

James D. Gaboardi

Geospatial Science & Human Security
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EDUCATION

- PhD Geography, *Florida State University*, 2019
Populated Polygons to Networks: A Population-Centric Approach to Spatial Network Allocation
Advisor David C. Folch
Committee Mark W. Horner, Chris K. Uejio, Michael J. Brusco
- MS Geographic Information Science, *Florida State University*, 2014
- BA Liberal Studies, *University of Central Florida*, 2005

RESEARCH APPOINTMENTS & ACTIVITIES

- 2021– Oak Ridge National Laboratory, *Geospatial Science & Human Security – Human Geography*
Associate Research & Development Scientist – Remote
• Scalable, high-performance research software development & engineering
• Synthetic population ensemble generation & digital twin modeling
• Spatial network-centric human mobility analysis
- 2019-21 Pennsylvania State University, *Department of Geography*
Post Doctoral Scholar – Remote
NSF Award #1825768: “Fixing” 1990-2010 Census Geography (NHGIS)
• Analyzing and standardizing census geographies in Python (2.x & 3.x) and SAS
• Building data workflows on Red Hat Enterprise Linux Server via PBS
• Geocoding restricted census microdata in SAS 9.4
- 2016-19 Florida State University, *Department of Geography*
Graduate Research Assistant – 50% Remote
NSF Award #1132008: Spatial Sciences Census Research Node (SSCRN)
• Development of GIS algorithms in Python, R, & Bash
• Building & testing of virtual Python environments on RHEL Server 5 & 6
• Special Sworn Status at the U.S.A. Census Bureau to work with restricted data
- 2014-19 Florida State University, *Department of Geography*
Instructor of Record
- 2014-19 Florida State University, *Department of Geography*
Lab Instructor
- 2014-19 Florida State University, *Department of Geography*
Graduate Teaching Assistant
- 2014 Florida State University, *Florida Resources and Environmental Analysis Center*
Graduate Intern

AFFILIATIONS

Current

- 2025– Center for Open Geographical Science at San Diego State University – COGS@SDSU

2024– Research Team on Urban Structure at Charles University – RToUS@USCUNI
 2015– Python Spatial Analysis Library – PySAL

Past

2019-21 The Peter R. Gould Center at Pennsylvania State University
 2019-21 The National Historical Geographic Information System – NHGIS@IPUMS
 2016-19 Spatial Sciences Census Research Node – SSRN

PUBLICATIONS

Journal Articles

- 2024 Fowler, C.S., **Gaboardi, J.D.**, Schroeder, J.P., and Van Riper, D.C. *Optimized spatial information for 1990, 2000, and 2010 U.S. census microdata*. Scientific Data. 11 (37). DOI: 10.1038/s41597-023-02859-9
- 2022 Feng, X., Barcelos, G., **Gaboardi, J.D.**, Knaap, E., Rey, S.J., and Wei, R. *spopt: a python package for solving spatial optimization problems in PySAL*. Journal of Open Source Software. 7(74) 3330. DOI: 10.21105/joss.03330
- 2021 Rey, S.J., Anselin, L., Amaral, P., Arribas-Bel, D., Cortes, R.X., **Gaboardi, J.D.**, Knaap, E., Kang, W., Li, Z., Lumnitz, S., Oshan, T.M., Shao, H., and Wolf, L.J. *The PySAL Ecosystem: Philosophy and Implementation*. Geographical Analysis. (54) 467-487. DOI: 10.1111/gean.12276
- 2021 **Gaboardi, J.D.**, Rey, S.J., and Lumnitz, S. *spaghetti: spatial network analysis in PySAL*. Journal of Open Source Software. 6(62) 2826. DOI: 10.21105/joss.02826
- 2021 **Gaboardi, J.D.**, Folch, D.C., and Horner, M.W. *Connecting Points to Spatial Networks: Effects on Discrete Optimization Models*. Geographical Analysis. (52) 299-322. DOI: 10.1111/gean.12211
- 2020 Lumnitz, S., Arribas-Bel, D., Cortes, R.X., **Gaboardi, J.D.**, Greiss, V., Kang, W., Oshan, T.M., Wolf, L.J., and Rey, S.J. *spplot - visual analytics for spatial statistics*. Journal of Open Source Software. 5(47) 1882. DOI: 10.21105/joss.01882

