

Nick Kunz

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Education

- Cornell University** — Ithaca, NY 2026
Ph.D., Systems Engineering, Artificial Intelligence
Advisors: H. Oliver Gao, Francesca Parise, Wenfei Xu
- Columbia University** — New York, NY 2019
M.S., Urban Planning, Urban Analytics
Advisors: Lance Freeman, Kazuki Sakamoto
- Harvard University** — Cambridge, MA 2012
Urban Planning
Advisor: Nick Hornig
- Arizona State University** — Tempe, AZ 2012
B.S. (Hons.), *summa cum laude*, Housing & Urban Development
Advisors: Kevin Kellogg, Michael Underhill, Trevor Barger

Research

Publications

- N. Kunz, H. O. Gao, “Transfer Learning on Street Networks from Graph Representation Synthesis” *In Preparation*. 2024.
- N. Kunz, H. O. Gao, “Global Geolocated Realtime Data of Interfleet Urban Transit Bus Idling” *Under Review*. 2024.
- W. Wu, N. Kunz, P. Branco, “Imbalanced Learning Regression” in *Machine Learning and Knowledge Discovery in Databases: European Conference, ECML PKDD, September 19–23, 2022, Grenoble, France*, Proceedings, Part VI, Lecture Notes in Computer Science, vol 13718. Springer, pp. 645–648, 2023. [\[Link\]](#)

Industry

- N. Kunz, “n-Dimensional Mapping by Normalized Value Approximation: Squad Immersive Virtual Trainer (SiVT) Safety Performance Metrics,” Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2021. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.
- N. Kunz, “Normalized n-Dimensional Inverse Euclidean Distance: Combining Independent Performance Metrics,” Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2021. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.
- N. Kunz, “An Exploratory Data Analysis of the Gavin Cup: Brining Readiness & Performance Metrics Into Focus,” Integrated Visual Augmentation System (IVAS), Microsoft, Redmond, WA, 2020. Protected from public disclosure pursuant to: Trade Secrets Act 18 USC § 1905, 5 USC § 552(b)(4), and C3.2.1.4. of US Dept. of Defense Regulation 5400.7-R. DISTRIBUTION F.

Theses

- N. Kunz, “Unsupervised Learning for Submarket Modeling: A Proxy for Neighborhood Change,” M.S. Thesis, Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2019. [Online]. Available: Columbia Academic Commons. [\[Link\]](#)
- N. Kunz, “Realizing Interactive Architecture: A Driver of the Knowledge Economy,” B.S. (Hons.) Thesis, Barrett, The Hons. Col., Arizona State Univ., Tempe, AZ, 2012. [Online]. Available: Barrett, The Honors College Thesis/Creative Project Collection. [\[Link\]](#)

Industry Experience

Deloitte — Seattle, WA Senior Data Scientist	2021 - 2024
Microsoft — Redmond, WA Data Scientist	2020 - 2021
Pacific Prospecting Group — Seattle, WA Data Scientist	2017 - 2019
Brawner & Company — Snoqualmie, WA Development Analyst	2016 - 2017
bcWORKSHOP — Dallas, TX Fellow	2013 - 2014

Software Packages

GRD-TRT-BUF-4I: Ground Truth Buffer for Idling 2023
 [Github](#) [[Link](#)]  [arXiv](#) [[Link](#)]  [Website](#) [[Link](#)]


A novel algorithm designed as a series of scalable microservices that detects urban transit bus idling in realtime on global scale. Utilizes a combination of templated ETL pipelines to provide a comprehensive view of the emergent behavior of interfleet idling patterns across multiple transit networks around the world.

SMOGN: Synthetic Minority Over-Sampling Technique for Regression with Gaussian Noise 2021
 [Github](#) [[Link](#)]  [PyPI](#) [[Link](#)]  [Kaggle](#) [[Link](#)]  [Stack Exchange](#) [[Link](#)]



A pre-processing algorithm designed to address imbalanced data for regression problems. Conducts over-sampling with traditional interpolation, as well as with the introduction of Gaussian noise. Selects between the two over-sampling techniques by the KNN distances underlying a given observation.

NestedHyperBoost: Nested Cross-Validation for Bayesian Optimized Gradient Boosting 2020
 [Github](#) [[Link](#)]  [PyPI](#) [[Link](#)]

Unifies Nested K-Fold Cross-Validation, Bayesian Hyperparameter Optimization, and Gradient Boosting. Designed for rapid prototyping on small to mid-sized data sets. Quickly obtains high quality prediction results by abstracting away tedious hyperparameter tuning and implementation details in favor of usability and implementation speed.

