

JUNCHUAN FAN

Phone: (319) 535-0631

Email: fanj@ornl.gov

Website: <https://smart-spatial.com/>

EDUCATION **Ph.D** **University of Iowa**, Geographic Information Science (2017)
Dissertation: “Modeling Space-time Activities and Places for a Smart Environment -- a Semantic Approach”
Advisor: Dr. Kathleen Stewart
Committee: Kathleen Stewart (co-chair), David Bennett (co-chair), Mark Armstrong, James Tamerius, Shih-Lung Shaw, Caglar Koylu

M.S. **University of Iowa**, Computer Science (2015)
Emphasis in data mining

M.S. **Graduate School of Chinese Academy Science**, Geographic Information System and Cartography (2010)
Thesis: “A Web-based Expert System for Remote Sensing Image Interpretation of Earthquake Hazard”
Advisor: Dr. Yalan Liu

B.E. **Wuhan University**, Geomatic Engineering (2007)
Graduated Top 5%, Major GPA: 3.9/4.0

B.S. Minor in Project Management

CURRENT POSITION **Research Scientist, Oak Ridge National Laboratory**

HONORS AND AWARDS **AAG Health Data Visualization Award**, Winner of health and medical geography specialty group health data visualization contest at AAG (2020)

Best Paper Award, Best paper in 1st International Symposium on Spatiotemporal Computing (2015)

Center for Global & Regional Environmental Research Graduate Student Presentation Award, University of Iowa (2015, 2016)

Graduate Student Travel Grant , University of Iowa (2015, 2016)

Outstanding Public Service through SPEC , University of Iowa (2011)

National Scholarship for Outstanding Academic Performance ,Wuhan

University(2007)

Top 3% undergraduate students from the University

**RESEARCH
EXPERIENCE**

Research Scientist, Geospatial Science and Human Security Division

Oak Ridge National Laboratory, 2020-

- Project Lead on “*Semantic Ontology Network for POI Categorization*”
- Project Lead on “*MapSpace: POI-based Multi-scale Global Land Use Modeling*”

Assistant Research Professor, Center for Geospatial Information Science

University of Maryland, College Park, 2019- 2020

- Co-PI: “*NSF RAPID: Using big passively collected location-based data to model mobility pattern changes during the COVID-19 outbreak*”

Postdoc associate, Center for Geospatial Information Science

University of Maryland, College Park, 2017- 2019

- Project lead on “*Data Analytics and Modeling Methods for Tracking and Predicting Origin-Destination Travel Trends based on Mobile Device Data*”
- Project lead on “*Analyzing Traveller’s Response to Different Active Traffic Management Technologies*”
- Project lead on “*Long-Haul Truck Parking Demand in Maryland*”
- Project lead on “*Improved Vehicle Miles Traveled (VMT) Estimation on Non Federal-Aid System Roadways*”

Faculty research associate, Center for Geospatial Information Science

University of Maryland, College Park, 2016-2017

Graduate research assistant, Department of Geography

University of Iowa, Iowa City, 2014-2015, 2010-2012

- Project: *Understanding Unintended Acceleration from Naturalistic Driving Trajectories (2014-2015)*
- Project: *Geospatial Semantic Region Discounting Based on Image (2011-2012)*
- Project: *Campus Facilities Flood Vulnerability Mapping and Analysis (2010-2011)*

Graduate research assistant, Graduate School

Chinese Academy of Science, Beijing, China ,2008-2010

US PATENT

De, D., Gurav, R., **Fan, J.** and Thakur, G., UT Battelle LLC, (2025).
Conflation of geospatial points of interest and ground-level imagery, Part II.

U.S. Patent 124,123,75.

Fan, J., Thakur, G., UT Battelle LLC, (2025). Multi-scale global land use model based on points of interest. US Patent App. 18/946,425.

De, D., Gurav, R., **Fan, J.** and Thakur, G., UT Battelle LLC, (2024). Conflation of geospatial points of interest and ground-level imagery. U.S. Patent 12,008,800.

JOURNAL ARTICLES

Goulet, N., Sun, R., **Fan, J.**, Sujan, V., & Miller, B. (2025). Regional Analysis for an Economically and Environmentally Viable Transition to Heavy-Duty Vehicles with Alternative Powertrains (No. 2025-01-8597). *SAE Technical Paper*.

