

Aaron Allred, PhD

Assistant Professor, Department of Aerospace Engineering
University of Maryland, College Park

arallred@umd.edu

Updated October 2026

Research Interests

Aerospace Engineering technologies centered on:

human spaceflight; space systems design; sensorimotor aids; navigation aids

Human-Autonomy Teaming (HAT) technologies centered on:

human decision-making; human-AI alignment; supervisory control; decision aids;
cognitive state estimation; isolated, confined, and extreme (ICE) environments

Education

Ph.D., Aerospace Engineering Sciences, University of Colorado – Boulder, June 2024

Dual Focus: Primary: Bioastronautics | Secondary: Fluids, Structures, and Materials

Dissertation: *Galvanic Vestibular Stimulation as a Countermeasure to Motion Sickness in Astronauts*

Advisor: Prof. Torin Clark

M.S., Aerospace Engineering Sciences, University of Colorado – Boulder, December 2021

Focus – Bioastronautics

Thesis: *Vestibular Perceptual Thresholds for Angular Rotation about the Yaw, Roll, and Pitch Axes*

Advisor: Prof. Torin Clark

B.S., Aerospace Engineering, University of Oklahoma, May 2016

Summa Cum Laude

Professional Experience

2027 – Present	Assistant Professor, Department of Aerospace Engineering, University of Maryland, College Park
2024 – 2026	Postdoctoral Associate, University of Colorado – Boulder Bioastronautics Laboratory Collaborations with the Institute of Cognitive Science
2021 – 2024	NASA Visiting Technologist Researcher: Neuroscience Laboratory - Johnson Space Center Entry Descent and Landing - Ames Research Center
2021 – 2024	Graduate Research Assistant, Bioastronautics Laboratory, University of Colorado – Boulder
2019 – 2021	Graduate Research Assistant, Aerospace Mechanics Research Center, University of Colorado – Boulder
2020	Materials Science Researcher, NASA Ames Research Center
2016 – 2019	Structural Engineer II, The Boeing Company, Oklahoma City, OK

2015 – 2016	Undergraduate Research Assistant, Unmanned Aerial Vehicle Lab, University of Oklahoma
2015	Aerospace Structural Engineering Internship, NORDAM, Tulsa, OK

Grants and Fellowships Awarded

2020 – 2024	NASA Space Technology Graduate Research Opportunities Fellowship
<i>Other Proposal Selections</i>	
2026 (PI)	Starlab and Ohio State University Parabolic Flight Research Selection
2025 – 2027 (PI)	SpaceX – Vast Haven-1 Orbital Flight Human Research Selection

Awards and Recognition

2025	Outstanding Postdoc of the Year Award, University of Colorado
2025	Space Medicine Association's annual Journal Publication Award
2025	Future Leaders in Aerospace Selected Participant
2024	Outstanding Graduate Research Award, University of Colorado Department of Aerospace Engineering Sciences
2020 – 2024	NASA Space Technology Graduate Research Opportunities Award
2019 – 2020	Ann and H.J. Smead Aerospace Department Scholarship
2016	Honors College, Summa Cum Laude, University of Oklahoma
2016	Design Build Fly, 5 th Place Finish
2014	Outstanding Student, Aerospace Engineering, University of Oklahoma
2012 – 2016	Oklahoma State Regents Scholar
2012 – 2013	Ellis and Bernice Sims Scholarship for Academic Achievement

Journal Articles, Peer-Reviewed

1. **Allred AR**, Richardson EE, Bostrom SR, Crum J, Tossell C, Niemeyer RE, Hirshfield LM, Hayman APA (2026 – *in press*). Decision-Making Amid Information-Based Threats in Sociotechnical Systems: A Review. *Journal of Cognitive Engineering and Decision Making*
2. Richardson EE, **Allred AR**, Sherman SO, Hirshfield LM, Hayman APA (2026). Identification of Factors Affecting Decision Making in Isolated, Confined, and Extreme Environments from Practitioner Interviews. *Small Group Research*
3. Crum J, **Allred AR**, Bostrom SR, Doherty E, McLain M, Richardson ER, Spencer C, Niemeyer RE, Hayman APA, Tossell C, Čeko M, Hirshfield LM (2025). Understanding the Neurocognitive Mechanisms of Cognitive Security. *Neuroscience & Biobehavioral Reviews*. doi: 10.1016/j.neubiorev.2025.106448
4. Lonner TL, **Allred AR**, Gopinath AR, Morgheim T, Groen EL, Oman CM, DiZio P, Lawson BD, Dreckler SR, Clark TK (2025). Reducing motion sickness during simulated astronaut post-spaceflight water landings using anticipatory cues or postural control. *Npj Microgravity*. <https://doi.org/10.1038/s41526-025-00478-9>

