

Stephen Lantin, Ph.D.

*10+ years of experience in engineering research and leadership,
developing technology for space-based life support systems and other applications.*

Dec 2024	Ph.D. , agricultural & biological engineering		University of Florida		GPA 3.85
Nov 2024	■ Dissertation: “A Digital Twin Framework for Crop Production in Space”				
Apr 2022	■ certificate in engineering project management				
Apr 2020	■ certificate in biological systems modeling				
	■ completed all Ph.D. coursework (72 semester hours)				
Jun 2019	B.S. , chemical engineering		University of California, Santa Barbara		GPA 3.50
	■ College of Engineering honors (260.5 quarter hours)				

Research & work experience

NASA Ames Research Center (ARC) | Moffett Field, CA

Jan 2024 – May 2024	As a Staff Scientist for Blue Marble Space Institute of Science at the NASA Ames Research Center, I
	■ Design and test novel spaceflight hardware for fluorescence detection and optogenetic activation in microbes.
Jun 2024 – Aug 2024 full-time	As a Visiting Technologist (ARC-SCR) at the NASA Ames Research Center, I
	■ developed a cell division submodel for the CFD-DEM Artificial Microgravity Developments for Living Ecosystem Simulation (CAMDLES) simulation tool
	■ improved the reliability of an artificial microgravity simulation experimental setup for probing microbial dynamics.
	■ VTE #3 Host: Dr. Jessica Lee
Jun 2023 – Aug 2023 full-time	As a Visiting Technologist (ARC-SCR) at the NASA Ames Research Center, I
	■ programmed additional sensor capabilities into the Microbial Vessel for Impedance Spectroscopy and Electrochemistry (MWISE) software using C
	■ developed a script to automatically pre-process and analyze hundreds of spectroscopic time series from the BioSentinel mission
	■ assisted with other ongoing ground support projects associated with the Lunar Explorer Instrument for Space Biology Applications (LEIA) mission.
	■ VTE #2 Hosts: Dr. Sergio Santa Maria and Dr. Chinmayee Govinda Raj

NASA Kennedy Space Center (KSC) | Merritt Island, FL

Jun 2022 – Aug 2022
full-time

As a **Visiting Technologist (KSC-UB-A)** at the NASA Kennedy Space Center, I

- assembled and tested sensor electronics, hydraulics, and science carrier quads for the PH-07 ground analog experiment,
- prototyped a rail-based imaging system for automated plant phenotyping,
- performed germination tests on 3-D printed materials.
- VTE #1 Host: Dr. Gioia Massa

University of Florida (UF) | Gainesville, FL

Aug 2021 – Aug 2024
full-time

As a **NASA Space Technology graduate researcher**, I currently

- develop digital twins for controlled environment and space agriculture,
- lead experiments to parametrize lettuce functional-structural plant models,
- manage four undergraduate researchers and an \$11k/year research budget.
- NASA Mentor: Dr. Gioia Massa

Aug 2019 – Present
full-time until
awarded NASA
Space Technology
Graduate Research
Opportunity

As a **graduate research assistant** to Dr. Aditya Singh and Dr. Melanie Correll, I

- build models to predict plant stress response, nutrient content, and biocontrol treatment efficacy from hyperspectral imaging,
- instruct lab classes and guest lecture as a teaching assistant (TA) in the ABE3000C (Applications of Biological Engineering) undergraduate course,
- lead public outreach events for K-12 students, farmers, and other stakeholders.

University of California, Santa Barbara (UCSB) | Santa Barbara, CA

Dec 2017 – Aug 2019
10 hours/week

As an **undergraduate research assistant** to Dr. Philip Lubin, I

- led the design, build, and funding for a lab-on-a-chip for space biology,
- led weekly discussions on interstellar space biology with 12 interdisciplinary and international collaborators, culminating in a first-author review paper,
- showcased the research group's work at public outreach events.

Jan 2017 – Feb 2019
10 hours/week,
except during NASA
internships (see
below)

As an **engineering intern** at LaunchPoint Technologies (Goleta, CA), I

- tracked material and labor costs for all projects and presented weekly to engineers and executives,
- managed inventory of >400 parts for SBIR projects,
- assembled motors for Navy and NASA SBIR projects.

