Luca Vaccino

Graduate Research Assistant
Purdue University
School of Mechanical Engineering
Ph.D. Candidate

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EDUCATION

Ph.D. Mechanical Engineering, Purdue University, West Lafayette, IN — Aug 2021–Current
Principal Advisor: Prof. Shirley J. Dyke
Dissertation: *Transition Planning and Optimization for Resilient Space Habitats*

GPA: 3.23/4

M.S. Mechatronic Engineering, Polytechnic of Turin, Turin, Italy — Dec 2018–Jul 2021
Principal Advisor: Prof. Luigi Mazza
Thesis: *Condition Monitoring of Hydraulic Pumps for Fluid Power Applications*

GPA: 4.0/4

B.S. Mechanical Engineering, Polytechnic of Turin, Italy — Jan 2014–Dec 2018
Thesis: *Progettazione di un banco prova per il veicolo XAM: dal motore alle ruote*

GPA: 3.0/4

WORK EXPERIENCES

Graduate Research Assistant — West Lafayette, IN
School of Mechanical Engineering — Aug 2021 –Current
Purdue University

- Plan and execute MATLAB Simulink simulations to study resilience in space habitats.
- Guide and mentor undergraduate students, introducing them to research. Work with average of 2 students each year. One of the students co authored the Space Architecture Technology AIAA best student paper.
- Present findings to my lab by conducting 3 oral presentations per semester.
- Wrote 80+ pages user manual and code documentation
- Authored 6+ peer reviewed paper
- Documented finding, results and research in Overleaf
- Organized 6th Midwest Smart Structures Colloquium (MSSC)

Mechatronic Engineering Intern – Helios Center for Engineering Excellence (HCEE) — San Antonio, TX
Helios Technologies — June 2024–Dec 2024

- Worked with Solidworks on 10 3D CAD parts and 5 2D drawings to facilitate project supplier conversations.
- Led the effort to identify suppliers for tightly toleranced critical components.
- Learned 3D printing skills and taught a lunch & learn session to the team about the process.
- Completed 5 rounds of stack up analysis across multiple projects.
- Completed tear down and set up (with support) of a hydraulic system.
- Documented results and procedures in Overleaf

Teaching Assistant – ME 274 West Lafayette, IN
School of Mechanical Engineering Jan 2025–current
Purdue University

- Grade 100 homework every week.
- Provide support to students.

Visiting Scholar West Lafayette, IN
School of Mechanical Engineering Aug 2020–July 2021
Purdue University

- Designed a digital twin of axial piston pump (using MATLAB and Simulink)
- Worked on pump data acquisition: sensor wiring and calibration, test rig configuration, A/D conversion using NI boards and Labview..
- Performed Fault analysis and modelization analysis.
- Designed a Condition monitoring model of an axial piston pump (using Matlab/Simulink): the model can detect 4 different faulty components inside the pump.

Training Member / Mechanical Designer Torino, Italy
Polytechnic of Turin Oct 2016–Dec 2018

- Designed 3D parts to optimize XAM hybrid vehicle efficiency.
- Participated as a mechanic to the Shell Eco Marathon Completion, one of the most important challenges for hybrid vehicles.

Lifeguard Pezzana, Italy
Piscina CLUB60 Summer 2016– 2018

- Assisted pool guests.
- Performed 4 water quality test every day.
- Educated people to the importance of safety in water

PEER-REVIEWED PUBLICATIONS

1. **Vaccino, L.,** Azimi, M., Dyke, S. J., & Whitaker, D. (2025). Exploring contingency responses to disruptive events during transitions in deep space missions. AIAA Journal .
2. Azimi, M., Lund, A., Fu, Y., Montoya, H., **Vaccino, L.,** Murali Krishnan, R., Rhee, S., ... (2025). HabSim: A modular-coupled virtual testbed for simulating extraterrestrial habitat systems. AIAA Journal.
3. Azimi, M., Tajik, N., Ghannami, N., Vallerga, E., Leatherman, O., Nettles, A., Entremont, C., Belaidi, D., **Vaccino, L.,** & Shahriar, A. (2024). Challenges in the decommissioning of a smart deep space habitat. In 2024 International Conference on Environmental Systems.
4. Chebbo, L., Gultekin, M. A., Bazzi, A., Tomastik, R., Pattipati, K., **Vaccino, L.,** ... (2023). Modeling and operation of microgrids for deep space habitats under environmental disturbances. In 2023 IEEE Power and Energy Conference at Illinois (PECI) (pp. 1-5).
5. **Vaccino, L.,** Pritchard, K., Azimi, M., Dyke, S., & Lund, A. (2023). Simulation-based assessment of hazardous states in a deep space habitat. In 2023 International Conference on Environmental Systems.
6. Pritchard, K., **Vaccino, L.,** Liu, X., Whitaker, D., Dyke, S., & Joyal, B. (2023). Lunar SmartHab

mission operations and crew day-in-the-life. In 2023 International Conference on Environmental Systems.

