

Kyle Johnson

kylej23@uw.edu | kcwjohnson.com | tinyurl.com/KJ-Gscholar | LinkedIn.com/in/kyle-johnson-0015

EDUCATION

University of Washington, Seattle 2017 – 2026

Paul G. Allen School of Computer Science & Engineering

Ph.D. Candidate (graduating June 2026)

Master of Arts and Science (graduated 2022)

GPA: 3.9 / 4.0

Electrical & Computer Engineering Department

Bachelor of Science: Controls, Minor in Mathematics (graduated 2020)

GPA: 3.54 / 4.0

University of South Africa, Cape Town Summer 2019

Symposium Speaker & Student, primarily located at Sinethemba High

GPA: 4.0 / 4.0

Queensland University of Technology Summer 2018

Photographer & Student, *Aeronautics & Astronautics Australia: Design of novel materials and structures: a fusion of art, mathematics, and science* program

GPA: 4.0 / 4.0

AWARDS & FELLOWSHIPS

Graduate

49th Annual GEM Conference Oral Presentation Competition (1st place) 2025

Black in Robotics Fellowship 2024

Clean Energy Institute Graduate Fellowship 2023

Graduate Fellowship for STEM Diversity 2023-2026

Quad Fellowship 2023

UW Black Graduate Student of The Year Award 2023, 2025

Amazon Science Hub Fellowship 2022

Marcy Migdal Fellow 2022

Washington NASA Space Grant Consortium Fellowship 2021-2024

SPEEA ACE Fellowship 2021-2024

Cadence Fellowship 2021-2024

NSF Graduate Research Fellowship Program 2021-2026

National GEM Consortium Fellowship 2021

Generational Google Scholar 2021

Herbold Fellowship 2021

Undergraduate

Washington Research Foundation Scholarship 2020

Benjamin A. Gilman International Scholarship 2019

Ronald E. McNair Postbaccalaureate Achievement Program Scholarship 2019

UW Electrical Engineering Scholarship 2019

Mart Bert Endowed Scholarship 2019

Office of Minority Affairs & Diversity Recognition Scholarship 2019

NSF Research Experience for Undergraduates at UW 2018 and 2019

Student of the Year - UW ECE 474 Embedded Systems (PI: Rania Hussein) 2019

Mary Gates Research Scholarship 2018

LSAMP Research Scholarship 2018

Minority Scholars Engineering Program Scholarship 2018

Office of Minority Affairs & Diversity Merit Scholarship 2018

Educational Opportunity Program Travel Scholarship 2018

ACADEMIC & INDUSTRY POSITIONS

University of Washington, Seattle

Iyer Lab, Advisors: Vikram Iyer and Sawyer Fuller

2021 – Present

My research focuses on creating autonomous robotic platforms for swarms of millimeter-scale devices capable of crawling, rolling, walking, jumping, gilding, and flying. Designing robots with onboard power, sensing & control allows for these systems to be deployed in dangerous or hard to reach environments and locations at low cost.

Networks & Mobile Systems Lab, Advisor: Shyam Gollakota

2020 – 2021

This research was focused on leveraging the bistability and scalability of leaf-out origami to design a low-power and battery-free robotic system for resource constrained applications. Implementing A3C & PPO Reinforcement Learning algorithms helped define efficient folding patterns for the unique energy landscapes of each structure.

Laboratory for Engineered Materials & Structures, Advisor: Jinkyu Yang

2018 – 2020

I researched centimeter scale leaf-out origami designs, demonstrating that leaf-out origami can kinematically output 150% of the energy input into the system. I fabricated many origami prototypes and proved analytically that tailored leaf-out designs can vary the normalized energy outputs from $\sim 37 E/k_0$ to $\sim 62 E/k_0$.

NASA

Goddard Space Flight Center, Advisor: Joanna Joiner

2021 – 2022

This project focused on the LSTM algorithm for a net carbon exchange estimator to incorporate memory effects from historical satellite data. I was able to predict NEE with 73% accuracy, current models have $\sim 65\%$ accuracy.