- Jun 2018 – Sep 2018
full-time
- As an **aerodynamics and propulsion (AFRC-RA) intern** for the NASA Armstrong Flight Research Center, I
- designed a hardware-in-the-loop (HIL) motor controller with MATLAB/Simulink,
 - shortened R&D time for future iterations of controllers.
- Jun 2017 – Sep 2017
full-time
- As an **aerodynamics and propulsion intern (AFRC-RA)** for the NASA Armstrong Flight Research Center, I
- characterized motor controller efficiency as a function of motor speed and load for the X-57 Maxwell's Hybrid-Electric Integrated Systems Testbed (HEIST),
 - automated power scope, controller area network (CAN) and MODBUS data acquisition communications via LabVIEW,
 - redesigned the testing setup to reduce electromagnetic interference.
- Oct 2016 – Jun 2017
10 hours/week
- As a **technology marketing intern** at the UCSB Office of Technology & Industry Alliances, I
- analyzed technical documents to produce marketing materials for laypersons,
 - ran Salesforce/MailChimp campaigns to market university technology to industry professionals,
 - Showcased university technology at local sponsored events.
- University of California, Irvine (UCI) | Irvine, CA
- Jun 2014 – Jul 2015
10 hours/week
- As a **high school research assistant** for Dr. Reginald Penner and graduate students, I
- fabricated nanowire-based devices using spin coating and electrodeposition,
 - assisted graduate students with microscopy imaging and cyclic voltammetry,
 - assisted in teaching (2015) and participated (2014) in the Penner Research Group High School Outreach Program.

Scientific contributions

Publications

- In review*
8. Escribà-Gelonch, M., Liang, S., **Lantin, S.**, Nguyen V., Hessel, V. Digital Twin Modelling of Lettuce Growth under Extreme Conditions on Earth.
- In review*
7. **Lantin, S.**, Raj, C. G., Gilbert, R., Santa Maria, S., Gentry, D., Optical Data Correction and Processing Toolkit for BioSentinel and the Lunar Explorer Instrument for space biology Applications (LEIA).
- Jun 2024
6. Souza, D., Bandemegala, S., Fountain, L., Wright, H., Moschopolous, A., **Lantin, S.**, Kainu, M., Buchli, V. Sustainable Crop Cultivation in Space Analogs: A BRIDGES Methodology Perspective Through SpaCEA Cabinets. *53rd International Conference on Environmental Systems (ICES), Louisville, Kentucky, USA.*

- Jun 2024 5. Bandemegala, S., Souza, D., **Lantin, S.**, Towards Self-Reliance Beyond Earth: Standardizing Controls for Plant Growth Systems using BRIDGES. *53rd International Conference on Environmental Systems (ICES), Louisville, Kentucky, USA.*
- Aug 2023 4. **Lantin, S.**, McCourt, K., Butcher, N., Puri, V., Esposito, M., Sanchez, S., Ramirez-Loza, F., McLamore, E., Correll, M., and Singh, A. The Scanning Plant IoT (SPOT) Facility. *HardwareX*. <https://osf.io/4d3hp/>.
- Jul 2023 3. Escobar, C., Grubbs, P., **Lantin, S.**, Shevtsov, J., Taub, F., Damlo, S. 1st International Space Ecology Workshop – Research Needs & Roadmap to the Future. *52nd International Conference on Environmental Systems (ICES), Calgary, Alberta, Canada.*
- Jan 2022 2. **Lantin, S.**, Mendell, S., Akkad, G., Cohen, A. N., Apicella, X., McCoy, E., Beltran-Pardo, E., Waltemathe, M., Srinivasan, P., Joshi, P. M., Rothman, J. H., and Lubin, P. (2022). Interstellar Space Biology via Project Starlight. *Acta Astronautica*, 190, 261–272. <https://doi.org/10.1016/j.actaastro.2021.10.009>.
Free pre-print on arXiv: “The First Interstellar Astronauts Will Not Be Human.”
Research featured on *New Scientist*, *BBC Science Focus*, *phys.org*, *Astronomy* magazine, Reddit (top page, 18k+ upvotes, 1000+ comments, 1/6/2022), and more.
- Oct 2021 1. Escobar, C., Altaf, N., Barker, R., Bhuiyan M., Correll, M., Fritsche, R., Humphrey, S., Jaiswal, P., **Lantin, S.**, Larkin, E., Price, A., Tabetah, M., and Toma, C. Artificial Intelligence for Autonomous Space Plant Production. *Submitted as a Research Campaign White Paper to the National Academies of Sciences Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032.*

