

ALEXANDER C. MICHELS

CURRICULUM VITAE

CONTACT INFORMATION

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RESEARCH INTERESTS

- CyberInfrastructure & HPC
- Health Geography
- CyberGIS & GIScience
- Spatial Analysis & Statistics
- Environmental Data Science & Justice
- Urban Informatics

EDUCATION

- Ph.D. University of Illinois Urbana-Champaign, Urbana, IL. 2025 (expected)
Informatics, Spatial concentration, **Advisor:** Dr. Shaowen Wang
- M.S. University of Illinois Urbana-Champaign, Urbana, IL. 2024
Geography
- B.S. Westminster College, New Wilmington, PA. 2019
Mathematics and Financial Economics

PUBLICATIONS (*underline indicates student mentee*)

Journal Articles Under Review

- [R3] **A. Michels**, J. Park, J.-Y. Kang, and S. Wang. “An Areal Approach to Spatial Accessibility Analysis”. *Geographical Analysis* (under review).
- [R2] **A. Michels**, C. Vogiatzis, and S. Wang. “Road Infrastructure Inequity in the Conterminous United States Revealed with a Scalable Geospatial Computing Approach”. *Scientific Reports* (under review).
- [R1] F. Lyu, E. Zhu, Y. Song, X. Ma, **A. Michels**, Y. Kang, and S. Wang. “Quantifying Urban Retrofitting: Where, When and What”. *Annals of AAG* (under review).

Journal Articles

- [J8] **A. Michels**, A. Padmanabhan, Z. Xiao, M. Kotak, F. Baig, and S. Wang. “CyberGIS-Compute: Middleware for democratizing scalable geocomputation”. *SoftwareX* 26 (2024). DOI: 10.1016/j.softx.2024.101691.
- [J7] **A. Michels**, J. Park, J.-Y. Kang, and S. Wang. “SPASTC: A Spatial Partitioning Algorithm for Scalable Travel-time Computation”. *International Journal of Geographical Information Science* 38.5 (2024). DOI: 10.1080/13658816.2024.2326445.

- [J6] **A. Michels**, A. Padmanabhan, Z. Li, and S. Wang. “EasyScienceGateway: A new framework for providing reproducible user environments on science gateways”. *Concurrency and Computation: Practice and Experience* 36.4 (Oct. 2023). DOI: 10.1002/cpe.7929.
- [J5] J. Park, **A. Michels**, F. Lyu, S. Y. Han, and S. Wang. “Daily Changes in Spatial Accessibility to ICU Beds and Their Relationship with the Case-Fatality Ratio of COVID-19 in the State of Texas, USA”. *Applied Geography* (Mar. 2023). DOI: 10.1016/j.apgeog.2023.102929.
- [J4] J.-Y. Kang, B. F. Farkhad, M.-p. S. Chan, **A. Michels**, D. Albarracin, and S. Wang. “Spatial Accessibility to HIV Testing, Treatment, and Prevention Services in Illinois and Chicago, USA”. *PLOS ONE* 17.7 (July 2022). DOI: 10.1371/journal.pone.0270404.
- [J3] **A. Michels**, J.-Y. Kang, and S. Wang. “Particle Swarm Optimization for Calibration in Spatially Explicit Agent-Based Modeling”. *Journal of Artificial Societies and Social Simulation* 25.2 (Mar. 2022). DOI: 10.18564/jasss.4796.
- [J2] J.-Y. Kang, **A. Michels**, A. Crooks, J. Aldstadt, and S. Wang. “An integrated framework of global sensitivity analysis and calibration for spatially explicit agent-based models”. *Transactions in GIS* 26.1 (Sept. 2021). DOI: 10.1111/tgis.12837.
- [J1] J.-Y. Kang, **A. Michels**, F. Lyu, S. Wang, N. Agbodo, V. L. Freeman, and S. Wang. “Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA”. *International Journal of Health Geographics* (2020). DOI: 10.1186/s12942-020-00229-x.