Whirlpool Corporation

WERLD Intern, Controls Engineer

Jun 2020 – Aug 2020

Optimized parameters for multi-state estimator for a washing machine motor using electrical values instead of sensors. MATLAB and Simulink simulations implemented a Kalman filter on various washing machine systems.

PUBLICATIONS

In Preparation Submissions

1. Arroyos V., Cora A., Kimanje A., Barrett T., Walker L., Smith B., Yamada K., Owens K., Iyer V., R. Shapiro B., Cunningham J., **Johnson K.** “Getting Unstuck, Staying On Task: Designing Local Small Language Models to Support Student Learning”. *Conference Computer Human Interaction*. (under review Jan 2025).
2. **Johnson K.**, Arroyos V., Cardenas K., Barrow I., Lyu J., and Iyer V. “FLEABOT: a Field Locomotive Electromagnetic Actuated roBOT”. (in preparation Jan 2025).

Peer Reviewed Journal Articles

1. **Johnson K.**, Arroyos V., Donahoe G., Njie O., Yewondwossen S., Arroyos R., Fuller S., and Iyer V. “Coin-copter: A Stable Near-gram Helicopter with Substantial Payload”. *Science Advances*. (in revision Jan 2025). Acceptance rate: 8.2%
2. **Johnson K.**, Arroyos V., Elberier T., Fuller S., Iyer V., and Gollakota S. “Solar-powered Shape-changing Origami Microfliers”. *Science Robotics*. 8, eadg4276 (2023). doi:10.1126/scirobotics.adg4276. Acceptance rate: 8.9%
3. Yasuda, Hiromi & **Johnson, Kyle**, et Al. “Leaf-like Origami with Bistability for Self-Adaptive Grasping Motions”. *Soft Robotics*. DOI: 10.1089/soro.2021.0008 (2022). Impact Factor: 6.1

Peer Reviewed Conference Papers

1. Cora A., Arroyos V., Kimanje A., Alemayehu L., Solyst J., Shapiro, R. B., Iyer V., **Johnson K.** “Tool or Toy? Student Views on ChatGPT in Culturally Responsive Computing Education: A Preliminary Investigation”. *World Engineering Education Forum – Global Engineering Deans Council (WEEF-GEDC)*, Daegu, Republic of Korea (2025), pp. 1-9, doi: 10.1109/WEEF-GEDC66748.2025.11256481.
2. **Johnson K.**, Arroyos V., Hussein L., Cora A., Sherif E., Garcia C., Barrett T., Uthmaan S., Shirazy S., Cunningham J., Shapiro B., and Iyer V. “Scalable Community Mentorship: A Vision for Engineering Literacy & Access”. *World Engineering Education Forum - Global Engineering Deans Council (WEEF-GEDC)*, Sydney, Australia (2024), pp. 1-9, doi: 10.1109/WEEF-GEDC63419.2024.10854949.

3. Cora A., Arroyos V., Hussein L., Iyer V., Shapiro R. B., and **Johnson K.** "Leveraging AI to Improve STEM Engagement for Black and Latine Youth". *2024 Black Issues in Computing Education (BICE)*, Santo Domingo, Dominican Republic, 2024, pp. xxiii-xxiii, doi: 10.1109/BICE60192.2024.00031.
4. **Johnson K.**, Arroyos V., Englhardt Z., Yin D., Patel S., and Iyer V. 2023. "MilliMobile: An Autonomous Battery-free Wireless Microrobot". In *Proceedings of the 29th Annual International Conference on Mobile Computing and Networking (ACM MobiCom '23)*. Association for Computing Machinery, New York, NY, USA, Article 90, 1–16. <https://doi.org/10.1145/3570361.3613304>
Acceptance rate: 14.7%
5. **Johnson K.**, V. Arroyos, R. Villanueva, A. Schulz, S. Fuller and V. Iyer, "Toward Sub-Gram Helicopters: Designing a Miniaturized Flybar for Passive Stability," 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, USA, 2023, pp. 2701-2708, doi: 10.1109/IROS55552.2023.10342256.
Acceptance rate: 43%