Sujan, V., Sun, R., Jatana, G., & **Fan, J.** (2025). Hydrogen and Electric Charging Infrastructure for Heavy-Duty Trucks: A Nationally Scalable Megaregion Assessment (No. 2025-01-8608). *SAE Technical Paper*.

Sujan, V., **Fan, J.**, Jatana, G., & Sun, R. (2024). Nationally scalable hydrogen fueling infrastructure deployment: a megaregion analysis and optimization approach. arXiv preprint arXiv:2410.06033.

Fan, J., & Thakur, G., (2024). Global Residential/Non-residential Land Use Map [Dataset]. <https://doi.org/10.17605/OSF.IO/395ZF>

Fan, J., & Thakur, G. (2023). Towards POI-based large-scale land use modeling: spatial scale, semantic granularity, and geographic context. *International Journal of Digital Earth*, 16(1), 430–445. <https://doi.org/10.1080/17538947.2023.2174607>

Fan, J., Bentley, J. & Thakur, G. (2023). SONET++: A Knowledge Graph of Geographic Categories based on OSM Tag Representation. *GIScience Conference 2023*. <https://doi.org/10.17605/OSF.IO/JSYMG>

Thakur, G., Sims, K., Rittmaier, C., Bentley, J., De, D., **Fan, J.**, Liu, T., Palumbo, R., McGaha, J., Nugent, P., Eaton, B., Burdette, J., Sheldon, T., & Sparks, K. (2021). Accelerated Assessment of Critical Infrastructure in Aiding Recovery Efforts during Natural and Human-made Disaster. *GIS: Proceedings of the ACM International Symposium on Advances in Geographic Information Systems*, 12, 195–206. <https://doi.org/10.1145/3474717.3483947>

Thakur, G., & **Fan, J.** (2021). MapSpace: POI-based Multi-Scale Global Land Use Modeling. *GIScience Conference 2021*. <https://doi.org/10.25436/E2Z59N>

Gurav, R., De, D., Thakur, G., & **Fan, J.** (2021). Conflation of Geospatial POI

Data and Ground-level Imagery via Link Prediction on Joint Semantic Graph. *Proceedings of the 4th ACM SIGSPATIAL International Workshop on AI for Geographic Knowledge Discovery*, 4. <https://doi.org/10.1145/3486635>

Zhu, G., Stewart, K., Niemeier, D., & **Fan, J.** (2021). Understanding the drivers of mobility during the covid-19 pandemic in florida, usa using a machine learning approach. *ISPRS International Journal of Geo-Information*, 10(7).

Xia, Z., Stewart, K., & **Fan, J.** (2021). Incorporating space and time into random forest models for analyzing geospatial patterns of drug-related crime incidents in a major U.S. metropolitan area. *Computers, Environment and Urban Systems*, 87, 101599.

Fan, J., Stewart, K. (2021). Understanding collective human movement dynamics during large-scale events using big geosocial data analytics. *Computers, Environment and Urban Systems*, 87 (November 2019), 101605.

Thakur, G., Sparks, K., Berres, A., Tansakul, V., Chinthavali, S., Whitehead, M., Schmidt, E., Xu, H., **Fan, J.**, Spears, D., & Cranfill, E. (2020). COVID-19 Joint Pandemic Modeling and Analysis Platform. *Proceedings of the 1st ACM SIGSPATIAL International Workshop on Modeling and Understanding the Spread of COVID-19, COVID-19 2020*, 43–52.

Kreuter, F., Barkay, N., Bilinski, A., Bradford, A., Chiu, S., Eliat, R., **Fan, J.**, Galili, T., Haimovich, D., Kim, B., LaRocca, S., Li, Y., Morris, K., Presser, S., Sarig, T., Salomon, J. A., Stewart, K., Stuart, E. A., Tibshirani, R. 2020. Partnering with a global platform to inform research and public policy making. *Survey Research Methods*, 14(2), 159-163.

Fan, J., Fu, C., Stewart, K., Zhang, L., 2019. Using Big GPS Trajectory Data Analytics for Vehicle Miles Traveled Estimation. *Transportation Research Part C: Emerging Technologies*. vol 103. 298-307.