Conference Papers

- 2025 **Gaboardi, J.D.**, Tuccillo, J.V., Isber, J., and Dunkley, J.M. *Producing High-fidelity Synthetic Population Ensembles at Scale*. 3rd Annual Conference of the US Research Software Engineer Association (US-RSE'25). Philadelphia, PA. October 2025. *In Submission*
- 2025 Fleischmann, M., Vybornova, A., **Gaboardi, J.D.**, Brázdová, A. and Dančejová, D. *Adaptive continuity-preserving simplification of street networks*. 33rd Annual GIS Research UK Conference (GISRUK). DOI: 10.5281/zenodo.15229590
- 2025 Bearman, N., **Gaboardi, J.D.**, Roddy, P.J., Zhao, Q., Chen, H., and Wolf, L.J. *Location-allocation and public transit: An update on UCL student teacher placements*. 33rd Annual GIS Research UK Conference (GISRUK). DOI: 10.5281/zenodo.15231178
- 2024 De, D., Thakur, G.M., McGaha, J., Brown, C., Nie, X., Thomas, T., **Gaboardi, J.D.**, Sparks, K., Burger, A., McBride, E.C., Kim, J.-S., Amichi, L., Gunaratne, C., Christopher, S.C., and Zubko, D. *DICER: Data Intensive Computing Environment and Runtime for Evaluating Unprecedented Scale of Geospatial-Temporal Human Mobility Data*. 25th IEEE International Conference on Mobile Data Management (MDM), Brussels, Belgium. 139-148. DOI: 10.1109/MDM61037.2024.00037
- 2024 Kim, J.-S., Thakur, G.M., Amichi, L., Burger, A., Gunaratne, C., Tuccillo, J.V., Hauser, T., Bentley, J., Sparks, K., De, D., Brown, C., McBride, E.C., McGaha, J., **Gaboardi, J.D.**, Nie, X., and Christopher,

- S.C. *HumoNet: A Framework for Realistic Modeling and Simulation of Human Mobility Network*. 25th IEEE International Conference on Mobile Data Management (MDM), Brussels, Belgium. 185-194. DOI: 10.1109/MDM61037.2024.00042
- 2023 Tuccillo, J.V., and **Gaboardi, J.D.** *Spatial Microsimulation and Activity Allocation in Python: An Update on the Likeness Toolkit*. Proceedings of the 22nd Python in Science Conference. 93–100 DOI: 10.25080/gerudo-f2bc6f59-00c
- 2023 Bearman, N., Xu, R., Roddy, P.J., **Gaboardi, J.D.**, Zhao, Q., Chen, H., and Wolf, L.J. *Developing capacitated p-median location-allocation in the spopt library to allow UCL student teacher placements using public transport*. AGILE: GIScience Series. Volume 4, 1–7 DOI: 10.5194/agile-giss-4-20-2023
- 2023 Tuccillo, J.V., and **Gaboardi, J.D.** *Likeness: a toolkit for connecting the social fabric of place to human dynamics*. Proceedings of the 21st Python in Science Conference. 125–135 DOI: 10.25080/majora-212e5952-014

Working Papers & Pre-prints

- 2025 Fleischmann, M., Vybornova, A., **Gaboardi, J.D.**, Brázdová, A. and Dančejová, D. *Adaptive continuity-preserving simplification of street networks*. arXiv::cs.CY. DOI: 10.48550/arXiv.2504.16198
- 2020 **Gaboardi, J.D.** *Validating Abstract Representations of Spatial Population Data while considering Disclosure Avoidance*. Center for Economic Studies, U.S. Census Bureau. DOI: 10.5281/zenodo.3677162

Reports, etc.

- 2025 Tuccillo, J.V., Cunningham, A.R., **Gaboardi, J.D.**, and Buck, W.J. *Initial Mobility Analysis for ORNL VA-EDH Synthetic Populations*. ORNL Report.