Patents

1. **Johnson K. C. W.**, Arroyos V., Donahoe G., Fuller S., and Iyer V. 2025. "Coin-copter: Battery-free Near-gram Helicopter Designs." *U.S. Provisional Patent Application*, filed October 2025.
2. **Johnson K. C. W.**, Arroyos V., Englhardt Z., Yin D., Patel S., and Iyer V. 2024. "Wireless microrobot and operating techniques." *International Patent Application WO 2025/058992 A1* (PCT/US2024/045862), published on March 20th, 2025.
3. **Johnson K. C. W.**, Arroyos V., Villanueva R., Schulz A., Fuller S., and Iyer V. 2023. "Flybar apparatus." *International Patent Application WO 2024/137785 A1* (PCT/US2023/085085), published June 27th, 2024.
4. DeLizo S. W., O'Connor I. D., Avantaggio A., and **Johnson K. C. W.** "Tractor-based trailer clearance and positioning system and method." *U.S. Patent Application 12,272,149 B2* (U.S. Patent App. 17/535,142), issued on April 8th, 2025.

Refereed Posters, Workshops, and Other Publications

1. Arroyos V., Ibrahim M., Mensah E., **Johnson K.**, Fuller S., Iyer V. "Battery-free Computer Vision on Insect-scale Microrobots". *IEEE International Conference on Robotics and Automation (ICRA) Late Breaking, Atlanta, Georgia USA* (2025).
Impact Factor: 3.4%
2. **Johnson K.**, Arroyos V., Garcia C., Aisha C., Hussein L., Melaku T., Cunningham J., Shapiro B., and Iyer V. "AVELA- A Vision for Engineering Literacy & Access: Understanding Why Technology Alone Is Not Enough". *arXiv Preprint*. doi.org/10.48550/arXiv.2401.14581 (2024).
3. **Johnson K.**, Arroyos V., Yang J. "Leaf-out Origami: Tailorable Fabrications and Applications". *University of California Los Angeles Ronald E. McNair Conference* (2019).
4. Knaus C., Ali S., Garcia-Stubbs D., **Johnson K.**, Mohamud L. "Trauma, Educational Exclusions, and Survival: Examining Global Student Experience & Resilience". *University of South Africa Academic Development Symposium* (2019).

TEACHING

Classes Taught

University of Washington

CSE474: Introduction to Embedded Systems (Spring 2023) – Undergrad class, Lead TA

CSE599U: Advanced topics in Ubiquitous Computing & HCDE (Fall 2022) – Graduate class, Lead TA

AVELA – A Vision for Engineering Literacy & Access

60-hour Introduction to Embedded Systems Robotics Applications – HS/Undergrad class, Lesson Plan Creator
Adopted in 15 classrooms (taught: Fall 2020, Winter 2021, Summer 2021, Fall 2021, Spring 2022, Summer 2023)

40-hour Introduction to Python & Machine Learning – MS/HS class, Lesson Plan Creator
Adopted in 30 classrooms (taught: Spring 2021, Summer 2021, Winter 2022, Fall 2022)

20-hour Innovative Applications of ML in Aerospace Industries – Professional class, Lesson Plan Creator
Adopted in 2 classrooms (taught: Spring 2024)

40-hour Introduction to Data Activism – HS class, Lesson Plan Creator

Adopted in 19 classrooms (taught: Spring 2023, Fall 2023, Winter 2024)

40-hour Introduction to Extended Reality – Professional class, Lesson Plan Creator

Adopted in 25 classrooms

Mentorship

Professionals

Azhar Kimanje (Exonicus, 2023)

Aisha Cora (Amazon, 2020)

Graduates

Colin Kessler (University of Edinburgh Info Ph.D., 2025)