Peer-Reviewed Conference Papers

- [C8] **A. Michels**, M. Kotak, A. Padmanabhan, J. Speaks, and S. Wang. “Providing Accessible Software Environments Across Science Gateways and HPC”. *Practice and Experience in Advanced Research Computing 2024: Human Powered Computing*. PEARC '24. Providence, RI, USA: Association for Computing Machinery, 2024. DOI: 10.1145/3626203.3670614.
- [C7] **A. Michels**, M. Kotak, A. Padmanabhan, and S. Wang. “Streamlined HPC Environments with CVMFS and CyberGIS-Compute”. *I-GUIDE Forum 2023*. Oct. 2023. DOI: 10.5703/1288284317677.
- [C6] **A. Michels** and S. Wang. “An Agent-Based Modeling Approach to Spatial Accessibility”. *I-GUIDE Forum 2023*. Oct. 2023. DOI: 10.5703/1288284317670.
- [C5] I. Haqiqi, W. Hu, R. Kumaran, P.-C. Li, N. Manning, **A. Michels**, A. Nassar, J. Park, J. Shi, A. Tonks, and Z. Wang. “I-GUIDE Climbers: A Model for Multidisciplinary Academic Labs for Early Career Development”. *I-GUIDE Forum 2023*. Oct. 2023. DOI: 10.5703/1288284317667.
- [C4] **A. Michels**, J. Park, B. Li, J.-Y. Kang, and S. Wang. “Impacts of Catchments Derived from Fine-Grained Mobility Data on Spatial Accessibility”. *12th International Conference on Geographic Information Science (GIScience 2023)*. Vol. 277. Sept. 2023. DOI: 10.4230/LIPIcs.GIScience.2023.52.
- [C3] F. Baig, **A. Michels**, Z. Xiao, S. Y. Han, A. Padmanabhan, Z. Li, and S. Wang. “CyberGIS-Cloud: A Unified Middleware Framework for Cloud-Based Geospatial Research and Education”. *Practice and Experience in Advanced Research Computing*. PEARC '22.

Boston, MA, USA: Association for Computing Machinery, 2022. DOI: 10.1145/3491418.3535148.

- [C2] **A. Michels**, J.-Y. Kang, and S. Wang. “An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient Using the ALMA Framework”. *Proceedings of the 3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. GeoSim '20. Seattle, Washington: ACM, 2020. DOI: 10.1145/3423335.3428167.
- [C1] J.-Y. Kang, J. Aldstadt, **A. Michels**, R. Vandewalle, and S. Wang. “CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling: A Case Study on Influenza Transmission”. *GeoSim '19: Proceedings of the 2nd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. Chicago, Illinois: ACM, 2019. DOI: 10.1145/3356470.3365531.

Conference Abstracts

- [A4] Z. Li, **A. Michels**, A. Padmanabhan, A. Nassar, D. G. Tarboton, and S. Wang. “CyberGIS-Jupyter for Water - An Open Geospatial Computing Platform for Collaborative Water Research”. *AGU Fall Meeting Abstracts*. Vol. 2022. Dec. 2022.
- [A3] A. Padmanabhan, Z. Xiao, R. Vandewalle, F. Baig, **A. Michels**, Z. Li, and S. Wang. “CyberGIS-Compute for Enabling Computationally Intensive Geospatial Research”. *SpatialAPI'21: Proceedings of the 3rd ACM SIGSPATIAL International Workshop on APIs and Libraries for Geospatial Data Science*. Nov. 2021. DOI: 10.1145/3486189.3490017.
- [A2] **A. Michels**, A. Padmanabhan, Z. Li, and S. Wang. “Towards Reproducible Research on CyberGISX with Lmod and Easybuild”. *Gateways 2021*. Oct. 2021. DOI: 10.5281/zenodo.5569659.
- [A1] A. Padmanabhan, Z. Xiao, R. Vandewalle, **A. Michels**, and S. Wang. “Enabling Computationally Intensive Geospatial Research on CyberGIS-Jupyter with CyberGIS-Compute”. *Gateways 2021*. Zenodo, Oct. 2021. DOI: 10.5281/zenodo.5570056.