Nasri, A., Zhang, L., **Fan, J.**, Stewart, K., Younes, H., Fu, C., Jessberger, S., 2019. Advanced Vehicle Miles Traveled (VMT) Estimation methods for Non Federal-Aid System (NFAS) Roadways Using GPS Vehicle Trajectory Data and Statistical power Analysis. *Transportation Research Record*. 0361198119850790

Stewart, K. and **Fan, J.**, 2018. Geospatial Analysis of Residential Parking Behaviors Using a Semantic Modeling Approach. *Travel Behaviour and Society*, 9-20.

Fan, J. and Stewart, K., 2018. Modeling Mobility and Dynamics of Scheduled Space-time Activities –An RDF Approach. In: S. Shaw and D.Z. Sui, eds.

Human Dynamics Research in Smart and Connected Communities. Springer, Cham, 81–105.

Fan, J. and Stewart, K., 2015. Detecting Spatial Patterns of Natural Hazards from the Wikipedia Knowledge Base. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Volume II-4/W2, 2015
○ **Winner of the best paper award**

Hubbard, S., Stewart, K., and **Fan, J.**, 2014. Modeling spatiotemporal patterns of building vulnerability and content evacuations before a riverine flood disaster. *Applied Geography*, 52, 172–181.

Stewart, K., **Fan, J.**, and White, E., 2013. Thinking about Space-Time Connections: Spatiotemporal Scheduling of Individual Activities. *Transactions in GIS*, 791–807.

Fan, J. and Liu, Y., 2011. Construction of Expert system of earthquake damage recognition based on ASP.NET. *Microcomputer Information*, 27(1), 78-87.

**CONFERENCE
PROCEEDINGS**

Goulet, N., Sun, R., **Fan, J.**, & Sujan, V., (2025) Geographical Analysis of Cost and Carbon Impacts Associated with Electrification of Heavy-duty Trucks in the US. *TRB Annual Meeting*.

Fan, J. and Stewart, K., 2016. Modeling and reasoning about geospatial event dynamics using semantic web technologies. In *Workshop on Spatial Data on the Web, 9th International Conference on Geographic Information Science*.

Fan, J. and Stewart, K., 2014. An Ontology-based Framework for Modeling Movement on a Smart Campus. In *Workshop on Analysis of Movement Data, 8th International Conference on Geographic Information Science*.

Stewart, K., **Fan, J.**, 2012. Spatiotemporal Event Diffusion: A Formal Model and Framework (Position Paper). NCGIA Specialist Meeting on Mapping Ideas.

Fan, J., Liu, Y., Ren, Y., and Hu, L., 2009. Interpretation Feature Database Design for Typical Objects Based on Remote Sensing Images after Wenchuan Earthquake. In: *ACRS: Asian Conference of Remote Sensing*.

Ren, Y.H., Liu, Y.L., **Fan, J.**, Xu, H., and Yi, L., 2009. A study on land cover classification based on HJ-1 CCD image. In: *Geoscience and Remote Sensing Symposium, 2009 IEEE International, IGARSS 2009*.

Zhou, X., Zhang, B., Lei, L., Liu, L., Chen, Z., **Fan, J.**, and Liu, H., 2009.

Variation of albedo with the increased impervious surface in Beijing-Tianjin area of China. *In: Geoscience and Remote Sensing Symposium, 2009 IEEE International, IGARSS 2009.*

**TECHNICAL
REPORT**

Xiong, C., Zhang, L., Stewart, K., **Fan, J.**, Lee, M., and Zhou, W. ,2018. Analyzing Travelers' Response to Different Active Traffic Management (ATM) Technologies (Report No. SP709B4K).

**PRESENTATIONS
AND INVITED
TALKS**

Fan,J., Stewart, K., Apr 2019, Understanding Human Movement Dynamics From Different Socially-sensed Data Sources – a Comparative Analysis, *Association of Geographers Annual Meeting. Washington, D.C.*

Fan,J., Stewart, K., Nov 2018, Understanding Human Mobility from Big Mobile Device Data . *GIS Day Lightning Talk, College Park, MD*

Fan, J., Ratcliff, W., Apr 2018, Doing Good with Data Science, A Case Study: Detecting Mines via Satellite Imagery. *2nd Meeting of INTOSAI Working Group on Big Data. Washington,D.C.*

Fan,J., Fu,C., Stewart, K., Apr 2018, Understanding Spatial Interactions from Estimated VMT using Big GPS Trajectory Data. *American Association of Geographers Annual Meeting. New Orleans, LA*