5. **Allred AR**, Gopinath AR, Clark TK (2025). Validating sensory conflict theory and mitigating motion sickness in humans with galvanic vestibular stimulation. *Communications Engineering*. <https://doi.org/10.1038/s44172-025-00417-2>
6. Valter Y, Vataski L, **Allred AR**, Hebert JR, Brunye TT, Clark TK, Serrador J, Datta A (2025). A Review of Parameter Settings for Galvanic Vestibular Stimulation applied in treatment. *Frontiers in Human Neuroscience*
7. **Allred AR**, Austin C, Klausing L, Boggess N, Clark TK (2024). Human Perception of Self-Motion and Orientation During Galvanic Vestibular Stimulation and Physical Motion. *PLOS Computational Biology*. <https://doi.org/10.1371/journal.pcbi.1012601>
8. **Allred AR**, Lipper A, Wood SJ (2024). Enhancing spatial-disorientation training through advancements in galvanic vestibular stimulation. *Aerospace Medicine and Human Performance*. <https://doi.org/10.3357/AMHP.6362.2024>
9. **Allred AR**, & Clark TK (2024). A Computational Model of Motion Sickness Dynamics During Passive Self-Motion in the Dark. *Experimental Brain Research*. <https://doi.org/10.1007/s00221-024-06804-z>
10. **Allred AR**, Weiss H, Clark TK, & Stirling L (2024). An Augmented Reality Hand-Eye Sensorimotor Impairment Assessment for Spaceflight Operations. *Aerospace Medicine and Human Performance*. <https://doi.org/10.3357/AMHP.6313.2024>
11. Lonner TL, **Allred AR**, Bonarrigo L, Gopinath A, Smith K, Kravets VG, Groen EL, Oman C, DiZio P, Lawson BD, Clark TK (2023). Virtual Reality as a Countermeasure for Astronaut Motion Sickness During Simulated Post-Flight Water Landings. *Experimental Brain Research*. <https://doi.org/10.1007/s00221-023-06715-5>
12. **Allred AR**, Kravets VG, Ahmed N, & Clark TK (2023). Modeling Orientation Perception Adaptation to Altered Gravity Environments with Memory of Past Sensorimotor States. *Frontiers in Neural Circuits*, 17. <https://doi.org/10.3389/fncir.2023.1190582>
13. **Allred AR**, & Clark TK (2023). Vestibular perceptual thresholds for rotation about the yaw, roll, and pitch axes. *Experimental Brain Research*. <https://doi.org/10.1007/s00221-023-06570-4>

Under Review and Revision.

1. **Allred AR**, Richardson EE, Bostrom SR, Crum J, Tossell C, Niemeyer RE, Hirshfield LM, Hayman APA (*In Review*). Behavioral Outcomes of Human Cognitive Security within an Integrative Modeling Framework. *Theoretical Issues in Ergonomics Science*
2. Rote NC, Clark TK, **Allred AR** (*In Review*). Temporal Dynamics of Yaw Perception Following Transitions in Visual Cues of Angular Velocity and Position.

Conference Papers, Peer-Reviewed

1. Hurd VS, **Allred AR**, Garbino A, Hayman APA, Mashall-Goebel (2027 – In Review). Reliability in Venous Gas Emboli Grading during Exposure to Decompression Stress. 2027 IEEE Aerospace Conference.

