June 2021 – Present)

- National Association for Rocketry (NAR) Level 2 High-Powered Rocket Certification (Feb 2017)
- Software Proficiencies
    - Human Solutions CAD/Vidya – software suite for 3D garment creation, simulation, and fit assessment on laser-scanned and rendered 3D human body scans
    - 3dMD Motion Capture System – temporal 3D scanning system capable of motion capture
    - Vitronics Vitus Laser Scanning System – Static 3D scanning system
    - ABAQUS/CAE – FEA solver with Python scripting capabilities
    - Various CAD modeling software including: Creo, AutoCAD, SOLIDWORKS, and Blender
    - MATLAB and Python programming languages
- Proficient knowledge of composites manufacturing techniques with experience in full preparation and procurement of complete composite structures
- Experience with general shop floor machinery operation.
- Performed quality and lean manufacturing review for Orbital ATK, Parker Racor, and Tecumseh Products manufacturing facilities

TECHNICAL CONFERENCES ATTENDED

- International Space Medicine Summit (2018, 2019, 2020, 2021)
- International Conference of Environmental Systems (2019, 2021)
- NASA Technology Collaboration Center EVA Workshop (2019)
- XXXII Association of Space Explorers (ASE) Planetary Congress (2019)
- SpaceCom Expo (2019)
- 2020 EVA Exploration Workshop (2020, 2021)

PUBLICATIONS AND PRESENTATIONS

Hall, D., Dunbar, B. J., Hartl, Darren. J. (Draft Paper Under Review): "Utilizing Finite Element Analysis (FEA) to Predict Fit and Performance of an EVA Lower Arm Assembly Pressure Garment". *2022 International Conference on Environmental Systems*, St. Paul, MN, 2022.

Hall, D., Haas, M., Dunbar, B. J. (Accepted for Publication): "Determining Spacesuit Reach and Range of Motion (ROM) Using 3D Photogrammetric Motion Capture". *2022 IEEE Aerospace Conference*, Big Sky, MT, 2022.

Hall, D., Dunbar, B. J., Burke, P., & Hajda, C.: "Range of Motion (ROM) Analysis for Pressure Garments (EVA and LES) using 3D Photogrammetric Motion Capture". *2020 International Conference on Environmental Systems*, virtual, July 2020.

Dunbar, B. J., Hall, D.: "Modeling of Extravehicular Activity (EVA) Suits Using Vitronics® Vitus Laser Scanning Coupled with CAD/Vidya Software for Fabric Behaviors". Poster presented at: *49th International Conference on Environmental Systems (ICES)*, 2019 June 7-11, Boston, MA.