

Brian Wei

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Education

Washington University in St. Louis , St. Louis, MO <i>B.A. in Data Science & Economics</i> ; GPA: 3.99	Aug 2022 – May 2026
Vrije Universiteit Amsterdam , Amsterdam, The Netherlands Semester Abroad in through IES Study Abroad	Jan 2024 – May 2024

Research Interests

- Multimodal representation learning
- Image and video generative modeling
- Efficient architectures for large-scale models

Research Experience

Undergraduate Researcher , Multimodal Vision Research Lab – St. Louis, MO	Aug 2025 – Present
<ul style="list-style-type: none">• <i>GeoDiT Project</i>: Developed and trained a conditional diffusion transformer for temporal satellite image generation and multi-spectral super-resolution; designed a full pipeline for semantic inpainting using spatial point-based prompts.• Building test-time attention adaptations for semantic control in image and video diffusion models.• Collaborating with PhD students in pipeline design, ablations, baseline evaluations, and research paper writing.	
REU Fellowship , Multimodal Vision Research Lab – St. Louis, MO	May 2025 – Aug 2025
<ul style="list-style-type: none">• <i>VectorSynth Project</i>: Designed and implemented a vision-language model aligning satellite imagery with structured text annotations to improve semantic consistency in image generation.<ul style="list-style-type: none">– Introduced a novel polygon-guided contrastive learning objective.– Outperformed baseline vision-language models on retrieval, dense labeling, and semantic grounding tasks in the remote sensing domain.– Contributed to related works, methodology, and evaluations for academic research paper.• <i>Herbarium Reclassification Project</i>: Applied a transformer-based model leveraging prior text labels to improve rare species recognition in herbarium image classification, surpassing state-of-the-art baselines.	
Undergraduate Researcher , SDS Summer Research Program – St. Louis, MO	May 2024 - Nov 2024
<ul style="list-style-type: none">• Applied a distributed spatial autoregressive (SAR) model to Missouri census tract data, linking human mobility and socioeconomic variables to mental health outcomes.• Implemented SAR estimation from scratch in Python (Geopandas, NumPy, SciPy), with feature engineering from SafeGraph mobility data.	

Publications & Presentations

VectorSynth: Fine-Grained Satellite Image Synthesis with Structured Semantics D. Cher*, B. Wei* , S. Sastry, N. Jacobs * Equal contribution <i>Winter Conference on Applications of Computer Vision (WACV) 2026</i>	Aug 2026
GeoDiT: Point-Conditioned Diffusion Transformer for Satellite Image Synthesis S. Sastry*, D. Cher*, B. Wei* , A. Dhakal, S. Khanal, D. Gupta, N. Jacobs * Equal contribution <i>Under Review, Conference on Computer Vision and Pattern Recognition (CVPR) 2026</i>	Nov 2026
Fine-Grained Vision-Language Representations for Satellite Image Synthesis B. Wei , D. Cher, S. Sastry, N. Jacobs	Aug 2025

Poster, REU Summer Poster Session, Washington University in St. Louis

Using Distributed Estimation to Uncover the Impact of Human Mobility on Mental Health Outcomes

Nov 2024

B. Wei, N. Lin, K. Li

Poster, Undergraduate Research Symposium, Washington University in St. Louis

The Methods and Extensions of Diffusion Models with Transformers

Sept 2026

B. Wei

Course Presentation, Advances in Computer Vision (CSE 5519), Washington University in St. Louis

Leadership & Projects

Co-President, WashU Robotics Club – St. Louis, MO

May 2023 – Aug 2024

- Led 100+ member organization with projects in autonomous navigation, reinforcement learning, VR, and HRI.
- Organized large-scale public and campus events, including Robot Day (200+ attendees), Robotics Showcase (100+ attendees), and hands-on engineering workshops.
- Directed software team on rover localization and navigation; integrated GPS, IMU, and depth cameras for path planning.
- Established partnerships, funding, and long-term club structure.

Machine Learning Engineer, Engineering Test Kitchen – St. Louis, MO

Sept 2024 – Dec 2024

- Built a convolutional neural network in TensorFlow/Keras to detect and count staves in barrel production images.
- Designed a Google Sheets + Python data pipeline for continuous image ingestion.

IT Intern, Midland States Bank – St. Louis, MO

Jun 2024 – Aug 2024

- Developed Optical Character Recognition (OCR) + Salesforce automation for inactive client outreach.
- Delivered Agile-managed technical solutions across departments.

Honors & Awards

NSF Research Experiences for Undergraduates (REU) Fellowship

Summer 2024

WashU Statistics & Data Science (SDS) Summer Research Award

Summer 2023

Skills

Programming: Python, R, SQL, Java, Stata, XML

AI/ML: Deep learning with PyTorch, experience with Hugging Face, scikit-learn, PyTorch Lightning, diffusers, timm for generative and multimodal model development.

Data & Visualization: pandas, NumPy, GeoPandas, SciPy, Tableau, matplotlib, Airflow, Snowflake

Tools: Git, Linux, Docker, LSF/Slurm (HPC job scheduling), LaTeX, WashU Compute Cluster (A100/H100 nodes)

Languages: English (fluent), Mandarin (fluent), Dutch (beginner)

Relevant Coursework

Theoretical Machine Learning, Advances in Computer Vision, Mathematical Statistics, Statistical Computation, Linear Models, Linear Algebra, Calculus (I-III), Data Manipulation and Management.