RESEARCH SOFTWARE DEVELOPMENT¹

- 2024– Research Team on Urban Structure
- `neatnet`^c – Street geometry processing toolkit
- 2021– Likeness: A Python toolkit for connecting the social fabric of place to human dynamics
- `likeness-vitals`^c – Shared utility functionality for Likeness modules.
 - `livelike`^c – Vivid Synthetic Populations
 - `pymedm`^c – Penalized Maximum-Entropy Dasymetric Modeling (P-MEDM) in Python
 - `pmedm-legacy`^c – Python-R Bridge to PMEDMrcpp
- 2015– PySAL: Python Spatial Analysis Library
- `spaghetti`¹ – Spatial Graphs: Networks, Topology, & Inference
 - `spopt`^c – Spatial Optimization
 - `momepy`^c – Urban Morphology Measuring Toolkit

EDITORIAL APPOINTMENTS

Academic Journals

- 2025– Journal of Open Source Software
Topic Editor

¹lead developer as ¹ & co-author and/or co-maintainer as ^c

INVITED TALKS

Seminars²

- 2024 Capabilities and Applications of the UrbanPop Spatial Microsimulation Framework. *United States Census Bureau's GEO Seminar Series*. Webinar. ❖
- 2023 Open-Source Software for Population Modeling and Spatial Optimization: Making Decision Support More Accessible. *Inha University Graduate School of Logistics: BK21 Spring 2023 Lecture Series*. 10.5281/zenodo.15343358
- 2022 Connecting Vivid Population Data to Human Dynamics. *Distilling Diversity: DecisionScience@ORNL*. Oak Ridge National Laboratory. 10.5281/zenodo.6607532
- 2021 Validation of Abstract Population Representations. *Oak Ridge National Laboratory*.

HONORS, AWARDS, & GRANTS

Honors

- 2019 Student Paper Competition (2nd Place). *American Association of Geographers: Spatial Analysis & Modeling Specialty Group*.
- 2017 Dissertation Mentorship Program. *Center for Economic Studies*. United States Census Bureau.
- 2015 Outstanding PhD Student. *Florida State University*. Department of Geography. \$300.

Awards

- 2022 Optimisation of teacher training placement allocations using spopt. AGILE 2023 – GitHub Repo.
- 2019 Travel Award. *American Association of Geographers Spatial Analysis & Modeling Specialty Group*. \$250.

Grants

- 2018-19 Research Travel Grants. *Atlanta Research Data Center*. \$1,966.
- 2017 Sponsored Travel. *NSF Census Research Network Meeting*. Washington, DC.
- 2015-19 Conference Presentation Grants. *Florida State University*. \$4,350.

CONFERENCE ACTIVITY

Program Committees

- 2023 22nd Python in Science Conference.

Sessions Organized

- 2019 Automated GISci for Network-based Decisions. *2019 American Association of Geographers Annual Meeting*. Washington D.C., USA.
- 2018 Automated GISci for Network-based Decisions: Session I. *2018 American Association of Geographers Annual Meeting*. New Orleans, USA.
- 2018 Automated GISci for Network-based Decisions: Session II. *2018 American Association of Geographers Annual Meeting*. New Orleans, USA.
- 2017 Automated GISci for Network-based Decisions. *2017 American Association of Geographers Annual Meeting*. Boston, USA.

²Non-presenting author denoted by ❖.

Sessions Chaired/Moderated

- 2017 GeoComputation II: Networks. *North American Regional Science Council*. Vancouver, BC, Canada.
- 2016 Location & Spatial Analysis I. *North American Regional Science Council*. Minneapolis, MN, USA.

Workshops & Tutorials

- 2022 Understanding the Structure of Cities through the Lens of Data. *Spatial Data Science Symposium*. (Virtual). GitHub Repo.

Invited Panelist

- 2018 Future of open source package of spatial analysis – PySAL. *2018 American Association of Geographers Annual Meeting*. New Orleans, USA.
- 2015 Careers in Public Policy. *College of Social Sciences and Public Policy*. Florida State University. Tallahassee, USA.

