

# Alexander C. Michels

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## 🎓 Education

### Ph.D. in Informatics

University of Illinois at Urbana-Champaign

– Pursuing the Spatial Informatics concentration under Dr. Shaowen Wang

📍 Champaign, IL

June 2019 - Present

### B.S. in Mathematics and Financial Economics

Westminster College

– **Honors Thesis:** “Capturing the Predictive Power of Cortical Learning Algorithms”

– Minor in Computer Science — Graduated Cum Laude — Honors in Computer Science and Math — 3.7 GPA

📍 New Wilmington, PA

August 2015 - May 2019

## 📖 Research Interests

- Agent-Based Models
- CyberInfrastructure
- Economic Geography
- High-Performance Computing
- Network Science
- Spatial Analysis

## 🔬 Research Experience

### Research Assistant

CyberGIS Center & Geospatial Information Laboratory (CIGI)

📍 Champaign, IL

June 2019 - Present

- Building cyberinfrastructure using Docker Swarm, Hadoop and Kubernetes clusters. I manage an undergraduate research assistant and maintain the development branch of [CyberGIS-Jupyter](#)
- Programming spatially-explicit models for disease and land-use change

### Informatics Researcher

Institute for Pure and Applied Mathematics at UCLA / Praedicat, Inc.

📍 Los Angeles, CA

June 2018 - August 2018

- Worked for Praedicat, Inc. automating information extraction, classification, and aggregation from web data for business profiling of over 52,600 companies and corporate entities.
- Worked for IPAM to develop a novel algorithm for computational fact-checking on knowledge graphs and a self-supervised machine learning algorithm for sentence importance which outperformed TF-IDF.

## 🏛 Teaching Experience

### Teaching Assistant and Tutor

Westminster College

📍 New Wilmington, PA

August 2015 - December 2018

- Assisted professors in grading, working with students individually, and developing curriculum for classes covering coursework in Calculus, Computer Science, and Operations Research.

## 🏆 Awards

### UIUC GIS Day Virtual Student Poster Competition

“Third Place”

November 2020

UIUC Department of Geography & Geographic Information Systems

### Cyberinfrastructure Specialty Group Robert Raskin Student Competition

“First Place for Research in Geospatial Cyberinfrastructure”

April 2020

American Association of Geographers (AAG)

### UCGIS Prize for Advances in Geospatial Problem Solving

“Advancing Reproducibility in Geospatial Research at the AAG-UCGIS Summer School 2019”

July 2019

AAG-UCGIS

### Best Robot in Division Prize for Senior Unique Division

“Robot in the Division with the lowest Total Final Scores”

April 2018

Trinity Fire Fighting Robot Contest

## North America Award for Level 2

*“The top North American robot in Level 2”*

April 2018

Trinity Fire Fighting Robot Contest

## Dr. Thomas R. Nealeigh Mathematics Scholarship

*“Awarded to an outstanding junior or senior mathematics major”*

March 2018

Westminster College

## COMAP International Mathematical Modeling Competition Honorable Mention

*“excellent modeling and sensitivity analysis”*

January 2017

COMAP International Mathematical Modeling Competition

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## \$ Fellowships & Grants

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### Computational Research Techniques Fellowship

*Awarded funds to attend the TACC Summer Institute on Applied Parallel Programming*

June 2020

TACC

### Financial Opacity and Challenges to Forest Governance in Indonesia and Malaysia

*Graduate Pursuit Member*

February 2020

National Socio-Environmental Synthesis Center (SESYNC)

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## 📖 Publications

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### Peer-Reviewed Publications

Kang, Jeon-Young, Michels, Alexander, Andrew Crooks, Jared Aldstadt, and Shaowen Wang (2021). “An Integrated Framework of Global Sensitivity Analysis and Calibration for Spatially Explicit Agent-Based Models”. In: *Transactions in GIS* Early View.n/a. DOI: <https://doi.org/10.1111/tgis.12837>.