Laila Walker (UW CSE Ph.D., 2024)

Teanna Barrett (UW CSE Ph.D., 2023)

Eman Sherif (UW CSE Ph.D., 2023)

Michael Ibrahim (UW CSE Masters, 2022)

Tilboon Elberier (UCLA ECE Ph.D., 2021)

Undergraduates

Isatou Barrow (2024)

Jiuyang Lyu (2024)

Giannah Donahoe (2023, now at Microsoft)

Brianna Smith (2023)

Semayat Yewondwossen (2023)

Ousman Njie (2023)

Kalea Yamada (2023)

Kevin Hernandez-Ramos (2023, now at Duolingo)

Rogelio Arroyos (2023)

William Vera (2023, now at Meta)

Matiyas Yared (2023)

Be-Emnet Elias (2023)

Dennis Yin (2023)

Maitri Debhia (2023)

Samira Shirazy (2021)

Saara Uthmaan (2021)

Raul Villanueva (2019, now at Kenworth Trucks)

INVITED LECTURES & PRESENTATIONS

2026 **Colloquium**, UC Berkeley Sensor & Actuator Center

2026 **Colloquium**, UW CSE Robotics

2026 **Presenter**, Black in Engineering Monthly Meeting

2025 **Presenter**, Seoul National University STAR Lab

2025 **Presenter**, UW Molecular Information Systems Lab

2024 **Presenter**, Japan Aerospace Exploration Agency (JAXA)

2024 **Presenter**, Materials Research Society Broadening Participation in STEM Symposium

2024 **Presenter**, NASA Goddard Space Flight Center Engineering Colloquium

2023 **Presenter**, Harvard University Microrobotics Lab

2023 **Presenter**, Machine Learning Dynamical Systems and Control Workshop – NSF CTF

2023 **Presenter**, Cornell University Robotics Seminar

2023 **Presenter**, UC Berkeley Ubiquitous Swarm Lab

2022 **Keynote**, Upward Bound Research for Public Good

2022 **Keynote**, UW Young Black & Gifted Conference

2022 **Panelist**, Ronald E. McNair Fellowship Workshop

2022 **Panelist**, UW Allen School NSF GRFP
 2022 **Panelist**, Gabriel E. Gallardo Research Student Leadership & Advocacy Symposium
 2020 **Presenter**, UW STARS Undergraduate Seminar
 2020 **Panelist**, Brother Initiative Workshop
 2019 **Presenter**, UW Ronald E. McNair Conference
 2019 **Panelist**, McNair Upward Bound Workshop
 2019 **Panelist**, UW CoE Scholar-Donor Recognition Luncheon

GRANTS & GIFTS

Total Awarded as PI/Co-PI: \$2,718,000 Total Awarded: \$3,156,000

*Funds awarded as Co-Founder of AVELA are described in more detail below in section ENTREPRENEURSHIP

External: Industry and Foundation

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| AVELA Co-Founder, Executive Director, PI Foundry10 Donations Grants to support educational research, trainings, and multi-tier near-peer mentorship | \$108,000 2025 – 2026 |
| AVELA Co-Founder, Executive Director, PI Apple Donations AI tool development on Apple hardware using MLX array framework (<u>social media content</u>) | \$155,000 2024 – 2026 |
| AVELA Co-Founder, Executive Director, PI BECU People Helping People Award Donation for research and educational outreach/training (<u>content</u>) | \$50,000 2024 |
| AVELA Co-Founder, Executive Director, PI Reboot Representation Grant Grant to support research and educational outreach/training for BLNA women (<u>content</u>) | \$360,000 2023 – 2025 |
| AVELA Co-Founder, Executive Director, PI National Urban League Contracts Contracts to support educational outreach in public schools (<u>CBS News</u>) | \$100,000 2023 - 2026 |
| AVELA Co-Founder, Executive Director, PI SPEEA Aerospace Career Enhancement Contracts Contracts to support technical trainings for professionals in WA State (<u>content</u>) | \$255,000 2023 – 2026 |
| AVELA Co-Founder, Executive Director, PI Schmidt Futures AI Collaboration Grants Research conference travel support (<u>content</u>) | \$28,000 2023 – 2024 |
| AVELA Co-Founder, Executive Director, PI Amazon Future Engineers Donations & Grants Grants to support research and educational outreach/trainings (<u>content</u>) | \$751,000 2022 – 2026 |
| AVELA Co-Founder, Executive Director, PI Additional Donations for research and outreach/trainings (<u>content</u>). | \$75,000 2022 - 2025 |