NestedHyperLine: Nested Cross-Validation for Bayesian Optimized Linear Regularization 2020
 [Github](#) [[Link](#)]  [PyPI](#) [[Link](#)]

Unifies Nested K-Fold Cross-Validation, Bayesian Hyperparameter Optimization, and Linear Regularization. Designed for rapid prototyping on small to mid-sized data sets. Quickly obtains high quality prediction results by abstracting away tedious hyperparameter tuning and implementation details in favor of usability and implementation speed.

CRASSMAT: Conditional Random Sampling Sparse Matrices 2019
 [Github](#) [[Link](#)]  [CRAN](#) [[Link](#)]

A novel matrix sampling algorithm designed to conditionally random sample sparse matrices. Useful for training and test set splitting prior to model fitting in cross-validation procedures and for estimating the predictive accuracy of imputation methods, such as NNMF and SVD.

Selected Projects

N. Kunz, S. Huang, S. Osakata, “Cloudy Night: Activating Park Space by Illuminated Interactivity,” Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2019. [Online]. Available:

 [GSAPP](#) [[Link](#)]  [Github](#) [[Link](#)]  [YouTube](#) [[Link](#)]  [Faculty](#) [[Link](#)]

N. Kunz and S. Bhele, “Signal or Noise? Qualified Opportunity Zone Affect on Development Activity in Queens,” Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2019. [Online]. Available:

 [GSAPP](#) [[Link](#)]  [Github](#) [[Link](#)]  [Issuu](#) [[Link](#)]  [Faculty](#) [[Link](#)]

E. Hudgins and **N. Kunz**, “Planning for Extreme Settlements, McMurdo Station, Antarctica,” Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2018. [Online]. Available:

 GSAPP [[Link](#)]  Issuu [[Link](#)]

J. Karasik, S. Lee, **N. Kunz**, *et. al.* “Negotiating Fragments (Restructuring Quarto Workshop),” Genoa, Italy, Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2018. [Online]. Available:

 GSAPP [[Link](#)]  YouTube [[Link](#)]  Issuu [[Link](#)]  Issuu [[Link](#)]  Press [[Link](#)]


N. Kunz, “Proportionalities: A Decade of Housing Markets to Subway Stations in Manhattan from 2006 to 2016,” Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2017. [Online]. Available:

 GSAPP [[Link](#)]  GSAPP [[Link](#)]  Issuu [[Link](#)]  Faculty [[Link](#)]

G. S. Coch, S. Nelsen, **N. Kunz**, K. Warner, “Seeking Refuge: The Geography of Migrant Deaths Along the US-MX Border,” Grad. Sch. of Arch., Plan., and Pres. (GSAPP), Columbia Univ., New York, NY, 2017. [Online]. Available:

 GSAPP [[Link](#)]  Medium [[Link](#)]


N. Kunz, “Health & Wellness Alliance for Children: Children’s Asthma, Healthy Physical Environments,” Dallas County, Texas, bcWORKSHOP, Dallas, TX, 2014. [Online]. Available:

 Issuu [[Link](#)]


N. Kunz, “The Bexar Street Corridor: A Century in Development,” Dallas, Texas, bcWORKSHOP, Dallas, TX, 2013. [Online]. Available:

 Issuu [[Link](#)]  Issuu [[Link](#)]  bc [[Link](#)]  Vimeo [[Link](#)]


N. Kunz, “Fenway-Kenmore Square: Comprehensive Planning & Finance,” Cambridge, Massachusetts, Grad. Sch. of Design (GSD), Harvard Univ., Cambridge, MA, 2012. [Online]. Available:

 Issuu [[Link](#)]


N. Kunz, “Danelle Plaza: Complete Street Mobility Planning,” Tempe, Arizona, Herberger Inst. for Des. and the Art., Arizona State Univ., Tempe, AZ, 2012. [Online]. Available:

 Issuu [[Link](#)]

N. Kunz, “Ascension: Multifamily Mixed-Use Real Estate Development Proposal,” Tempe, Arizona, n Creative Studios, Phoenix, AZ, 2012. [Online]. Available:

 Issuu [[Link](#)]

N. Kunz, “Sui Residence: Second Story Architectural Design,” Paradise Valley, Arizona, n Creative Studios, Phoenix, AZ, 2011. [Online]. Available:

 Issuu [[Link](#)]

Honors & Awards

Graduate Engineering Fellowship , Cornell University — Ithaca, NY	2023 - 2026
Systems Engineering Fellowship , Cornell University — Ithaca, NY	2022 - 2023
Top 20 Analytics Libraries , Github20k — San Francisco, CA	2023
AVID Applause Award , Deloitte Consulting — Seattle, WA	2022
Distinguished Alumni Award , Arizona State University — Tempe, AZ	2016
Eli Segal AmeriCorps Education Award , AmeriCorps — Dallas, TX	2014
Dingwall Foundation Scholarship , William Orr Dingwall Foundation — Washington, DC	2011 - 2012
Barrett, The Honors College Scholarship , Arizona State University — Tempe, AZ	2010 - 2012
AIERF Undergraduate Scholarship , Appraisal Institute — Chicago, IL	2010 - 2011
Herberger Institute for Design & the Arts Scholarship , Arizona State University — Tempe, AZ	2010
Study.net Foundation Scholarship , Study.net — Fort Lauderdale, FL	2010
Dean’s List (4.00/4.00 GPA) , Arizona State University — Tempe, AZ	2009 - 2012

Mentorship Activities

Albert Rosario-Pichardo , M.S., Urban Analytics, Columbia University — New York, NY GIS Analyst Intern, New York City Economic Development Corporation <i>Academic and professional development in early career public service.</i>	2023 - 2024
Albert Ruiz Martinez , B.S., Computer Science, Arizona State University — Tempe, AZ Analyst, Deloitte Consulting <i>Professional development and management in early career consulting.</i>	2023 - 2024
Julia VanPutte , B.S., Operations Research, Cornell University — Ithaca, NY Business Intelligence Engineer Intern, Amazon <i>Academic and professional development from undergraduate school to industry.</i>	2022 - 2024
Chawner Hurd , M.B.A., Business, Columbia University — New York, NY Associate Intern, Visa <i>Military transition from US Army, 5th Special Forces Group to graduate school and industry.</i>	2020 - 2023
Michael Bollinger , B.A., Computer Science, Columbia University — New York, NY Software Engineer Intern, Amazon <i>Military transition from US Army, 75th Ranger Regiment to undergraduate school and industry.</i>	2019 - 2023
Daniel Hine , B.A., Political Science, Columbia University — New York, NY Associate Intern, Guggenheim Partners <i>Military transition from US Army, 82nd Airborne Division to undergraduate school and industry.</i>	2018 - 2023

Talks, Exhibits & Presentations

Ground Truth Buffer for Idling , 3-Minutes of Madness, Cornell University — Ithaca, NY	2024
Global Geolocated Realtime Data , Flash Talks, Cornell University — Ithaca, NY	2023
Emerging Technology Workshop , Countryside Angels Talks, Ag Ventures Alliance — Mason City, IA	2021
Urban Planners in Technology , Alumni Panel, Columbia University — New York, NY	2021
Cloudy Night , Urban Planning Showcase, Columbia University — New York, NY	2019
The Bexar Street Corridor , US Congresswoman Eddie Bernice Johnson's Office — Dallas, TX	2014
The Bexar Street Corridor , bcSHOPFRONT Series, bcWORKSHOP — Dallas, TX	2013
Realizing Interactive Architecture , Honors Symposium, Arizona State University — Tempe, AZ	2012

Media & Press

Spotlights: Nick Kunz , Cornell Systems Engineering — Ithaca, NY [Link]	2023
Meet the N-K Alumni Nick Kunz , Northwood Anchor, Vol. 126, No. 41, Pg. 4 — Northwood, IA [Link]	2022
Achievement Oriented: Nick Kunz , ASU Magazine, Vol. 20, No. 2, Pg. 7 — Tempe, AZ [Link]	2016
Welcome Nick Kunz , bcWORKSHOP — Dallas, TX [Link]	2013

Military Service

Assignments

US Army, 2d Ranger Battalion, 75th Ranger Regiment — Fort Lewis, WA <i>Infantry</i>	2015 - 2016
US Army, Ranger Training Detachment — Fort Benning, GA <i>Ranger Assessment and Selection Program</i>	2015
US Army, 1st Special Warfare Training Group — Fort Bragg, NC <i>Special Forces Assessment and Selection</i>	2014
US Army, 1st Special Warfare Training Group — Fort Bragg, NC <i>Special Forces Preparation and Conditioning</i>	2014
US Army, 507th Parachute Infantry Regiment — Fort Benning, GA <i>Airborne School</i>	2014
US Army, 19th Infantry Regiment — Fort Benning, GA <i>Infantry School</i>	2014