Kang, Jeon-Young, Michels, Alexander C, Fangzheng Lyu, Shaohua Wang, Nelson Agbodo, Vincent L Freeman, and Shaowen Wang (2020). “Rapidly Measuring Spatial Accessibility of COVID-19 Healthcare Resources: A Case Study of Illinois, USA”. In: *International Journal of Health Geographics*. DOI: [10.1186/s12942-020-00229-x](https://doi.org/10.1186/s12942-020-00229-x).

Michels, Alexander, Jeon-Young Kang, and Shaowen Wang (2020). “An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient Using the ALMA Framework”. In: *Proceedings of the 3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. GeoSim '20, pp. 48–51. DOI: [10.1145/3423335.3428167](https://doi.org/10.1145/3423335.3428167).

Kang, J.-Y., J. Aldstadt, A. C. Michels, R. Vandewalle, and S. Wang (2019). “CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling: A Case Study on Influenza Transmission”. In: *GeoSim '19: Proceedings of the 2nd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation*. Ed. by Hamdi Kavak, Joon-Seok Kim, and Sarah Wise, pp. 32–35. DOI: [10.1145/3356470.3365531](https://doi.org/10.1145/3356470.3365531).

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## 🗨 Presentations

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### Oral Presentations

**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*

November 2020

📍 Seattle, WA, virtual

**Particle Swarm Optimization for Calibration in Spatially Explicit ABMs**  
*American Association of Geographers*

April 2020

📍 Denver, CO, virtual

**Capturing the Predictive Power of Cortical Learning Algorithms**  
*National Conference on Undergraduate Research*

April 2019

📍 Atlanta, GA

**Computational Fact-Checking through Knowledge Graphs**  
*AMS Contributed Paper Session at 2019 Joint Mathematics Meeting*

January 2019

📍 Baltimore, MD

**Information Extraction and Aggregation for Business Profiling**  
*Invited Talk at Institute for Pure and Applied Mathematics*

July 2018

📍 Los Angeles, CA

## Decentralizing the World with Blockchain

*Undergraduate Research & Arts Celebration*

*April 2018*

♥ New Wilmington, PA

## Repeated Play Games

*MAA, Allegheny Mountain Section Meeting*

*April 2017*

♥ Pittsburgh, PA

## Optimizing Throughput, Cost, and Safety in Toll Booth Plazas

*Pi Mu Epsilon Regional Conference*

*February 2017*

♥ Youngstown, OH

### Poster Presentations

#### The Effect of Buyer Preference and Market Composition on the Rent Gradient

*UIUC GIS Day*

*November 2021*

♥ Champaign, IL

#### Particle Swarm Optimization for Calibration in Spatially Explicit ABMs

*UIUC SESE Research Review*

*February 2020*

♥ Champaign, IL

#### CyberGIS-Jupyter for Spatially Explicit Agent-based Modeling

*UIUC GIS Day*

*November 2019*

♥ Champaign, IL

#### CyberGIS-Jupyter for Sustainable and Reproducible Geospatial Analytics

*UIUC GIS Day*

*November 2019*

♥ Champaign, IL

#### Computational Fact-Checking through Knowledge Graphs

*Undergraduate Research Poster Session at 2019 Joint Mathematics Meeting*

*January 2019*

♥ Baltimore, MD

#### Agent-Based Simulations for Repeated Play Game Theory

*Undergraduate Research & Arts Celebration*

*April 2017*

♥ New Wilmington, PA



### Professional Associations

#### American Association of Geographers (AAG)

Specialty Groups:

- Cyberinfrastructure
- Socialist and Critical Geography
- Transportation Geography
- Economic Geography
- Spatial Analysis and Modeling



### Professional Service

#### Student Director, AAG CyberInfrastructure Specialty Group (CISG)

*American Association of Geographers (AAG)*

📍 April 2021 - Present



### Skills

📊 **Data Science:** Big Data, G.I.S., Git, Machine Learning, Parallel Programming, Network Science

🔗 **Languages:** Python (& Cython), Bash, Java, C++, R

📦 **Technologies:** Docker, Hadoop (HDFS/Spark/Yarn), Kubernetes, OpenStack, Terraform

💻 **Operating Systems:** Linux (esp. Mint & Ubuntu), Windows