

# David Brown

Applied Mathematician & Chief of Staff

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## Education

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<b>Harvard University</b> <i>M.S. Applied Mathematics</i>	<b>Cambridge, MA</b> <i>May 2025</i>
<b>Harvard University</b> <i>B.A. Applied Mathematics, Secondary in Astrophysics</i> Magna Cum Laude with Highest Honors	<b>Cambridge, MA</b> <i>May 2025</i>

## Professional & Research Experience

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<b>Urban Sky</b> <i>Chief of Staff</i>	<b>Denver, CO</b> <i>June 2025 – Present</i>
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- Ensure timely & successful completion of all company goals and objectives

<i>Simulations Engineer</i>	<i>November 2022 – June 2025</i>
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- Conducted scientific studies into trends in wind behavior, historical shifts, and forecasting accuracies
- Managed small team in 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

<i>Simulations and Modeling Intern</i>	<i>May 2022 – November 2022</i>
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- 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

<b>Maxar</b> <i>Aerospace Engineering Analyst Intern</i>	<b>Herndon, VA</b> <i>June 2023 – August 2023</i>
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- 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 “Machine Learning for Space Operations” at Maxar Applied ML Summit to over 200 ML experts

<b>Harvard School of Engineering &amp; Applied Sciences</b> <i>Associate Scientist, Linz Group</i>	<b>Cambridge, MA</b> <i>June 2025 – Present</i>
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- Ongoing partnership to further research & partnerships between Urban Sky and Research bodies

<i>Undergraduate Researcher, Linz Group</i>	<i>January 2023 – May 2025</i>
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- 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

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- **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](https://doi.org/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](https://doi.org/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](https://arxiv.org/abs/2505.11774)

## Honors, Awards, and Fellowships

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- **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

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

## Projects

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- **iTour: Fort Gaines** (2019 – Present) – Developed tour system for historic civil war site: physical infrastructure coupled with audio-based smartphone app. Not for Profit.
- **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

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- 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