Kaila M. Y. Coimbra

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Education

Stanford University — Palo Alto, CA
Ph.D. Student in Aeronautics and Astronautics — Sep 2023 - 2028
Advisor: Prof. Grace Gao, *GPA:* 4.0/4.0
Research Area: Position, navigation, and timing of lunar satellites and rovers

California Institute of Technology (Caltech) — Pasadena, CA
B.S. in Mechanical Engineering and a minor in Aerospace Engineering — Oct 2019 - Jun 2023
Advisors: Prof. Soon-Jo Chung, Prof. Chiara Daraio, *GPA:* 4.0/4.0
Thesis: Powering Artemis - Power Generation for Sustained Lunar Habitation

Fellowships & Grants

Knight-Hennessy Fellowship, Stanford University — *Sep 2023*
Program to prepare graduates to be visionary, courageous, and collaborative leaders. Three years of funding.

NSF Graduate Research Fellowship — *Sep 2023*
Awarded for the potential to be high achieving scientists and engineers, early in their careers. Three years of funding.

EDGE Doctoral Fellowship, Stanford University — *Sep 2023*
Awarded for academic accomplishments and the potential to contribute to the diversity of perspectives in my academic field.

NASA BIG Idea Challenge 2022 Finalist - $180,000 Grant — *Feb 2022*
Received the *Visionary Concept Award* out of seven Finalist teams

NASA BIG Idea Challenge 2021 Finalist - $180,000 Grant — *Feb 2021*
Received the *Best Product Development Award* out of the seven Finalist teams

Awards

Mechanical Engineering Award, Caltech — *Jun 2023*
B.S. candidate in M.E. whose academic performance has demonstrated outstanding original thinking and creativity

AIAA David and Catherine Thompson Space Technology Scholarship - $10,000 Scholarship — *Sep 2022*
Awarded for my promise as a future aerospace professional

Tau Beta Pi (TBP) Scholar, Caltech — *Apr 2022*
Invited to be a member of the TBP honors society for being in the top 1/8 of Caltech engineering majors by GPA

Hispanic Scholarship Fund Scholar — *Sep 2020*
Among the top 100 HSF Scholars who were invited to attend the 2021 STEM Summit

Research Experience

Navigation and Autonomous Vehicles (NAV) Lab, Stanford — *Oct 2023 - Now*
Ph.D. Student, *Advisor:* Prof. Grace Gao
- Developed a weighted batch filter optimization framework to refine the position estimation of a lunar rover using only the Doppler shift observables from a lunar satellite (C3)

Autonomous Robotics and Control Lab, Caltech — *Jun 2022 - Aug 2022*
Research Fellow, *Advisors*: Prof. Soon-Jo Chung, Dr. Matt Anderson, Dr. Lu Gan
- Developed ROS nodes to communicate sensor frequency values through a visual output
- Helped build a neural network to process images together for object detection through adverse weather conditions

NASA BIG Idea Challenge 2022: Extreme Terrain Mobility ($180,000 Grant) — *Oct 2021 - Nov 2022*
Lead for Finalist team, *Advisor*: Prof. Soon-Jo Chung
- Developed a robotic system with novel rover locomotion modalities for use in extreme lunar terrain applications (C2)
- Performed field testing in a desert environment and validated the system to a Technology Readiness Level (TRL) of 4

Mechanics and Materials by Design Lab, Caltech *Jun 2021 - May 2022*
Research Fellow, *Advisor*: Prof. Chiara Daraio & Dr. Gunho Kim
- Performed numerical simulations on the dynamic properties of helical-type acoustic metamaterials (J2)
- Fabricated metamaterial samples and experimentally validated numerical findings with a laser-transducer set-up

Coimbra Research Group, UC San Diego *Jun 2020 - 2021*
Researcher, *Advisor*: Prof. Carlos Coimbra
- Explored the role that molecular shape (aspect ratio) takes on the binary diffusion of monoatomic, diatomic, and triatomic molecules through air and other gases (J1)