RESEARCH FUNDING

- 2024 Social Determinants Of Health (SDOH) & Place Fellowship, Healthy Regions & Policies Lab
- 2023 PI (Co-PI: Dr. Shaowen Wang), 400,000 credits. Advanced Cyberinfrastructure Coordination Ecosystem: Services & Support (ACCESS)
ACCESS Explore Allocation for “SPACTS: a spatial partitioning algorithm for computing travel-time zones at scale” (CIS230031)
- 2022 SESYNC Graduate Research Fellow, National Socio-Environmental Synthesis Center (SESYNC)

AWARDS

- 2024 First Place, Data Visualization Competition, Data Science for Everyone Workshop, Practice and Experience in Advanced Research Computing (PEARC) 2024
- 2023 Teacher Ranked as Excellent By Their Students, Center for Innovation in Teaching & Learning
- 2023 Student of the Year 2022, CyberGIS Center

- 2020 Third Place, UIUC GIS Day Virtual Student Poster Competition, UIUC Department of Geography & Geographic Information Systems
- 2020 Computational Research Techniques Fellowship, Texas Advanced Computing Center (TACC)
- 2020 First Place, Robert Raskin Student Competition, Cyberinfrastructure Group, American Association of Geographers (AAG)
- 2019 UCGIS Prize for Advances in Geospatial Problem Solving, American Association of Geographers (AAG) / University Consortium for Geographic Information Science (UCGIS)

SELECTED PRESENTATIONS

Invited Talks

- 2024 “I-GUIDE Platform” with Dr. Anand Padmanabhan. *I-GUIDE Summer School 2024: Leveraging AI for Environmental Sustainability*. Boulder, CO. Aug 6, 2024.
- 2023 “CyberGIS-Compute: Geospatial Middleware for Simplifying Access to High-Performance Computing” with Dr. Furqan Baig. *Accelerating Computing for Emerging Sciences (ACES) Workshop 2023*. League City, TX. Jul 15, 2023.
- 2022 “CyberGIS-Compute: Enabling Simplified Access to High Performance Computing for your Geospatial Computation” with Dr. Anand Padmanabhan. *NSF Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) - Virtual Consulting Office*. Virtual. Nov. 2, 2022.
- 2022 “CyberGIS-Compute: Geospatial Middleware for Simplifying Access to High-Performance Computing” with Dr. Anand Padmanabhan. *NSF Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) - Virtual Consulting Office*. Virtual. Jul 27, 2022.

Conference Talks

- 2024 “Providing Accessible Software Environments Across Science Gateways and HPC”. *Practice and Experience in Advanced Research Computing (PEARC)*, Providence, RI. Jul 24, 2024
- 2024 “Spatial Accessibility with Machine-Learned Driving Times”. *Social Determinants Of Health (SDOH) & Place Symposium*, Chicago, IL. Jun 15, 2024
- 2024 “Putting the Area in Catchment Areas: An Areal Approach to Spatial Accessibility Analysis”. *American Association of Geographers (AAG) Annual Meeting*, Honolulu, HI. Apr 16, 2024
- 2023 “Streamlined HPC Environments with CVMFS and CyberGIS-Compute”. *I-GUIDE Forum*, New York City, NY. Oct 6, 2023
- 2023 “An Agent-Based Modeling Approach to Spatial Accessibility”. *I-GUIDE Forum*, New York City, NY. Oct 5, 2023
- 2023 “Impacts of Catchments Derived from Fine-Grained Mobility Data on Spatial Accessibility”. *International Conference on Geographic Information Science (GIScience)*, Leeds, UK. Sept 13, 2023

- 2023 “Exploring Road Infrastructure Inequities Across the Conterminous U.S.”. *American Association of Geographers (AAG) Annual Meeting*, Denver, CO. Mar 25, 2023
- 2022 “SCAMEL: Spatial Accessibility Analysis at Scale”. *American Association of Geographers (AAG) Annual Meeting*, Virtual. Feb 28, 2022
- 2021 “Towards Reproducible Research on CyberGISX with Lmod and Easybuild”. *Gateways*, Virtual. Oct 21, 2022
- 2020 “An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient using the ALMA Framework”. *3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*, Virtual. Nov 3, 2020
- 2020 “Particle Swarm Optimization for Calibration in Spatially Explicit ABMs”. *American Association of Geographers (AAG) Annual Meeting*, Virtual. Apr 10, 2020

Tutorials & Workshops

- 2023 “Introduction to Git”. *I-GUIDE Summer School 2024: Leveraging AI for Environmental Sustainability*. Boulder, CO. Aug 7, 2024.
- 2023 “Geospatial Knowledge Discovery Harnessing Pre-trained Language Models on CyberGISX” with Zhaonan Wang, Wei Hu, and Anand Padmanabhan. *2023 NSF HDR Ecosystem Conference*. Denver, CO. Oct 17, 2023.
- 2023 “CyberGIS-Compute: Geospatial Middleware for High-Performance Computing” with Anand Padmanabhan and Shaowen Wang. *I-GUIDE Forum 2023*. New York City, NY. Oct 4, 2023.
- 2023 “CyberGIS-Compute: Geospatial Middleware for High-Performance Computing”. *Annual Meeting of the American Association of Geographers (AAG) 2023*. Denver, CO. Mar 24, 2023.