External: Government

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| AVELA Co-Founder, Executive Director, Co-PI Department of Energy, Water Power Technologies Office, Grant PIN DE-EE0011702, NEPA Control No. GFO-0011702-001, CID Number: GO11702 | \$33,000 2025 - 2027 |
| AVELA Co-Founder, Executive Director, PI WA King County 4Culture, Grants Grants to support research and educational outreach/trainings (<u>content</u>) | \$578,000 2024 – 2027 |
| AVELA Co-Founder, Executive Director, PI City of Seattle Human Services Department (Councilmember Hollingsworth), Grant Grants to provide research and training positions in Seattle to promote economic opportunity. | \$25,000 2025 |

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| AVELA Co-Founder, Executive Director, PI Seattle Public School District, Contracts Contracts to support educational outreach in the greater Seattle area (<u>content</u>) | \$50,000 2024 – 2026 |
| <i>Internal: University of Washington</i> | |
| AVELA Co-Founder, Executive Director, PI UW Department, Grants Grants to create research-based outreach lessons (<u>ECE</u> , <u>CSE</u> , <u>BioEng</u> , <u>MechE</u> , <u>Aero&Astro</u>). | \$150,000 2019-2025 |
| UW Student, Writer | \$65,000 |
| UW Student Technology Fee (2024-30), Grant | 2024 |
| UW Student, Writer | \$13,000 |
| Washington NASA Space Grant Consortium, Grant | 2023 |
| UW Black Graduate Student Association President, Writer | \$20,000 |
| UW Black Opportunity Fund, Grant | 2022-2024 |
| UW AVELA President, Writer | \$40,000 |
| Institute for STEM Cells & Regenerative Medicines (ISCRM), Grant | 2021-2025 |
| Lead Student, Writer | \$75,000 |
| UW Student Technology Fee (2021-12), Grant | 2020 |
| Lead Student, Writer | \$225,000 |
| UW Student Technology Fee (2019-11), Grant | 2019 |

SCHOLARLY SERVICE

Academic Reviewer

ORCID: 0000-0002-0443-9892

- 2025 IEEE RoboSoft Conference
- 2025 Journal of Aerospace Engineering, ISSN: 0893-1321
- 2024 Nature Communications, ISSN: 2041-1723

Boards

- 2025 4Culture, King County Funding Agency, Board Member
- 2024 Hip Hop is Green, nonprofit, Board Member
- 2022 AVELA – A Vision for Engineering Literacy & Access, nonprofit, Board Chair

Recruiter

University of Washington, Paul G. Allen School for Computer Science & Engineering 2022 - 2025

NSBE Conference (Chicago, 2025), Grace Hopper Conference (Philadelphia, 2024), NSBE Conference (Atlanta, 2024), Tapia Conference (Dallas, 2023), NSBE Conference (Anaheim, 2022)

AVELA – A Vision for Engineering Literacy & Access 2022 - 2025

GEM Conference (San Diego, 2025), CRA-WP (Denver, 2025), Women in Data Science Worldwide Conference (Puget Sound, 2025) Hip Hop Climate Conference (Seattle, 2024), GEM Conference (Phoenix, 2022), GEM Conference (Houston, 2021)

Organizer

University of Washington Black Graduate Student Association 2020 - 2025

I founded the BGSA and grew the organization to 250+ members. The BGSA enhances scholarly and professional development of Black graduate students at UW by providing opportunities for service, activism, and academic fellowship by hosting events like Black History Month Speaker Series (2022, 2023, 2024, 2025), UW Black Research Symposium (2021, 2022), UW Black Art Showcase (2023, 2024, 2025), and many more.

