

## Shu-Yu (Mich) Lin, M.S.

Ph.D. Candidate, Department of Aeronautics and Astronautics

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Massachusetts Institute of Technology

## Research Interests

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Human spaceflight, human-environment relationship, isolated/confined/extreme environments, behavioral health, space psychology, behavioral design in architecture, post-occupancy evaluation, user-centered design

## Education

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Ph.D., Space Architecture, Massachusetts Institute of Technology, exp. June 2026

Thesis: *Architectural Design Framework for Providing Passive Behavioral Health Countermeasures*

Committee: Prof. Katya Arquilla; Prof. Olivier de Weck (chair); Dr. Lauren Landon

GPA: 5.00/5.00

M.S., Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2023

Thesis: *Wearable Sensor System for Quantifying Proprioceptive Competence in Microgravity [10]*

Advisors: Prof. Jeffrey Hoffman; Prof. Katya Arquilla

GPA: 5.00/5.00

B.S., Aerospace Engineering Sciences, University of Colorado Boulder, June 2021

Summa cum laude, with honors, GPA: 3.94/4.00

B.S., Applied Mathematics, University of Colorado Boulder, June 2021

Summa cum laude, with honors, GPA: 4.00/4.00

## Selected Publications

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**Shu-Yu Lin**, Lauren Landon, Katya Arquilla. "Mood Changes in an Isolation Analog: Validation and Analysis of the Subjective Habitability & Acceptability Questionnaire (SHAQ)". *In preparation*.

**Shu-Yu Lin**. "Wearable Sensor System for Quantifying Proprioceptive Competence in Microgravity" Master's Thesis. Massachusetts Institute of Technology. 06/2023.

## Research and Professional Experience

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3XN/GXN, Copenhagen, Denmark, Behavioral Designer & Researcher	Su. 2024
<i>Conducted post-occupancy evaluations to assess affordances</i>	
<i>Created behavioral design brief for masterplan project</i>	
<i>Contributed to and edited chapter on blending research and practice [8]</i>	
NASA Johnson Space Center - Behavioral Health & Performance Lab, Houston, TX, Researcher; Mentor: Dr. Lauren Landon	Su. 2023
<i>Analyzed participant data from NASA's analog isolation habitat studies to quantify the correlation between habitability and mood [3][11]</i>	
SpaceX – Operations, Hawthorne, CA, Space Medicine & Research Engineer	Su. 2022
<i>Led flight hardware hazard assessment for over 25 research projects</i>	
Astrolab – Field Test, Dumont Dunes, CA, Human Factors Consultant	Su. 2021
<i>Provided human factors &amp; ergonomics assessment for lunar rover</i>	
Blue Origin – Advanced Concepts, Kent, WA, Space Architecture Intern	Su. 2020
<i>Modeled and rendered a human habitation design in microgravity with</i>	

<i>Rhino and VRay</i>	
SpaceX – Vehicle Engineering, Hawthorne, CA, Mechanisms Intern <i>Designed and fabricated flight parts for Demo-II and Crew-1</i> <i>Designed portable actuation box for docking mechanism</i>	Su. 2019
CU Bioastronautics Lab, Boulder, CO, Researcher <i>Led software development in Unreal and Blendr to produce an augmented reality environment through the Microsoft HoloLens [1][2]</i>	2019-2021
Colorado Legislature, Denver, CO, Science & Engineering Policy Fellow <i>User research on renewable energy in rural communities</i>	Su. 2018
Colorado Space Grant, Boulder, CO, Systems Engineering Lead <i>Managed schedules and requirements for inflatable habitat model</i>	2017-2018

### **Grants and Fellowships**

Richard Dupont Memeorial Fellowship (MIT)	2024
MISTI International Travel Support (MIT)	2024
NASA Space Technology Graduate Research Fellowship <i>Award: Architectural Design Framework for Providing Passive Behavioral Health Countermeasures</i>	2022
Graduate Student Council Conference Travel Grant (MIT)	2021
National Science Foundation Graduate Research Fellowship	2021
Jack and Vickie Kerrebrock Fellowship	2021
John B. Cox '48 Endowed Scholarship (CU Boulder)	2020
Rudolph and Helen Gagg Scholarship (CU Boulder)	2019
Dorothy Martin Endowment Fund (CU Boulder)	2018
J. Tour Scholarship in Arts and Sciences (CU Boulder)	2020
Quarton Scholar (CU Boulder)	2021
Ball Aerospace Broadening Opportunities through Leadership and Diversity Scholarship (CU Boulder)	2018-2021
Esteemed Scholars Award (CU Boulder)	2017-2021
Engineering Scholarship (CU Boulder)	2017-2021
Greenhouse Scholarship	2017-2021