Presentations

- 2025 Producing High-fidelity Synthetic Population Ensembles at Scale. *3rd Annual Conference of the US Research Software Engineer Association (US-RSE'25)*. Philadelphia, PA. October 2025. *In Submission*.
- 2025 Synthetic Population Ensembles for Small Area Estimation. *3rd Annual Conference of the US Research Software Engineer Association (US-RSE'25)*. Philadelphia, PA. October 2025. *In Submission*. ❖
- 2025 Using Synthetic Populations to Model Travel Burdens among US Veterans Health Administration Patients. *2025 ACS Data Users Conference*. Washington, D.C., USA (Virtual). ❖
- 2025 Adaptive continuity-preserving simplification of street networks. *33rd Annual GIS Research UK Conference*. Bristol, UK. 10.5281/zenodo.15229590 ❖
- 2025 Location-allocation and public transit: An update on UCL student teacher placements. *33rd Annual GIS Research UK Conference*. Bristol, UK. 10.5281/zenodo.15231178 ❖
- 2024 DICER: Data Intensive Computing Environment and Runtime for Evaluating Unprecedented Scale of Geospatial-Temporal Human Mobility Data. *25th IEEE International Conference on Mobile Data Management (MDM)*. Brussels, Belgium. 10.1109/MDM61037.2024.00037 ❖
- 2024 HumoNet: A Framework for Realistic Modeling and Simulation of Human Mobility Network. *25th IEEE International Conference on Mobile Data Management (MDM)*. Brussels, Belgium. 10.1109/MDM61037.2024.00042 ❖
- 2024 Examining Food Access Disparities using Spatial Microsimulation. *Population Association of America 2024 Annual Meeting*. Columbus, OH, USA. 10.5281/zenodo.11060894 ❖
- 2023 Developing capacitated p -median location-allocation in the `spopt` library to allow UCL student teacher placements using public transport. *26th AGILE Conference on Geographic Information Science "Spatial Data for Design"*. Delft, the Netherlands (Virtual). ❖
- 2023 Bridging population, activity space, and social interactivity with the Likeness software stack. *2023 ACS Data Users Conference*. Washington, D.C., USA (Virtual). 10.5281/zenodo.10011877 ❖
- 2023 Spatial Microsimulation and Activity Allocation for Examining COVID-19 Vaccine Access Profiles. *2023 American Association of Geographers Annual Meeting*. Denver, CO, USA (Virtual). 10.5281/zenodo.7768809
- 2023 Demographic characterization of human dynamics models with time-use and travel surveys. *2023 American Association of Geographers Annual Meeting*. Denver, CO, USA. 10.5281/zenodo.7853704 ❖
- 2022 Examining COVID-19 Vaccine Access Profiles through Spatial Microsimulation and Activity Allocation. *North American Regional Science Council*. Montreal, Canada. 10.5281/zenodo.7335794 ❖

- 2022 Likeness: a Python toolkit for connecting the social fabric of place to human dynamics. *GeoPython*. Basel, Switzerland (Virtual). 10.5281/zenodo.6685086
- 2022 Simulating Travel to Points of Interest for Demographically-rich Synthetic Populations. *2022 American Association of Geographers Annual Meeting*. (Virtual). 10.5281/zenodo.6335783
- 2019 Validation of Abstract Population Representations. *Atlanta Research Data Center Annual Research Conference at Vanderbilt University (ARDC)*. Nashville, TN, USA. 10.5281/zenodo.4287456
- 2019 A Polygon-Based Approach to Spatial Network Allocation. *2019 American Association of Geographers Annual Meeting*. Washington, D.C., USA.
- 2018 A Polygon-Based Approach to Spatial Network Allocation. *North American Regional Science Council*. San Antonio, TX, USA.
- 2018 A Polygon-Based Approach to Spatial Network Allocation. *2018 American Association of Geographers Annual Meeting*. New Orleans, LA, USA.
- 2017 Connecting Points to Spatial Networks: Effects on Discrete Spatial Network Optimization Models. *North American Regional Science Council*. Vancouver, BC, Canada.
- 2017 An Out-of-Core Computational Approach to the Transportation Problem. *2017 American Association of Geographers Annual Meeting*. Boston, MA, USA.
- 2016 The Effects of Centroid Connector Density on the p -median and p -center Discrete Spatial Network Optimization Models. *North American Regional Science Council*. Minneapolis, MN, USA.
- 2016 Automating Multiple Single-Objective Spatial Optimization Models for Efficiency and Reproducibility. *2016 American Association of Geographers Annual Meeting*. San Francisco, CA, USA.
- 2015 Network-Based Model Building for Discrete Location Allocation in Python: Integrating PySAL and Gurobi. *Seven Hills User Group Annual Conference*. Tallahassee, FL, USA.
- 2015 Network-Based Model Building for Discrete Location Allocation in Python: Integrating PySAL and Gurobi. *North American Regional Science Council*. Portland, OR, USA.
- 2015 The Effects of Centroid Connector Density on Spatial Network Optimization Models. *American Association of Geographers*. Chicago, IL, USA.
- 2014 The Effects of Centroid Connector Density on Spatial Network Optimization Models. *Seven Hills User Group Annual Conference*. Tallahassee, FL, USA.