2. Spencer CA, **Allred AR**, Richardson EE, Hayman APA, Hirshfield L (2026). When Crewmates Become More Trusted Than Information Displays: Trust and Reliance During Mars-Analog Missions with Deception. Space CHI 2026.
3. Rote NC, **Allred AR**, Dooley C, Fechtig C, Kates C, Hayman APA (2026). Optimization of Machine Learning Methods for Prediction of G-Induced Loss of Consciousness. 2026 IEEE Aerospace Conference.
4. Richardson EE, **Allred AR**, Spencer CA, Crum J, Tossell C, Hirshfield LM, Hayman APA (2025). Investigating the Effects of Hierarchy and Fatigue on Cognitive Security in Isolated, Confined, and Extreme Environments. ASPIRE, the HFES International Annual Meeting. October 2025.
5. **Allred AR**, Richardson EE, Priebe C, Peyok T, Crum J, Spener CA, Bateman B, Hirshfield LM, Hayman AP (2025). Development and validation of a spacesuit simulator for collecting experimental physiological and behavioral data. 54th International Conference on Environmental Systems. July 2025.
6. Lonner TL, **Allred AR**, Bonarrigo L, Gopinath A, Clark TK. Countermeasures for Astronaut Entry Motion Sickness during Water Landings. 2024 IEEE Aerospace Conference
7. Austin CR, Boggess N, Klausing L, **Allred AR**, Clark TK. Characterization of Galvanic Vestibular Stimulation Effects for Use in Astronaut Training. 2024 IEEE Aerospace Conference. March 2024.

Other Publications

1. **Allred AR**, Clark TK, “Galvanic Vestibular Stimulation as a Countermeasure to Motion Sickness Following Gravity Transitions in Astronauts” (2024) International Astronautical Congress.
2. **Allred AR**, “Galvanic Vestibular Stimulation as a Countermeasure to Motion Sickness in Astronauts” Doctoral Degree in Aerospace Engineering Sciences, University of Colorado – Boulder. Advisor Prof. Torin Clark. 8/2024.
3. **Allred AR**, Abbott LJ, Doostan A, & Maute K (2022). Automated processing of X-ray computed tomography images via panoptic segmentation for modeling woven composite textiles (arXiv:2202.01265). <https://doi.org/10.48550/arXiv.2202.01265>
4. **Allred AR**, “Vestibular Perceptual Thresholds for Angular Rotation About the Yaw, Roll, and Pitch Axes” Masters Degree in Aerospace Engineering Sciences, University of Colorado – Boulder. Advisor Prof. Torin Clark. 12/2021

Conference Presentations

1. **Allred AR**, Alla S, Clark TK (2026). Capturing Spatial (Dis)Orientation Perception During Active Vehicle and Learned Vehicle Dynamics. The Aerospace Medical Association 96th Annual Scientific Meeting, Denver, CO 2026.
2. Hurd VS, Richardson EE, **Allred AR**, Marshall-Goebel K, Hayman APA (2026). The Effects of Teleguidance on Novice Ultrasonographer Skill in Analog Spaceflight Crews for Earth-Independent Medical Operations. The Aerospace Medical Association 96th Annual Scientific Meeting, Denver, CO 2026.

3. **Allred AR**, Rote NC, Gopinath AR, Klausing L, Clark TK (2025). Advancements in Spatial Orientation Perception Modeling for Active Motion and Visual References. The Aerospace Medical Association 95th Annual Scientific Meeting, Atlanta, GA, 4 June, 2025.
4. **Allred AR**, Gopinath AR, Clark TK (2025). Galvanic Vestibular Stimulation as a Means of Altering Motion Sickness and Evaluating Sensory Conflict Theory. Vestibular Oriented Research Meeting, Boulder, CO, 19 May, 2025.
5. **Allred AR**, Gopinath AR, Clark TK (2025). Altering motion sickness symptoms during motion with galvanic vestibular stimulation. NASA Human Research Program Investigator's Workshop, Galveston, TX, Jan 31, 2025
6. **Allred AR**, Clark TK, "Galvanic Vestibular Stimulation as a Countermeasure to Motion Sickness Following Gravity Transitions in Astronauts." International Astronautical Congress, Milan, Italy, Oct 17, 2024
7. **Allred AR**, Clark TK, "Modeling human self-orientation perception resulting from galvanic vestibular stimulation and physical motion." NASA Human Research Program Investigator's Workshop, Galveston, TX, Feb 13, 2024
8. Clark TK, Lonner TL, **Allred AR**, Gopinath A, Oman CM, Lawson BD, Groen EL, DiZio P, "Assessment of countermeasures to mitigate motion sickness for post-flight astronauts during water landings." NASA Human Research Program Investigator's Workshop, Galveston, TX, Feb 13, 2024
9. **Allred AR**, Austin C, Boggess N, Temple D, Klausing L, Edwards S, Clark TK, "Modeling the impact of galvanic vestibular stimulation on human self-orientation perception in the presence of physical stimuli." Vestibular-Oriented Research Meeting, Boulder, CO, June 28, 2023
10. **Allred AR**, & Clark TK. "A Computational Model of Motion Sickness Driven by Sensory Conflict from Spatial Orientation Perception." The Aerospace Medical Association 93rd Annual Scientific Meeting, New Orleans, LA, 24 May, 2023.
11. Kravets VG, **Allred AR**, & Clark, TK, "Modeling Vestibular Adaptation to Gravity Transitions." The Aerospace Medical Association 93rd Annual Scientific Meeting, New Orleans, LA, 24 May, 2023.
12. Lippert A., **Allred AR**, & Wood SJ, "Galvanic Vestibular Stimulation as an Analog Device for Spatial Disorientation Training in Military Aviation." The Aerospace Medical Association 93rd Annual Scientific Meeting, New Orleans, LA, 24 May, 2023.
13. Lonner TL, **Allred AR**, Bonarrigo, L, Gopinath A, & Clark TK, "Using Virtual Reality as a Countermeasure for Astronaut Motion Sickness and Sensorimotor Impairment in Post-Flight Water Landings." The Aerospace Medical Association 93rd Annual Scientific Meeting, New Orleans, LA, 25 May, 2023.
14. **Allred AR**, Doostan A, Maute K, "Scale-Sensitive Homogenization Utilizing Deep Neural Networks." 16th U.S. National Congress on Computational Mechanics. Virtual, 27 July, 2021

