David Brown

david@davidcalebbrown.com 251-518-0543 Denver, CO
davidcalebbrown.com linkedin.com/in/davidcalebbrown github.com/Davidb8

Education

Harvard University **Cambridge, MA**
M.S. Applied Mathematics *May 2025*

Harvard University **Cambridge, MA**
B.A. Applied Mathematics, Secondary in Astrophysics *May 2025*
Magna Cum Laude with Highest Honors

Professional & Research Experience

Urban Sky **Denver, CO**

Chief of Staff *June 2025 – Present*

- Ensure timely & successful completion of all company goals and objectives

Simulations Engineer *November 2022 – June 2025*

- Conducted scientific studies into trends in wind behavior, historical shifts, and forecasting accuracies
- Lead development of several multimillion-dollar AFWERX/SBIR government contracts
- Developed high fidelity model of balloon system operating in a chaotic and dynamic 4D space
- Leveraged Optimal Control Theory to develop AutoPilot system to intelligently navigate transitions of complex nonlinear dynamic systems in real-time environments
- Stood up in-house machine learning capacity, initially targeted for controlling balloons using classical ML and reinforcement learning
- Business development research for opportunities & partnerships for humanitarian and sustainable development

Simulations and Modeling Intern *May 2022 – November 2022*

- Modeled balloon flight behavior by creating custom simulator
- Created tool for analyzing flight viability of any location in the US based on wind and geographical conditions
- Government contracting support (Phase 1 and 2) for proposal development and research

Maxar **Herndon, VA**

Aerospace Engineering Analyst Intern *June 2023 – August 2023*

- Simulation and Modeling to enable space agents to make intelligent decisions in complex environments
- Developed tools for fully customizable space-based simulator including high fidelity multibody transfer, satellite-based observation and communication, and Kalman Filter based predictions
- Implemented optimization algorithms to solve complex orbital transfers with up to 60% reductions in fuel costs
- Leveraged Machine Learning to eliminate costly planning procedures, achieving 98% faster flight planning
- Presented work to over 200 ML experts

Harvard School of Engineering & Applied Sciences **Cambridge, MA**

Associate Scientist, Linz Group *June 2025 – Present*

- Ongoing partnership to further research & partnerships between Urban Sky and Research bodies

Undergraduate Researcher, Linz Group *January 2023 – May 2025*

- Collaborated with Urban Sky to model general zero-pressure balloon behavior over extended flight durations

- Mass simulation using ERA5 Wind Data to identify major trends behind global viability of navigation
- Investigating applications to deforestation monitoring in Amazon Rainforest and wildfire prevention in Australia

Undergraduate Researcher, Ba Group *May 2024 – September 2025*

- Devised framework to differentiate ground truth from imperfect information in machine learning via attention mechanisms
- Applied framework to balloon navigation to develop state-of-the-art controller

Publications

- **Brown, D.**, Linz, M., Leidich, J. "Seasonal and geographic viability of high altitude balloon navigation." *Nature Scientific Reports*, 2024. doi:10.1038/s41598-024-71445-9
- **Brown, D.**, Leidich, J. "The stratospheric Goldilocks zone is critical for high-altitude balloon navigation." *Nature: Communications Earth & Environment*, 2025. doi:10.1038/s43247-025-02526-4
- Roggeveen, J.V., Wang, E.Y., ..., **Brown, D.**, et al. "HARDMath2: A Benchmark for Applied Mathematics Built by Students as Part of a Graduate Class." *arXiv*, 2025. arXiv:2505.11774

Honors, Awards, and Fellowships

- **Thomas T. Hoopes Thesis Award** – Harvard University, 2025
- **Alex G Booth '30 Fund Fellowship** – Harvard University, 2025
- **Three Minute Thesis (3MT) Competition Winner** – Harvard University, 2025
- **Roberts Family / Technology Innovation Fellow** – Harvard Business School, 2024
- **DRCLAS Summer Research Travel Grant** – Harvard University, 2024
- **Salata/HUCE Summer Undergraduate Independent Research Fund** – Harvard University, 2024
- **Harvard College Research Program Fellow** – Harvard University, 2023
- **John Harvard Scholarship Award** – Harvard University, 2022
- **Eagle Scout** – Boy Scouts of America, 2019

Talks & Presentations

- **Atmosys: The Atmospheric Operating System** – Academic High Altitude Conference, June 2025. Poster presentation. doi:10.31274/ahac.20138

Projects

- **iTour: Fort Gaines** (2019 – Present) – Developed tour system for historic civil war site: physical infrastructure coupled with audio-based smartphone app. Not for Profit.
- **Bartending Robot** (2023) – Bartending assistant able to craft made-to-order drinks with NFC-based ordering and queueing system.
- **Star Tracking Telescope Mount** (2022) – Astrophotography mount using high precision stepper motors and sensor analysis to rotate DSLR in celestial directions to match the motion of the stars.
- **Voice Assistant** (2019) – Python-based assistant with speech-to-text, keyword detection filtered into Database for scaling, call-and-response, weather tracking, and name profiling.

Skills & Interests

Languages: Python, C, Java, MATLAB, Arduino, Git, LaTeX
AI Toolkits: Superuser of all major modern AI Tools & Frameworks
Software: ArcGIS, PyTorch, TensorFlow, STK, GMAT, QGIS, CAD, CATIA Cameo
Technical: Microcontrollers, 3D Printing, Milling, Laser Cutting, Machine Shop
Interests: Photography (Fine Art, Astrophotography, Underwater), Space Exploration