### **Peer Reviewed Journal Publications**

1. Banerjee, N., Baughman, A., **Lin, S.**, Witte, Z., Klaus, D., Anderson, A. "Development of Alternative Reality Environments for Spacecraft Habitat Design Evaluation." *Virtual Reality*, 1-10. 07/2020.
2. Banerjee, N., Baughman, A., **Lin, S.**, Witte, Z., Klaus, D., Anderson, A. "Side-by-Side Comparison of Human Perception and Performance in Augmented, Hybrid, and Virtual Reality." *IEEE Transactions on Visualization and Computer Graphics*. 07/2020.

#### *Under revision, review, or preparation*

3. **Shu-Yu Lin**, Landon, L., Arquilla, K. "Mood Changes in an Isolation Analog: Validation and Analysis of the Subjective Habitability & Acceptability Questionnaire (SHAQ)". *In preparation*.
4. **Shu-Yu Lin**, Lian, C., Yang, A., and Arquilla, K. "Fluidity as a Measure of Movement Quality in Microgravity". *Under revision*.

### **Peer Reviewed Conference Publications**

5. **Shu-Yu Lin**, Chen, L., Landon, L., Arquilla, K. "Acyclic framework for identifying causal

- relationships in habitat design." International Astronautical Congress, Milan, Italy, 10/2024.
6. **Shu-Yu Lin**, Yang, A., Arquilla, K. "Prototyping Wearable Sensor Garment for Understanding Proprioceptive Changes in Microgravity." International Astronautical Congress, Paris, France, 09/2022.
  7. **Shu-Yu Lin**, Yang, A., Arquilla, K. "Quantifying Proprioceptive Experience in Microgravity." SpaceCHI Workshop at ACM Computer Human Interaction. New Orleans, LA, 05/2022.

### **Other Publications**

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8. Lunsjö, M., **Lin, S.Y.**, Allen, K. "Bridging Theory and Practise: Applying Environmental Psychology in Architecture" in Handbook of Neuroscience and the Built Environment, Routledge. *Under review.*
9. Bell, S.T., Dev, S.I., Landon, L.B., Miller, J.C.W., Anderson, S.R., Flynn-Evans, E., Spencer, C.A., **Lin, S.Y.**, Khader, A. Human Factors and Behavioral Performance Exploration Measures in HERA Campaign 6: Final Report. Internal report submitted to the Human Factors and Behavioral Performance Element, NASA Human Research Program. Houston, TX: NASA Johnson Space Center. 09/2024.
10. **Shu-Yu Lin**. "Wearable Sensor System for Quantifying Proprioceptive Competence in Microgravity" Master's Thesis. Massachusetts Institute of Technology. 06/2023.

### **Presentations and Posters**

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11. **Shu-Yu Lin**, K. Arquilla, D. Garcia, L. Landon, and O. de Weck. "Architecture in Extreme Environments: A Site-Specific Case Study for Space Architecture." NASA Human Research Program Investigators Workshop. Galveston, TX. 01/2025. (Poster)
12. **Shu-Yu Lin**, L. Landon, K. Arquilla. "Factors Impacting Habitability: Analysis of SHAQ Data from HERA C5 & C6." NASA Human Research Program Investigators Workshop. Galveston, TX. 01/2024. (Presentation)
13. **Shu-Yu Lin**, R. Howard, K. Arquilla. "Exploration of Place-Making in Space Architecture for Behavioral and Psychological Health." NASA Human Research Program Investigators Workshop. Galveston, TX. 01/2022. (Poster)
14. Banerjee N., Baughman A., **Lin S.**, Witte Z., Klaus D., Anderson A. "Development of Alternative Reality Environments for Spacecraft Habitat Design Evaluation" NASA Human Research Program Investigators Workshop. Galveston, TX. 01/2019. (Poster)