Abstracts and Posters

1. **Allred AR**, Alla S, Clark TK, “Capturing Spatial (Dis)Orientation Perception During Active Vehicle and Learned Vehicle Dynamics. (abstract). The Aerospace Medical Association 96th Annual Scientific Meeting, Denver, CO 2026.
2. Hurd VS, Richardson EE, **Allred AR**, Marshall-Goebel K, Hayman APA, “The Effects of Teleguidance on Novice Ultrasonographer Skill in Analog Spaceflight Crews for Earth-Independent Medical Operations” (abstract). The Aerospace Medical Association 96th Annual Scientific Meeting, Denver, CO 2026.
3. Richardson EE, **Allred AR**, Hirshfield LM, Hayman AP, “Understanding Decision-Making in Isolated, Confined, and Extreme Environments Through Qualitative Interviews” (abstract and poster). NASA Human Research Program Investigators Workshop, Galveston, TX, 29 Jan, 2025.
4. Spencer CA, Richardson EE, **Allred AR**, Crum J, Hayman AP, Hirshfield LM, “Protecting Astronaut Decision-Making via Cognitive State Evaluation and Intervention During a Martian Rover Task” (abstract and poster). NASA Human Research Program Investigators Workshop, Galveston, TX, 29 Jan, 2025.
5. **Allred AR**, Gopinath AR, & Clark TK, “Altering Motion Sickness During Motion via Galvanic Vestibular Stimulation.” (abstract and poster) NASA Human Research Program Investigators Workshop, Galveston, TX, 29 Jan, 2025.
6. **Allred AR**, Clark TK, “Galvanic Vestibular Stimulation as a Countermeasure to Motion Sickness Following Gravity Transitions in Astronauts.” (abstract and poster) International Astronautical Congress, Milan, IT, Oct, 2024.
7. Lonner TL, **Allred AR**, Gopinath A, Clark TK, “Active postural control and anticipatory cueing as countermeasures for astronaut motion sickness during water landings.” (abstract and poster) NASA Human Research Program Investigators Workshop, Galveston, TX, 13 Feb, 2024.
8. **Allred AR** & Clark TK, “A computational model of motion sickness driven by sensory conflict from spatial orientation perception.” (abstract and poster) NASA Human Research Program Investigators Workshop, Galveston, TX, 7 Feb, 2023.
9. Clark TK, Lonner TL, **Allred AR**, Gopinath A, Bonarrigo L, Oman CM, Lawson BD, Groen EL, Lackner J., DiZio P, “Countermeasures to reduce sensory conflict and mitigate motion sickness from ground based analogs of gravity transitions and sea state motion.” (abstract and poster) NASA Human Research Program Investigators Workshop, Galveston, TX, 7 Feb, 2023.
10. **Allred AR** & Clark TK, “A galvanic vestibular stimulation-based countermeasure for motion sickness in astronauts.” (abstract and poster) NASA Human Research Program Investigators Workshop, Galveston, TX, 8 Feb, 2022.
11. Clark TK, Lonner TL, **Allred AR**, Drecksler S, Poole N, Oman CM, Lawson BD, Lackner J, DiZio P, “Development of a countermeasure suite for motion sickness induced by post-flight water landings.” (abstract and poster) NASA Human Research Program Investigators Workshop, Galveston, TX, 8 Feb, 2022.