Fan,J.,Stewart, K.,Fu,C., Apr 2018, Innovations in Geospatial Science: Understanding Human Mobility and More. *Maryland Transportation Institute Launch,Annapolis,MD*

Stewart, K.,Fan,J., Fu,C., Mar 2018, Big Data GPS Trajectory Analysis for Travel Activity Modeling. *Department Colloquium, University of Colorado,Boulder,CO*

Fan,J., Fu,C., Stewart, K., Nov 2017, VMT -- Reconstruct Vehicle Trajectories from Big GPS Waypoints Data . *Center for Geospatial Information Science Inauguration, College Park, MD*

Fan,J., Stewart,K., Sep 2016, Modeling and Reasoning about Geospatial Event Dynamics Using Semantic Web Technologies. *Workshop on Spatial Data on the Web, 9th International Conference on Geographic Information Science. Montreal, Canada*

Fan,J., Stewart,K., Apr 2016, Integrating semantic web technique and social media data for modeling activities and movements on a campus. *American Association of Geographers Annual Meeting. San Francisco, CA*

Fan,J., Stewart,K., Jul 2015, Detecting Spatiotemporal Dynamics from the Wikipedia Knowledge Base. *International Symposium on Spatiotemporal Computing. Fairfax, VA*

Fan,J., Stewart,K., Apr 2015, Semantic Data Modeling for Movement on a Smart Campus. *American Association of Geographers Annual Meeting. Chicago, Illinois*

Fan,J., Stewart,K., Nov 2013, Space-time Scheduling for a Smart Campus. *Department Colloquium, Iowa City, IA*

**TEACHING
EXPERIENCE**

University of Maryland, College Park

Instructor, Object Oriented Programming for GIS (GEOG476), *Fall 2019*

- Senior undergraduate course with 19 students
- Developed course material, labs and exams

University of Maryland, College Park

Instructor, Advanced GIS and Spatial Analysis (GEOG473), *Spring 2018*

- Senior undergraduate course with 46 students
- Developed course material, labs, homework and exams
- Coordinated grading and labs with two teaching assistants

University of Maryland, College Park

Instructor, Processing Geospatial Data Using Open Source Tools (GEOG788O), *Winter 2018*

- Graduate students courses with 10 students, covering the following topics: PostGIS, QGIS, GeoServer, Web Mapping API
- Developed course material, labs and projects

University of Maryland, College Park

Guest Lecture, Introduction to Geodatabase (GEOG373), *Spring 2016*

- Guest lecture on GeoSPARQL and linked data query

University of Iowa, Iowa City

Teaching Assistant, Foundation of GIS (GEOG1050), *Fall 2012, Spring 2013*

- Instructed two lab sessions with 45 students in total
- Graded labs and homeworks

**PROFESSIONAL
AFFILIATIONS**

IEEE, *2020- Present*

American Association of Geographers, *2012-Present*

Chinese Overseas Transportation Association, *2017-Present*

**PROFESSIONAL
SERVICE**

Peer-Reviewed Articles for:

- *Transactions in GIS; GIScience Conference; International Journal of Geographic Information Science; Cartography and Geographic Information Science; ISPRS International Journal of Geo-Information; GeoInformatica; International Journal of Environmental Research and Public Health*

Geospatial Data Scientist Volunteer for Datakind, 2017-2018

- Collaborate with data engineers from Google, Foursquare and develop algorithms to generate spatial features for deep learning model that is trained to detect illicit mining sites in Congo from Landsat8 images

Academic Translation, 2016- 2020

- Help China National Knowledge Infrastructure (CNKI) review and translate research articles in GIScience domain

**COMMUNITY
SERVICE**

Volunteer Tax Assistant, University of Iowa, 2011

- Help new international students prepare tax return

Volunteer English Teacher, Beijing, 2009

- Teach English classes for children of migrant workers

**COMPUTER
SKILLS**

Programming language: Python (proficient), R, Scala, Java, JavaScript, Lisp , C#, VB

Data Analytic Platform: Apache Spark, Pig

Database: PostgreSQL/PostGIS, Oracle Spatial, Microsoft SQL Server, MongoDB, Neo4J, GraphDB

Web Development: OpenLayer API, Google Map API, Leaflet , Mapbox API, Python/Django, HTML/CSS

LANGUAGES

Chinese (Mandarin): Native

English: Fluent