Presentations

- Dec 2024 32. Simulating Microbial Communities & External Interactions in the Space Environment
American Society for Gravitational and Space Research Annual Mtg., San Juan, PR, USA
- Nov 2024 31. A Digital Twin Framework for Crop Production in Space
Dissertation Defense, Gainesville, FL, USA
- Oct 2024 30. Autonomous Detection and Rectification of Water Stress in Space Agriculture
UF Astraeus Launch Event, Gainesville, FL, USA
- May 2024 29. [Invited Speaker] The Scanning Plant IoT Facility
UF Center for Remote Sensing Annual Workshop, Gainesville, FL, USA
- Nov 2023 28. MWISE: Microbial Vessel for Impedance Spectroscopy and Electrochemistry
American Society for Gravitational and Space Research Annual Mtg., Washington, DC, USA
- Oct 2023 27. Oral Qualifying Exam
UF Agricultural & Biological Engineering Dept., Gainesville, FL, USA
- Aug 2023 26. “Self-Driving Labs for Space Biology”
LEIA Group Meeting – Exit Presentation
- Aug 2023 25. “Self-Driving Labs for Space Biology”
Bioscience Collaboration Facility Monthly Forum Meeting
- Apr 2023 24. “A Low-Cost Hyperspectral Data Analysis Pipeline for Controlled Environment and Space Agriculture”
2023 NCERA-101 Annual Meeting, Davis, CA, USA

- Mar 2023 23. [Invited Speaker] “Accelerating Plant Hyperspectral Model Development with Self-Driving Labs: A Concept”
NASA AI/Machine Learning Analysis Working Group (AWG), Self-driving Labs Subgroup
- Mar 2023 22. [Invited Speaker] “A Hyperspectral Imaging Pipeline for Controlled Environment and Space Agriculture”
NASA Analysis Working Group (AWG) Symposium – Plant AWG Science Talk, virtual
- Mar 2023 21. “A Low-cost Hyperspectral Data Analysis Pipeline for Controlled Environment and Space Agriculture”
2023 UF Ag. & Bio. Engineering Poster Symposium, Gainesville, FL, USA
- Feb 2023 20. [Invited Speaker] “Hyperspectral Imaging and LiDAR Applications for Mapping and Monitoring Performance from Plant to Field Scales”
Headwall Hyperspectral Remote-Sensing Workshop, Gainesville, FL, USA
- Jan 2023 19. [Invited Speaker] “Lessons Learning and Learned: Digital Twins for Controlled Environment Plant Production in Space”
NASA GeneLab Plants Analysis Working Group (online)
- Nov 2022 18. A Space-first Approach to Plant Digital Twins: Rail-based Imaging System
American Society for Gravitational and Space Research Annual Mtg., Houston, TX, USA
- Aug 2022 17. [Invited Speaker] “Lessons Learning and Learned: Digital Twins for Controlled Environment Plant Production in Space”
NASA KSC UB-A Weekly Lunch, Learn, and Discuss
- May 2022 16. “Digital Twins for Controlled Environment Plant Production in Space”
Crop Physiology and Climate Change Workshop, Wageningen University, Netherlands
- Apr 2022 15. “Digital Twins for Controlled Environment Plant Production”
Institute of Biological Engineering (IBE) Annual Meeting, Athens, GA, USA
- Mar 2022 14. “Digital Twins for Controlled Environment Plant Production in Space”
2022 UF Ag. & Bio. Engineering Poster Symposium, 2nd place, Gainesville, FL, USA
- Dec 2021 13. [Invited Speaker] “Digital Twins for Controlled Environment Plant Production”
UF ABE Biocomplexity Seminar Series, Gainesville, FL, USA
- Nov 2021 12. “Digital Twins for Controlled Environment Plant Production in Space”
Lightning Talks, NCERA-101 Annual Meeting (online)
- Nov 2021 11. “Digital Twins for Controlled Environment Plant Production in Space”
American Society for Gravitational and Space Research Annual Mtg., Baltimore, MD, USA
- Jul 2021 10. “Remote Assessment of Biocontrol Efficacy via Hyperspectral Imaging: Thrips on the Invasive Brazilian Peppertree”
American Society of Agricultural and Biological Engineers Annual Int’l. Mtg. (online)
- May 2021 9. [Invited Speaker] “SIMoN: The Spacefaring Intelligence Modular Nursery”
NASA KSC UB-A Weekly Lunch, Learn, and Discuss
- Mar 2021 8. “The Scanning Plant IoT Facility”
Institute of Biological Engineering Annual Meeting (online)
- Nov 2020 7. “Classifying Thrip Biocontrol Damage in the Invasive Brazilian Peppertree”
2020 UF Ag. & Bio. Engineering Poster Symposium, 2nd place, Gainesville, FL, USA
- Mar 2020 6. [Invited Speaker] “Assessing Plant Stress via Hyperspectral Imaging in a Lab-based Setting”
Headwall Photonics & UF Hyperspectral Seminar (online)