University of Washington LSAMP Ambassador 2018 - 2020

Networked with industries like Google and HashiCorp, and assisted a team of 8 in the planning of workshops and seminars for the 10th Annual PNW LSAMP Conference. Mentored underrepresented students as defined by NSF, promoting community engagement and college retention, and supervised the UW's on campus LSAMP center.

NASA Space Camp & UW Summer Programs

Summer 2019

Designed, built & taught engineering activities that taught groups of 50 students' introductory level coding & hardware skills, helped students build circuits with practical implementations. Collaborated lesson plans with professors and teaching staff to align my engineering activity's learning objectives with WA State Common Core standards and Arduino's best practices

Additional Events

2019 - 2022

UW GEM Fellows Luncheon (2022), Women in Science & Engineering Conference (2020), Study Abroad Table at Engineering Discovery Days (2019)

Public Speaking

Fathers and Sons Together Next Generation Level Up Final Celebration (2025), Hip Hop Is Green Final Celebration (2022), Electrical Engineering Undergraduate Orientation (2019), LSAMP 3D Printing & Design Workshop (2019), STEM Study Abroad Workshop (2019)

Participant

NSBE Career Fair (2020), NAAM (2020-2022), Seattle MESA (2019-2022), MLK Coalition (2019-2022), Bellingham Community Meal Program (2018)

Professional Memberships

Association for Computing Machinery (2022), Society of Women Engineers (2020), NSBE (2018)

ENTREPRENEURSHIP

National Programs

NSF I-Corps, UW CoMotion. "Designing a Flybar for Stabilizing Millimeter-scale Flying Robots" 2023
UW GEM partnership with NSF I-Corps, Program Recruiter. 2022
NSF I-Corps, MIT Spark. "AVELA – A Vision for Electronic Literacy & Access" 2022

Founder/Co-Founder

Hip-Hop Climate Conference & Concert (HHCCC) Founded 2024

Nonprofit (EIN: 99-1450402) conceived by climate advocates aiming to inspire action, promote science-based climate solutions, and unite hip-hop culture with STEM.

AVELA – A Vision for Engineering Literacy & Access (AVELA) Founded 2022

- Nonprofit (EIN: 88-4125697) that leads research and outreach trainings to promote economic opportunities in STEM for underserved and underrepresented students interested in college and STEM careers.
- Have supported 40+ research intern positions, one annual scholarship program, and 6 refereed publications.
- Since 2020, AVELA's 500+ members have partnered with ~100 faculty, schools, and community partners to teach 6,000+ students, culminating in over 110,000 STEM instruction hours (avg. 18+ hours per participant).
- This widescale research and outreach has been covered by *Converge Media*, *Fox4*, *the Seattle Medium*, *Africatown Community Land Trust Newsletter*, and many others.

SELECTED MEDIA COVERAGE

UW CSE, "I Am CSE: Kyle Johnson" Mar 2024
NSF Discovery Flies, "Self-Powered Mini Robot" Dec 2023
Allen School News, "Allen School Ph.D. students Kyle Johnson & Lisa Orii receive Quad Fellowships". Dec 2022
Amazon, "Amazon and University of Washington Announce inaugural Science Hub Fellows" Nov 2022
NAAM's October Interactive Story Time, "I Promise, by LeBron James voiced by Kyle Johnson" Oct 2022
CNET, "These Tiny Sensors Ride the Wind Like Dandelion Seeds" May 2022
Allen School News, "Kyle Johnson wins 2021 Generation Google Scholarship" Jul 2021
Allen School News, "Allen School students recognized for excellence in research by the NSF" Apr 2021