Poster Presentations

- 2023 “CyberGIS-Compute: Middleware for Democratizing Scalable Geocomputation”. *2023 NSF HDR Ecosystem Conference*, Denver, CO. Oct 16, 2023
- 2021 “ScalableAccess: Travel-Time Polygons for Accessibility at Scale”. *UIUC GIS Day*, Champaign, IL. Nov 17, 2021
- 2021 “Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA”. *UIUC SESE Research Review*, Champaign, IL. Apr 23, 2021
- 2020 “Effect of Buyer Preference and Market Composition on the Rent Gradient”. *UIUC GIS Day*, Champaign, IL. Nov 18, 2020
- 2020 “Particle Swarm Optimization for Calibration in Spatially Explicit ABMs”. *UIUC SESE Research Review*, Champaign, IL. Feb 14, 2020
- 2019 “CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling”. *UIUC GIS Day*, Champaign, IL. Nov 13, 2020

TEACHING AND MENTORING

Courses Taught as Instructor of Record

Spring 2023 **Business Location Decisions (GGIS/BADM 205)**
Department of Geography and Geographic Information Science, UIUC

Undergraduate Student Mentees

2023-present Ian Zhang, B.S. in CS+Math, UIUC
2023-present Jeffrey Huang, B.S. in CS+Statistics, UIUC
2023-present John Speaks, B.S. in CS+Linguistics, UIUC
2022-23 Mit Kotak (pursuing Ph.D. at MIT), B.S. in Physics, UIUC
2022-23 Taylor Ziegler (software engineering intern), B.S. in CS, UIUC
2019-22 Zimo Xiao (pursuing MS at CMU), B.S. in CS+GGIS, UIUC

Certificates and Workshops

May 2023 Certificate in Foundations of Teaching, The Center for Innovation in Teaching & Learning, University of Illinois Urbana-Champaign
Jan 2023 Graduate Academy for College Teaching, The Center for Innovation in Teaching & Learning, University of Illinois Urbana-Champaign

SERVICE

Professional Organizations

2022-26 **Director, AAG CyberInfrastructure Specialty Group (CISG)**
2021-22 **Student Director, AAG CyberInfrastructure Specialty Group**

Conferences and Workshops

2024 **Symposium Organizer**, AAG 2024 Symposium on Geospatial Data Science for Sustainability
2024 **Session Organizer**, “Challenges and Opportunities of Spatial Accessibility 1 & 2.” AAG 2024 Symposium on Geospatial Data Science for Sustainability
2023 **Reviewer**, Institute for Geospatial Understanding through an Integrative Discovery Environment (I-GUIDE) Forum
2023 **Symposium Program Co-Chair**, AAG 2023 Symposium on Harnessing the Geospatial Data Revolution for Sustainability Solutions
2023 **Session Chair**, “Data-intensive and Computational Geography,” AAG 2023 Symposium on Harnessing the Geospatial Data Revolution for Sustainability Solutions
2022 **Session Organizer**, “Computation and Uncertainty of Spatial Accessibility,” AAG 2022 Symposium on Data-Intensive Geospatial Understanding in the Era of CyberGIS

Journal Reviewer

- Geocarto International, Taylor & Francis
- International Journal of Geographical Information Science (IJGIS), Taylor & Francis

PROFESSIONAL ASSOCIATIONS

American Association of Geographers (AAG)

Specialty Groups: Applied Geography, Cyberinfrastructure, GIScience & GIS, Health and Medical Geography, Spatial Analysis and Modeling, Transportation Geography

Association for Computing Machinery (ACM)

Campus Research Computing Consortium (CaRCC)

United States Research Software Engineer Association (US-RSE)