Decorations

Expert Badge, Rifle Component Bar , US Army, 75th Ranger Regiment — Fort Lewis, WA	2016
Global War on Terrorism Service Medal , US Army, 75th Ranger Regiment — Fort Lewis, WA	2016
Driver Badge, Wheeled Vehicle Component Bar , US Army, 75th Ranger Regiment — Fort Lewis, WA	2015
Parachutist Badge, Unit Trimming , US Army, 507th Parachute Infantry Regiment — Fort Benning, GA	2014
Infantry Blue Chord Fourragère , US Army, 19th Infantry Regiment — Fort Benning, GA	2014
National Defense Service Medal , US Army, 19th Infantry Regiment — Fort Benning, GA	2014
Army Service Ribbon , US Army, 19th Infantry Regiment — Fort Benning, GA	2014

Civil Service

AmeriCorps — Dallas, TX <i>Volunteer in Service to America (VISTA)</i>	2013 - 2014
Open Architecture Collaborative — Dallas, TX <i>Architecture & Planning</i>	2013 - 2014
Trinity Park Conservancy — Dallas, TX <i>Public Park Conservation</i>	2013 - 2014

Technical Skills

Languages

Scripting: Python, Bash
Statistical: R, Stata
Compiled: C/C++, Fortran
Database: SQL, NoSQL, Cypher
Typesetting: ~~La~~TeX, Markdown

Frameworks

Data Science: NumPy, SciPy, Pandas, statsmodels, Featuretools, Tidyverse
Visualization: Matplotlib, Seaborn, Plotly, Processing, Shiny, ggplot
Statistical Learning: Scikit-Learn, XGBoost, LightGBM, CatBoost
Reinforcement Learning: OpenAI Baselines, Stable Baselines
Prompt Engineering: GPT, LLaMA, Claude
Deep Learning: Pytorch, TensorFlow, ONNX

Deployment

DevOps: Git, Ubuntu, Docker, CI/CD
Databases: PostgreSQL, SQLite, CosmosDB, Neo4j
Web Services: Flask, Gunicorn, Nginx
Web Automation: Selenium, Puppeteer
Cloud Platforms: Azure, AWS, Databricks
Security: STIGs, NIST, ZAP

Software

Development Environments: VS Code, RStudio, Jupyter
Geographic Information Systems: ArcGIS, QGIS, OSM, Leaflet, Mapbox
3D Modeling & Optimization: Rhino, Grasshopper, SketchUp, AutoCAD, Unity
Design & Illustration: Adobe Photoshop, Illustrator, InDesign
Financial Modeling: Excel, Macros, CoStar
Studio & Live Audio: Logic, Protools

Prototyping

Sensors & Hardware: Arduino, Raspberry Pi
Project Management: Agile, Scrum, Critical Path
Electrical: Soldering, Wiring, Safety
Ideation: Drawing & Sketching, Storyboarding
Analogs: Hand Drafting, Physical Modeling, Photography

Personal Activities

Music & Live Audio

Atlas North American Tour — US & Canada The Word Alive (<i>Fearless Records</i>), Co-Tour Manager The Word Alive (<i>Fearless Records</i>), Guitar Tech	2013
Fight the Silence Tour — US The Word Alive (<i>Fearless Records</i>), Guitar Tech For Today (<i>Razor & Tie Records</i>), Guitar Tech	2013
All Stars Tour — US The Word Alive (<i>Fearless Records</i>), Guitar Tech A Skylit Drive (<i>Fearless Records</i>), Guitar Tech	2012
Van's Warped Tour — US & Canada The Word Alive (<i>Fearless Records</i>), Co-Tour Manager Of Mice & Men (<i>Rise Records</i>), Guitar Tech	2011
Regional Performances — US The Rendering (<i>Authentik Artists</i>), Guitar	2011

Outdoors & Endurance

Running (*Half Marathon, 13.1mi, Marathon, 26.2mi*)
Cycling (*Century Ride, 100mi*)
Hiking (*Mt. Rainier, Mt. Olympus, Mt. Denali*)
Overlanding (*Rubicon Trail, Alaskan Arctic Circle, Powder River Basin, All 50 States*)
Snowboarding (*Cascades, Sierra Nevadas, Colorado Plateau, Mississippi River Valley*)