- Jan 2020 5. "SPOT and SCICLOPS: Developing the technologies to scale plant health observations from individual plants to entire fields"
Pathways toward the Next Gen. of Ag. and Nat. Resources in FL, Gainesville, FL, USA
- Dec 2019 4. "The Scanning Plant IoT (SPOT) Facility"
Warren B. Nelms Annual IoT Conference, Gainesville, FL, USA
- Nov 2018 3. "The Limits of Life: Reanimating Extremotolerant Species in Space"
American Institute of Chemical Engineers (AIChE) STAR Tech, Houston, TX, USA
- May 2018 2. "The Limits of Life: Reanimating Extremotolerant Species in Space"
UCSB Undergrad. Research and Creative Activities Colloquium, Santa Barbara, CA, USA
- Nov 2017 1. "Characterization of a HEIST Motor Controller"
Southern California Conferences for Undergraduate Research, Pomona, CA, USA
Awarded Exemplary Research Presentation (top 15 of 800+ presentations)

Outreach/Community Involvement/Service

- Mar 2024 20. UF ABE Open House
University of Florida, Ag. & Bio. Engineering Dept., Gainesville, FL, USA
- Oct 2023 19. Fellowship Proposal Writing Workshop
Engineering Graduate Student Council (EGSC) Workshops
- Mar 2023 18. ASABE Southeastern Rally Lab Tours
University of Florida, Ag. & Bio. Engineering Dept., Gainesville, FL, USA
- Feb 2023 17. Interview + News Article – *Muse Magazine (Children's Science Magazine)*
For "Interstellar Space Biology via Project Starlight" (online)
- Jan 2023 16. Honors and Awards Committee – Doctoral Dissertation Mentoring Award Evaluator
UF Herbert Wertheim College of Engineering, Gainesville, FL, USA
- Jan 2023 15. UF ABE Centennial Celebration Tours
University of Florida, Ag. & Bio. Engineering Dept., Gainesville, FL, USA
- Oct 2022 14. UF ABE Open House
University of Florida, Ag. & Bio. Engineering Dept., Gainesville, FL, USA
- Sep 2022 13. Fellowship Proposal Writing Workshop
Engineering Graduate Student Council (EGSC) Workshop
- Sep 2022 12. [Invited panelist] Space Farming panel
NYC Agriculture Collective's NYC Agtech Week
- Jul 2022 11. KSC Intern Tour @ Greenwerks and Plant Processing Facility
NASA Kennedy Space Center
- Jun 2022 10. Growing Beyond Earth® classroom outreach
Fairchild Tropical Botanic Garden, virtual
- Jan 2022 9. UF|IFAS Department Tour – Farm Babe
University of Florida, Ag. & Bio. Engineering Dept., Gainesville, FL, USA
- Jan 2022 8. Future Cities Philadelphia Special Awards Judge
Judge for American Society of Ag. and Bio. Engineers Circular Economy Award (online)
- Jan 2022 7. Interview – *BBC Science Focus*
For "Interstellar Space Biology via Project Starlight" (online)
- Oct 2021 6. Interview + News Article – *New Scientist*
For "Interstellar Space Biology via Project Starlight" (online)

- Oct 2021 5. [Invited lecturer] “Hyperspectral Imaging and Controlled Environment Agriculture”
EGS1006 (Introduction to Engineering), University of Florida, Gainesville, FL, USA
- Sep 2021 4. UF|IFAS Department Tour – Farmers Bureau
University of Florida, Ag. & Bio. Engineering Dept., Gainesville, FL, USA
- Sep 2021 3. Fellowship Proposal Writing Workshops
Engineering Graduate Student Council (EGSC) Workshops (online)
- Jul 2021 2. Astrobotany Outreach Presentation and Technology Showcase
UF Ag. & Bio. Engineering 4-H Workshop Day, UF, Gainesville, FL, USA
- May 2021 1. [Invited lecturer] Astrobotany Outreach Presentation
City of Irvine Youth Action Team at Venado Middle School in Irvine, CA, USA (online)