Invited Seminars

2026 “Aerospace Technologies for Earth-Independent Human Operations” – University of Maryland

2026 “Aerospace Technologies for Earth-Independent Human Operations” – University of Texas Austin
2025 “Advancing Exploration Technologies for Aerospace Operators” Massachusetts Institute of Technology
2024 “Advancing Exploration Technologies for Aerospace Operators” University of Maryland
2024 “Mitigating Spaceflight-Relevant Sensorimotor Deficits” Harvard / Mass General
2023 “Relativity and the Vestibular System” University of Colorado Boulder

Media Appearances

2026 Interviewed by Aerospace America on Galvanic Vestibular Stimulation
2026 University of Colorado – Decision Making in ICE Environments- Research featured
2025 Interviewed by Discover Magazine on Motion Sickness
2024 University of Michigan – Astronaut Adjustment – Interviewed about Astronaut Assessments and Sensorimotor Deficits
2024 University of Colorado – Astronaut Motion Sickness – Research featured

Teaching Experience

University of Colorado – Boulder

Sp. 2026	Instructor for ASEN 5226: Medicine in Space and Surface Environments (graduate-level course spanning the Department of Aerospace Engineering Sciences and the Anschutz School of Medicine)
Sp. 2026	Guest Lecture on Sensorimotor Deficits for ASEN 5016: Space Life Sciences
F. 2024	Guest Lecture on Motion Sickness for ASEN 6216: Human Operation of Aerospace Vehicles (graduate-level course, aerospace engineering)
Sp. 2020	Teaching Assistant for ASEN 1022: Materials Science for Aerospace Engineers. University of Colorado – Boulder (undergraduate level)
F. 2019	Teaching Assistant for ASEN 2001: Introduction to Statics, Structures, and Materials. University of Colorado – Boulder (undergraduate level)

Thesis Committees

University of Colorado Boulder

Josh Coffie, PhD Student, exp. 2027 (Chair)
Caroline Austin, PhD Candidate, exp. 2027
Erin Richardson, PhD Candidate, exp. 2027
Jasmin Chadha, PhD Student, exp. 2027

Community Service, Outreach, and Leadership

2024 – 2026	Interim leadership for the Hayman Research Group during Prof. Allison PA Hayman’s leave
-------------	---

2025 – Present	Reviewer, Springer Nature’s <i>NPJ Microgravity</i>
2024 – Present	Reviewer, ACM <i>CHI Conference on Human Factors in Computing Systems</i>
2024 – Present	Reviewer, Springer Nature’s Journal of <i>Biological Cybernetics</i>
2024 – Present	Reviewer, Springer Nature’s Journal of <i>Experimental Brain Research</i>
2023 – 2024	CU Sports Medicine Physical Therapist Assistant Volunteer Tech
2023	Graduate Student Aerospace Applicant Review Committee
2018 – 2019	Engineering Mentor, The Boeing Company
2016 – 2019	Endeavor Games Representative
2015 – 2016	President of the University of Oklahoma’s American Society of Professional Engineers Chapter
2016	Design Build Fly (DBF) Project Lead, University of Oklahoma
2016	Community Citizen Project Volunteer with Habitat for Humanity

Advised Students - Direct Research Responsibilities

2026 – Present	Victoria Hurd – PhD Student
2026 – Present	Joshua Coffie – PhD Student
2025 – 2025	Brady Hogoboom – PhD Student
2025 – 2026	Sweta Alla – Master’s Student
2025 – 2026	Gavin Radtke – Undergraduate Student Researcher
2025 – Present	Eli Gerber – Undergraduate Student Researcher
2025 – Present	Jose Caraveo Herrera – Undergraduate Student Researcher
2024 – Present	Erin Richardson – PhD Candidate
2024 – 2025	Nicole Rote – PhD Student
2024 – Present	Blake Bateman – Undergraduate Student
2024 – Present	Mackenzie Weber – Undergraduate Student
2024	Charlie Priebe – Master’s Student
2024	Tucker Peyok – Master’s Student