7. **Vaccino, L.** (2021). Condition monitoring of hydraulic pumps for fluid power applications. Politecnico di Torino.

OTHER PUBBLICATIONS

1. **Vaccino, L**. Safeguarding the Future of Lunar Living: A Journey in Simulation-Based Space Habitat Recovery. Purdue Innovated magazine, April 08,2024.
2. **Vaccino, L.,** & Rush, M. (2024, May). HabSim v6.3 user manual. Resilient Extra-Terrestrial Habitats Institute (RETHi). https://www.purdue.edu/rethi/files/HabSim%20User%20Manual.pdf
3. Davis, J. (2025, April). HabSim: Testing deep space habitat resilience. Purdue University - School of Mechanical Engineering. https://engineering.purdue.edu/ME/News/2025/habsim-testing-deep-space-habitat-resilience-

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PRESENTATIONS

1. **Vaccino, L.**, Dyke, S. J., & Whitaker, D. Rapid Transition Rescheduling for Deep Space Missions. Poster presented at Advancing Space Exploration, Purdue University, West Lafayette, Feb, 2025.
2. **Vaccino, L.**, Dyke, S. J., & Whitaker, D. Exploring Contingency Responses to Disruptive Events During Transitions in Deep Space Missions. Poster presented at NASA Annual Review, Purdue University, West Lafayette, June 10, 2024.
3. **Vaccino, L.** Disruption Simulation and Transition Planning for Resilient Space Habitats. Oral presentation at the 6th Midwest Smart Structures Colloquium (MSSC) at Camp Tecumseh YMCA, Indiana, April 27, 2024.
4. **Vaccino, L.** Safeguarding the Future of Lunar Living: A Journey in Simulation-Based Space Habitats. Oral presentation at the 11th Annual Graduate Industrial Research Symposium, West Lafayette, March 7, 2024.
5. **Vaccino, L.** Importance of Repair Order in Space Habitats. Oral presentation at the 5th Midwest Smart Structures Colloquium (MSSC) at Urbana-Champaign, Illinois, April 15, 2023.
6. **Vaccino, L.**, Lund, A. K., Pritchard, K. A., & Dyke, S. J. Disruption, Damage, and Repairability Modelling for Space Habitat Systems. Poster presented at the Inaugural Workshop on Interdisciplinary Paradigms for Autonomous Deep-Space Habitation, San Antonio, TX, October 16, 2022.
7. **Vaccino, L.**, et al. Talk About the Future of Resilient Extraterrestrial Habitats. Oral presentation at the Herrick Laboratories 50th Anniversary Conference, Purdue University, West Lafayette, July 13, 2022.
8. Azimi, M., & **Vaccino, L.** MCVT Functionalities, Disruptions, and Their Propagation. Oral presentation at NASA Annual Review, Purdue University, West Lafayette, June 13, 2022.

MENTORSHIP INVOLVEMENT

School of Mechanical Engineering
Purdue University

Graduate Research Assistant 2021–Present

- Introduce undergrad students to research.
- Guide undergraduate students to awards and graduate position applications.

- Worked with a mentee on a paper which got the 2023 AIAA SATC Best Paper – Student Award

NASA MCA (Mission Concept Academy)

Engineering Lead 2024–Present

- Lead a group of 7 undergraduate students and supported them to complete a Mars Exploration mission proposal.
- Constantly guide undergraduate students toward graduate school application, providing examples based on my experience.

NASA NPWEE (Proposal Writing and Evaluation Experience)

Project Manager 2023–Present

- Lead a group of 5 undergraduate students and supported them to complete a new technology proposal. One of the students submitted a patent proposal.
- Constantly guide undergraduate students toward graduate school application, answering to questions and advising them on possible academic path.

MEMBERSHIPS

2025 - Present. Space Architecture Technical Committee
2024 - Present. American Institute for Aeronautics and Astronautics
2024 - Present. Space Generation Advisory Council
2022 - Present. Lions of Layette

HONORS, AWARDS AND RECOGNITIONS

2024. 3 Minute Thesis – Semifinalist
2024. Writing Tools for Mid-Stage Doctoral Students
2023. The AIAA SATC Best Paper – Student Award
2020. Flex tech in actions: best presentation

SKILLS AND EXTRACURRICULARS

Technical: Solidworks, Siemens NX, MATLAB, Simulink, Solidworks, Overleaf
Language: Native proficiency in Italian, full professional proficiency in English, and elementary proficiency in Spanish.