Timothy Chase Jr

✉ tbchase@buffalo.edu 📞 (716) 949-0748 in LinkedIn 🔗 Website 🎓 Google Scholar

Education

University at Buffalo, State University of New York — Buffalo, NY
- ○ **Ph.D. Candidate**, Computer Science and Engineering — Aug. 2020 – Present
- ○ **Master of Science**, Computer Science and Engineering — Aug. 2020 – Feb. 2023
- ○ **Bachelor of Science**, Computer Science (Certificate, Data-Intensive Computing) — Aug. 2016 – May 2020

Technical Skills

Programming Languages: C, C#, C++, Python, Rust, Ruby, Go, R, Java, Scala, JavaScript, SQL, MATLAB

Frameworks & Tooling: TensorFlow/Keras, PyTorch, Hugging Face, CUDA, ONNX, ROS, Git, Travis CI, Docker, AWS

Robotics: Visual/LiDAR/Multi-modal Perception, 3D Reconstruction, Mapping, Planning, Multi-agent, State Estimation

3D Modeling, Simulation, & Data Generation: AirSim, Gazebo, PyBullet, Unity, Blender, Unreal Engine

AI/ML: Generative/Latent Modeling, Contrastive/Bayesian/Transfer Learning, Domain Adaptation, Recognition/Retrieval

Experience

Graduate Research Assistant, *University at Buffalo* — Aug. 2020 — Present
- ○ Learning feature recognition with perceptual uncertainty; generalized Bayesian learning/Monte Carlo inference methods
- ○ Improved space robot perception; feature detection/recognition, domain adaptation, contrastive learning, attention regularizations, generative modeling (GANs, VAEs, diffusion), 3D reconstruction (NeRFs/Splats), edge deployment
- ○ Advancements in Visual/LiDAR perception and SLAM; dynamic feature reasoning, modular and edge-assisted systems

Student Researcher, Software Engineer, *NASA Goddard Space Flight Center* — May 2018 — Present
- ○ Principal Investigator ($22K); sparse 3D reconstruction, Digital Elevation Model (DEM) generation, and patch-based feature navigation with radiance fields (Neural Radiance Fields and Gaussian Splatting)
- ○ Principal Investigator ($27.5K); learning-based object detection with unsupervised domain adaptation, white-box interpretability methods, custom MLIR compilers, and resource-constrained edge deployment
- ○ Team lead, robot simulation and synthetic training data generation; Unity, Unreal Engine, AirSim, Gazeebo, PyBullet, and Blender; **support of multiple internal research and flight projects**
- ○ Developer, Intelligent Extensible Mission Architectures (IEMA); multi-agent coordination for mixed asset sensing, distributed PDDL planning (Fast-Downward, Pyperplan, fmap), learning-based algorithms for science event recognition
- ○ Developer, Onboard Artificial Intelligence Research (OnAIR) platform; Python development in data flow and processing, cognitive architectures, drone interfacing and control (PX4/MAVLink), network and radio communication, packet framing, scheduling, and unit testing; **flight heritage on NASA drone missions**
- ○ Developer, NASA flight software (cFS, C/C++) and ground control (COSMOS, Ruby) applications; onboard deep learning/machine learning execution, image processing (RGB/Hyperspectral), data compression, storage handling, FPGA/co-processor interfacing, radio communication and packet framing, real-time operating systems (VxWorks), Linux kernel configuration, hardware and science instrument driver development; **flight heritage on multiple CubeSats and ISS**

Software Engineer, Intern, *NASA Jet Propulsion Laboratory* — Sep. 2019 – Jan. 2020
- ○ Developer, flight-software-in-the-loop simulation/operations tooling for the Mars Perseverance Rover
- ○ Python/C++ system for decoding raw flight software memory; vehicle state reconstruction for command validation and autonomous behavior prediction

Data Scientist, Intern, *NOVI Aerospace* — Mar. 2019 – Dec. 2019
- ○ Deep learning dataset curation, pre-processing, model training

Flight Software Lead, *UB Nanosatellite Laboratory* — Aug. 2016 – Dec. 2019
- ○ Team lead; architecture design and decision making, team/project scheduling, team tasking and training, stakeholder engagement (NASA/AFRL)
- ○ Lead developer, CubeSat flight software (C/C++/Python); hardware and science instrument drivers, system optimizations, hardware and software level test planning and execution, software-defined radio development (GNU Radio), packet framing, Linux kernel configuration

Undergraduate Researcher, *UB Scalable Computing Group* — May 2019 – Aug. 2019
- ○ Bayesian network learning; algorithm acceleration and search space pruning (C++)

Undergraduate Researcher, *UB Blockchain Thinklab*   Mar. 2019 – May 2019
- Smart contracts developer (Solidity), Ethereum blockchain; full-stack Web3 applications

Honors and Awards

NASA Special Act Award, *Outreach and university engagement of NASA research*   Sep. 2023
UB Blockchain Buildathon, *First place use-case, second place overall*   Apr. 2019
UB Hackathon, *First place*   Nov. 2018

Service

Co-Organizer, IEEE Aerospace Conference 2025   Jul. 2024 – Mar. 2025
Session 10.08: Image Processing and Computer Vision