Posters

- 2024 Examining Food Access Disparities using Spatial Microsimulation. *Population Association of America 2022 Annual Meeting*, Columbus, Ohio, USA. DOI: 10.5281/zenodo.11060894 ✧
- 2023 Spatial Microsimulation and Activity Allocation in Python: An Update on the Likeness Toolkit. *22nd Scientific Computing with Python*. Austin, TX, USA. DOI: 10.25080/gerudo-f2bc6f59-01a
- 2022 New Insights into the Tightly Coupled Social Fabric of the Built Environment. *American Geophysical Union*. Chicago, IL, USA. ✧
- 2022 Likeness: a toolkit for connecting the social fabric of place to human dynamics. *22st Scientific Computing with Python*. Austin, TX, USA. DOI: 10.25080/majora-212e5952-02d
- 2022 Optimized Spatial Census Information Linked Across Time (OSCILAT): Improving the spatial accuracy of 1990, 2000, and 2010 census microdata. *Population Association of America 2022 Annual Meeting*. Atlanta, GA (Virtual), USA. DOI: 10.5281/zenodo.6596527

SERVICE

Academic Journal Peer Review

Environment and Planning B: Urban Analytics and City Science

Gates Open Research Foundation

Geographical Analysis

Journal of Geographical Systems

Journal of Open Source Software

International Journal of Applied Earth Observation and Geoinformation

International Journal of Geographical Information Science

Networks and Spatial Economics

Social Science Japan Journal

Spatial Economic Analysis

Sustainability

Transportation Research Record

Academic Press Peer Review

Chapman & Hall (CRC Press)

Open Reviews

- 2024 **Gaboardi, J.D.** Peer Review Report For: *Simulated data for census-scale entity resolution research without privacy restrictions: a large-scale dataset generated by individual-based modeling* [version 1; peer review: 1 approved, 1 approved with reservations, 1 not approved]. Gates Open Research. 8:36. DOI: 10.21956/gatesopenres.16769.r37051
- 2022 Kucharski, R., Fleischmann, M., and **Gaboardi, J.D.** Peer Review Report For: *DRSP-Sim: A Simulator for Ride-Sharing with Pooling: Joint Matching, Pricing, Route Planning, and Dispatching*. Journal of Open Source Software. Rejected. Review: [openjournals/joss-reviews#3761](https://openjournals.org/joss-reviews#3761)
- 2022 **Gaboardi, J.D.**, Mary, B., and Fleischmann, M. Peer Review Report For: *TessPy: a python package for geographical tessellation*. Journal of Open Source Software. 7(76) 4620. DOI: doi.org/10.21105/joss.04620. Review: [openjournals/joss-reviews#4620](https://openjournals.org/joss-reviews#4620)
- 2021 **Gaboardi, J.D.**, Graser, A., and Fleischmann, M. Peer Review Report For: *TransBigData: A Python package for transportation spatio-temporal big data processing, analysis and visualization*. Journal of Open Source Software. 7(71) 4021. DOI: doi.org/10.21105/joss.04021. Review: [openjournals/joss-reviews#4021](https://openjournals.org/joss-reviews#4021)

Mentorship

- 2023 Google Summer of Code: Rongbo Xu. *[PySAL - spopt Development] P-Median Model with Near-Far Cost Allocation: Guided by Tobler's Law*. Mentors: Wolf, L.J. **Gaboardi, J.D.**, Rey, S.J., Zhao, Q., and Barcelos, G.
- 2022 Google Summer of Code: Gabriel Agostini. *[pysal] Morphological Street Network Simplification*. Mentors: Fleischmann, M., **Gaboardi, J.D.**, and Veytia, A.M.
- 2022 Google Summer of Code: Greg Maya. *Street Network Simplification: A combined approach*. Mentors: Fleischmann, M., **Gaboardi, J.D.**, and Veytia, A.M.
- 2022 Google Summer of Code: Erin Olson. *Facility Location Modeling (spopt) Package Development*. Mentors: Wolf, L.J., **Gaboardi, J.D.**, and Zhao, Q.