Leadership, awards, and honors

Selected leadership experience

- Apr 2022 – Apr 2023 As the **Chair** of the Engineering Graduate Student Council, I
 - organize social and professional development events that cater to 3,000+ UF engineering graduate students,
 - lead monthly meetings between the college administration and representatives of all engineering departments and DE&I organizations,
 - organize Ph.D. recruitment weekends (UF Junior Preview and Spring Visit events, host 150+ prospective students from around the U.S.),
 - founded and moderate a Discord server to facilitate communication between engineering graduate students.
- Apr 2020 – Apr 2022 As the **Treasurer** of the Engineering Graduate Student Council, I
 - managed the budget of the organization,
 - developed and led grant proposal writing workshops (20+ attendees) after identifying a resource gap within the college,
 - led various committees for Ph.D. recruitment weekends and other events.
- Jun 2019 – Apr 2020 As a **Department Representative** of the Engineering Graduate Student Council, I
 - reported college-wide events and announcements at department meetings,
 - served on committees for Ph.D. recruitment weekends and other events.

Awards and honors

- Jan 2024 **Brains Fellow, Inaugural Cohort**
Speculative Technologies – coordinated research program accelerator <https://spec.tech/brains>
- May 2022 College of Agricultural and Life Sciences (CALs) Graduate Student Travel Grant
UF CALs, for the Crop Physiology & Climate Change Postgraduate Course at Wageningen University, Netherlands
- Apr 2021 Alpha Epsilon Honor Society, Florida Gamma Beta Chapter (President Pro Tempore)
American Society of Ag. & Bio. Engineers, UF

Dec 2021	Student/Early Career Associate (SECA) <i>American Society for Gravitational and Space Research</i>
Apr 2021	Growing Beyond Earth® Maker Challenge – Collegiate Division, 1st place <i>Year-long NASA-sponsored team competition to design/build an automated plant production system for use in space. I was responsible for the overall design and the imaging system.</i> https://makeprojects.com/project/simon-spacefaring-intelligent-modular-nursery
Apr 2021	NASA Space Technology Graduate Research Opportunity (NSTGRO21) <i>Awarded for “Digital Twins for Controlled Environment Plant Production in Space.” NASA Grant #80NSSC21K1257. \$80,000/yr, renewable. Total funds to date: \$244,000.</i>
Aug 2019	UF Agricultural & Biological Engineering Pathfinder Fellow <i>Funding provided by UF Graduate School. \$46,475/yr. Total funds received: \$92,950.</i>
Nov 2018	Hanson Family Travel Grant <i>UCSB College of Letters and Sciences, for AIChE STAR Tech Conference, Houston, TX, USA</i>
Jul 2018	Associate <i>Committee on Space Research (COSPAR), Pasadena, CA, USA</i>
Nov 2017	Exemplary Research Presentation – “Characterization of a HEIST Motor Controller” <i>Southern California Conferences for Undergraduate Research (SCCUR), awarded to top 15 of 800+ presentations</i>
Apr 2017	William R. Hearst Scholarship <i>UCSB College of Engineering</i>
Nov 2014	Eagle Scout <i>Boy Scouts of America, Troop 691, Irvine, CA, USA</i>

Relevant Coursework

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> ■ General chemistry series ■ Organic chemistry series ■ Physics series ■ Thermodynamics series ■ Materials science series ■ Transport phenomena | <ul style="list-style-type: none"> ■ Separation processes ■ Analytical methods ■ Statistical methods ■ Process design ■ Engineering project management ■ Control systems | <ul style="list-style-type: none"> ■ Remote sensing ■ Grant proposal writing ■ Decision support systems ■ Ecophysiology of crop production ■ Supply chain management ■ Crop simulation |
|--|--|--|

Skills

Programming, etc.

- Python
- R
- MATLAB
- Simulink
- LabVIEW
- DSSAT (crop modeling software)
- OpenFOAM
- LIGGGHTS
- Computational fluid dynamics
- High performance computing
- GPU code profiling
- Machine vision
- Parametric modeling
- Machine learning
- Arduino
- Raspberry Pi
- Serial communication

Laboratory

- Hyperspectral data collection, processing, and analysis
- Hydroponic crop production
- Experimental design
- Process control
- IoT architecture design, assembly, and testing
- Digital twin development and operation

Other

- Project management
- Microsoft Project
- Graphic design
- Technical communication
- Teaching
- Grant proposal writing
- Workshop hosting
- Curriculum design
- Event management