### **Teaching Experience**

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Instructor, 16.459: Bioastronautics Journal Seminar. MIT Co-Instructors: Prof. Charles Oman, Dr. Andrew Liu	Fa. 2023 — Sp. 2025
Guest lecturer, Masters in Architecture and Extreme Environments. Royal Danish Academy	October 2024
Kaufman Teaching Certificate Program. MIT	Fa. 2022
Lecturer, Educational Students Program. MIT	2021-2022
Guest Lecturer, National Central University, Taiwan	January 2021
Recitation Leader EHON 1151: Critical Encounters. CU Boulder	Fa. 2018, 2019

### **Student Research Advising**

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Yutian He  
Crystal (Crys) Yang (Undergraduate Research Opportunity Program)

Yihong (Amy) Chen (UROP)  
Claire Chen (UROP) [5]  
Caitlin Lian (UROP) [4]  
Anna Yang (UROP) [4][7]

### **Honors and Awards**

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Arts Scholar (MIT)	2024
AIAA Neil Armstrong Award	2022
Graduate Award in Research (CU Boulder)	2021
Graduate Award in Justice, Equity, Diversity, and Inclusion (CU Boulder)	2021
Matthew Isakowitz Fellowship	2020
Aviation Week / AIAA Tomorrow's Technology Leaders: The 20 Twenties	2020
Brooke Owens Fellowship	2019
Women in Aerospace Foundation Scholarship in memory of Molly K. Macauley	2019
Dean's List (CU Boulder)	2017-2021

### **Outreach and Community Involvement**

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Mentor, K-12 Fashion Workshop, Morningside Academy of Design (MIT)	2024
Mentor, Glass & Flamework Makerspaces (MIT)	2023
Board member, Flipping Failure Initiative (MIT)	2022-2023
Organizer, Multicultural Conference, Office of Intercultural Engagement (MIT)	2022-2024
Lecturer, Living in Space. Educational Studies Program (MIT)	Sp. 2022
<i>Developed for grade school students</i>	
Alumni mentor, Brooke Owens Fellowship Program	2021, 2023
Outreach & Diversity Chair, Graduate AeroAstro Association (MIT)	2021-2022
Advocate, DC Science Policy Day (MIT)	2022
Lecturer, How to be an Astronaut. Educational Studies Program (MIT)	Fa. 2021
<i>Developed for grade school students</i>	
Summit conference organizer, Brooke Owens Fellowship Program	2020
Undergraduate Representative, Inclusive Culture Committee Working Group Aerospace Engineering Sciences (CU Boulder)	2020
Mentor, CEAS Access & Inclusion Mentorship Program (CU Boulder)	2020-2021
Panelist, Designing for Mars Camp, Taliesin West of the Frank Lloyd Wright Foundation	2020
Panelist, Terranaut Club Nova Scotia	2020
Keynote Speaker, Society of Women Engineers	2020
Founder and President, CU Women of Aeronautics & Astronautics	2019-2021
Founder, CU Science Policy Initiative	2019
Mentor, Womxn of Color Program, Broadening Opportunities through Leadership and Diversity (CU Boulder)	2019-2020

### **Media Appearances**

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Podcast speaker, Ignited Thinkers	2022
Podcast speaker, "An Aspiring Explorer Navigates a Changing Space Industry" Supercluster	2020
Interviewed for local news on bioastronautics research at CU Boulder	2019

### **Skills and Softwares**

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#### *Research*

Data Analysis (R, Matlab, Python, Atlas.ti), literature review (Zotero, Mendeley),  
experimental & statistical design, non-parametric statistics, publication and grant  
writing

*Design and fabrication*

Computer-aided 3D/2D drawing (Rhino, NX, AutoCad), human factors and ergonomics analysis, microelectronics, soldering, machine and hand sewing, mill and lathe, film processing, geometric dimensioning and tolerancing, glass framework and lampwork

*Project management*

Gantt milestone tracking, selection criteria development, communicative, self-starter, detail-oriented

**Additional Certifications and Experience**

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1. SCUBA – PADI Open Water, SSI Advanced Open Water
2. Freediving – AIDA II
3. Parabolic flight experience – Completed 25 total parabolas. 2022 Campaign, 1 day
4. Coxswain, MIT Rowing Club
5. First Responder Training – Medical CPR
6. Institutional Review Board – Biomedical Research Investigators (exp. 02/2025)
7. Languages: English (native), Mandarin Chinese (native), Taiwanese (basic), Spanish (proficient), German (basic)