2021 Google Summer of Code: Germano Barcelos dos Santos. *PySAL – Open Source Facility Location Modeling (spopt)*. Mentors: Wolf, L.J., Zhao, Q., and **Gaboardi, J.D.**

University

Graduate Representative *22nd Congress of Graduate Students*. Florida State University.
Graduate Representative *Faculty Senate Library Committee*. Florida State University.
Liaison *Geography & Environmental Studies Student Assoc.* Florida State University.
Member *University Libraries Grad. Advisory Board*. Florida State University.
Member *University Libraries Grad. Advisory Council*. Florida State University.

Other

Member *Code of Conduct Committee*. PySAL.
Member *Steering Council*. PySAL.
Secretary *Florida Surveying & Mapping Society*. Northwest Florida Chapter.

COURSES TAUGHT

Florida State University

Instructor of Record Spatial Data Analysis
Instructor of Record Introduction to GIS
Instructor of Record World Regional Geography
Lab Instructor Introduction to GIS
Teaching Assistant Map Analysis
Teaching Assistant Florida GIS Applications
Teaching Assistant Physical Geography

ACADEMIC & PROFESSIONAL ASSOCIATIONS

Current

American Association of Geographers
United States Research Software Engineer Association

Past

Florida Surveying & Mapping Society
Mathematical Optimization Society
Population Association of America
Regional Science Association International
Seven Hills Regional User Group

CREDENTIALS

U.S. Federal Government

U.S. Census Bureau Special Sworn Status

CORE SOFTWARE COMPETENCIES

Research Software Engineering

Programming Languages	Python, Bash, R
Scientific Python Stack	NumPy, SciPy, Pandas, Matplotlib, Shapely, JupyterLab, GeoPandas, Dask, NetworkX, OSMnx, PuLP, pytest
Version Control Systems	git, GitHub, GitLab
Virtualization & Scaling	Docker, Prefect
Geographic Information UI	QGIS, TransCAD
Typesetting & Text	L ^A T _E X, Markdown, reStructuredText

GRADUATE COURSEWORK

Facility Location & Spatial Optimization	Facility Location in Operations Research
High Performance Spatial Computing	Spatial Algorithms on Restricted-use Data
Network Analysis in Python	GIS Programming with Python
Advanced Network Analysis in Python	Spatial Optimization & Racial Segregation
Spatial Modeling in GIS	Transport Geography
Network Allocation	Spatial Databases
Smart Cities	GIS in Social Science
Social Vulnerability to Natural Hazards	Responsible Research & Ethical Conduct
Land Surveying Methods	Remote Sensing
Geographic Research Methods	Geographic Thought
Urban & Regional Information Systems	Advanced GIS
Quantitative Geography	Intro GIS
Professional Development in Geography	Writing in the Sciences

OTHER PROFESSIONAL EXPERIENCE

2015	GIS Consultant – <i>Marquis Software</i> . Tallahassee, FL, USA.
2014	Technical Rover – <i>Leon County Supervisor of Elections</i> . Tallahassee, FL, USA.
2014	GIS Technician – <i>Citizens Property Insurance</i> . Tallahassee, FL, USA.
2009-12	Eiken Specialist – <i>STEP</i> . Tokyo, Japan.
2008	Marketing Communications Specialist – <i>Oracle</i> . Tokyo, Japan.

PERSONAL INFORMATION

Service

Organizer *Room to Read/Beers for Books*. Tokyo, Japan.

Volunteer *Hillcrest School for Exceptional Children*. Ocala, FL, USA.

Volunteer *Imbodenhuus St. Gallen*. St. Gallen, Switzerland.

Languages

English Native

German Elementary

Italian Elementary

Japanese JLPT N₃

Spanish Elementary

Citizenship & Residency

Born

Ocala, Florida, USA

Citizenship

USA

Resided

USA Florida & Georgia

Italia (Italy) Sicilia (Sicily)

日本 (Japan) 神奈川県 (Kanagawa) & 特別23区 (Tokyo)

Schwiiz (Switzerland) St. Gallen & Thurgau