Mentorship, NASA Goddard Space Flight Center
Summer 2024 Internship, Robotics and Learning, Four Students (Undergraduate/Graduate)   Jun. 2024 – Aug. 2024
Summer 2023 Internship, Robotics, Two Students (Undergraduate/Graduate)   Jun. 2023 – Aug. 2023
Drexel University Senior Design 2023, Computer Vision, Learning, and Simulation, Six Students   Aug. 2022 – Jun. 2023

Teaching Assistant, University at Buffalo   Jan. 2020 – May 2020
CSE 421/521: Introduction to Operating Systems

Publications

Under Submission
- **T. Chase Jr**, K. Dantu, "You Only Crash Once v2: Perceptually Consistent Strong Features for One-Stage Domain Adaptive Detection of Space Terrain", *IEEE Transactions on Aerospace and Electronic Systems*
- **T. Chase Jr***, Y. Turkar*, C. Aluckal, K. Dantu, "Learning Visual Information Utility with PIXER", *IEEE International Conference on Robotics and Automation*, 2025 (**ICRA '25**)
- **T. Chase Jr**, A. Seshar, S. Rana, A. Balotin, D. Shahane, K. Dantu, "Vision is the Bottleneck to SLAM in Space: a Comparative Analysis", *IEEE Transactions on Aerospace and Electronic Systems*

Accepted/Published: Conferences
- W. Zhang, J. Goodwill, **T. Chase Jr**, J. Marshall, "Evaluation and Integration of YOLO Models for Autonomous Crater Detection", *IEEE Aerospace Conference*, 2025 (**Aero '25**)
- E. Gizzi, **T. Chase Jr**, et al., "Applications of The NASA On-Board Artificial Intelligence Research Platform", *AAAI Innovative Applications of Artificial Intelligence*, 2025 (**AAAI-IAAI '25**)
- C. Gnam, **T. Chase Jr**, A. Liounis, "Machine Learning based Crater Detection for Terrain Relative Navigation", *AAS Guidance, Navigation and Control Conference*, 2025 (**GNC '25**)
- **T. Chase Jr**, K. Dantu, "MARs: Multi-view Attention Regularizations for Patch-based Feature Recognition of Space Terrain", *European Conference on Computer Vision*, 2024 (**ECCV '24**)
- E. Gizzi, **T. Chase Jr**, C. Firth, J. Marshall, A. Gibson, "The Onboard Artificial Intelligence Research (OnAIR) Platform", *ESA/IAA Conference on AI in and for Space*, 2024 (**SPAICE '24**)
- **T. Chase Jr**, S. Kilaru, S. Srinivas, K. Dantu, "Unsupervised Surface-to-Orbit View Generation of Planetary Terrain", *IEEE Aerospace Conference*, 2024 (**Aero '24**)
- **T. Chase Jr**, J. Goodwill, K. Dantu, C. Wilson, "Profiling Vision-based Deep Learning Architectures on NASA Space-Cube Platforms", *IEEE Aerospace Conference*, 2024 (**Aero '24**)
- M. Moussa, M. Brandt, D. Rogers, B. Theiling, S. Bull, J. MacKinnon, **T. Chase Jr**, E. Haengel, "An Autonomous Agent Framework for Constellation Missions: A Use Case for Predicting Atmospheric CO2" *Small Satellite Conference*, 2023, *Poster* (**SmallSat '23**)
- A. Geist, G. Crum, C. Brewer, D. Afanasev, S. Sabogal, D. Wilson, J. Goodwill, J. Marshall, N. Perryman, N. Franconi, **T. Chase Jr**, et al., "NASA SpaceCube Next-Generation Artificial-Intelligence Computing for STP-H9-SCENIC on ISS", *Small Satellite Conference*, 2023 (**SmallSat '23**)
- **T. Chase Jr**, A. Ben Ali, S. Ko, K. Dantu, "PRE-SLAM: Persistence Reasoning in Edge-assisted Visual SLAM", *IEEE International Conference on Mobile Ad Hoc and Smart Systems*, 2022 (**MASS '22**)
- **T. Chase Jr**, C. Gnam, J. Crassidis, K. Dantu, "You Only Crash Once: Improved Object Detection for Real-Time, Sim-to-Real Hazardous Terrain Detection and Classification for Autonomous Planetary Landings", *AAS/AIAA Astrodynamics Specialist Conference*, 2022 (**Astro '22**)
- S. Semenova, P. Meshram, **T. Chase Jr**, et al., "A Modular, Extensible Framework for Modern Visual SLAM Systems", *International Conference on Mobile Systems, Applications and Services*, 2022, *Poster* (**MobiSys '22**)
- C. Gnam, **T. Chase Jr**, et al., "Attitude Determination via Earth Surface Feature Tracking Given Precise Orbit Knowledge", *AAS Guidance, Navigation and Control Conference*, 2022 (**GNC '22**)
- **T. Chase Jr***, C. Gnam*, K. Dantu, J. Crassidis, "Efficient Feature Matching and Mapping for Terrain Relative Navigation Using Hypothesis Gating", *AIAA SciTech Forum*, 2022 (**SciTech '22**)

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*Equal Contribution