NASA BIG Idea Challenge 2021: Lunar Dust Mitigation ($180,000 Grant) *Oct 2020 - Nov 2021*
Competition Finalist, *Advisor*: Prof. Soon-Jo Chung
- Developed a novel electrodynamic dust shielding technology that mitigates lunar dust for the Artemis missions (C1)
- Designed and implemented verification procedures that validated our system to Technology Readiness Level (TRL) 5

Journal Publications

(J2) Kim, G., **Coimbra, K.M.Y.**, and Daraio, C., "Mode hybridization in helical metamaterials with variable centro-asymmetry," *Applied Physics Letters*, Vol. 121, 072201, August 2022. https://doi.org/10.1063/5.0106740 (PDF)
- Selected as the cover for APL's August 15th, 2022 issue (Cover)

(J1) **Coimbra, K.M.Y.**, Coimbra, M.C.Y., and Coimbra, C.F.M., "On the Slip Correction Factor for Simple Gas Molecules Diffusing in Air," *AIAA Journal*, 60(8), 4744-4753, April 2022. https://doi.org/10.2514/1.J061338 (PDF)

Conference Publications

(C3) **Coimbra, K.M.Y.**, Cortinovis, M., Mina, T., and Gao, G., "Single-Satellite Lunar Navigation via Doppler Shift Observables for the NASA Endurance Mission," Proceedings of the Institute of Navigation GNSS+ conference (ION GNSS+ 2024), Baltimore, MD. Peer reviewed.

(C2) **Coimbra, K.M.Y.**, Junker, C. et al., "Design of a Lunar Architecture for Tree Traversal in Service of Cabled Exploration," *AIAA SciTech 2023 Forum*, AIAA 2023-0020, January 2023. https://doi.org/10.2514/6.2023-0020 (PDF)
- Presenter in the AIAA International Student Conference at SciTech
- 1st Place (Team Category) and presenter in the 2022 AIAA Region VI Student Conference

(C1) Tisdale, M. et al. including **Coimbra K.M.Y.**, "Design of a Modular and Orientable Electrodynamic Shield for Lunar Dust Mitigation," *AIAA SciTech 2022 Forum*, AIAA 2022-2623, December 2021. https://doi.org/10.2514/6.2022-2623 (PDF)
- 1st Place (Team Category) in the AIAA International Student Conference at SciTech
- 1st Place (Team Category) in the 2021 AIAA Region VI Student Conference

Leadership & Mentorship

Mentor in Stanford's EDGE Program *Aug 2024 - Now*

Diversity, Equity, and Inclusion (DEI) Committee Member in the Knight-Hennessy Program *Apr 2024 - Now*

Executive Board of Caltech's American Institute of Aeronautics and Astronautics (AIAA) Student Branch
Vice Chair *May 2022 - May 2023*
Technical Lead for the NASA BIG Idea 2022 team *Oct 2021 - Oct 2022*
Director of Public Relations *Oct 2020 - May 2022*

Teaching Assistant in Caltech's Mechanical and Civil Engineering Department
ME 50ab: Experiments and Modeling in Mechanical Engineering, *Instructor*: Prof. Michael Mello *Jan 2023 - Jun 2023*
ME 11ab: Thermal Science, *Instructor*: Prof. Guillaume Blanquart *Oct 2021 - Mar 2022*
ME 10: Thinking Like an Engineer, *Instructor*: Prof. José Andrade *Oct 2020 - Dec 2020*

Representative in Caltech's Board of Control *Jan 2019 - Mar 2020*

Skills

Programming & Software: MATLAB, C++, Python, Mathematica, LaTeX
Design & Modeling: SolidWorks, COMSOL Multiphysics, ANSYS
Machine Prototyping: 3D Printing (SLS, FDM), Lathe, Mill, Band Saw, Water Jet, Laser Cutter
Soft Skills: Team Leadership, Teaching & Tutoring, Conversational Japanese