Zihui Ma, Ph.D.

Postdoctoral Research Associate
Department of Civil and Environmental Engineering
University of Maryland College Park
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EDUCATION

University of Maryland College Park

Ph.D. in Civil Engineering 2020 – 2024
Dissertation*: "Natural Language Processing, Social Media and Epidemiological Model for Wildfire Response and Resilience Enhancement"*
Advisor: Gregory B. Baecher, PhD, NAE, Dist.M. ASCE

M.S. in Civil Engineering (concentrate on project management) 2018 – 2020
Thesis*: "Reliability-Based Modeling for Missouri River Dam System"*
Sponsor: U.S. Army Corps of Engineers (USACE)
Advisor: Gregory B. Baecher, PhD, NAE, Dist.M. ASCE

San Francisco State University

M.S. in Civil Engineering (concentrate on structure/seismic engineering) 2015 – 2017
Thesis*: "Real-time Non-intrusive Information Extraction for Highway Trucks"*
Advisor: Zhaoshuo Jiang, PhD, PE, LEED AP

San Francisco State University. and Zhejiang University of Science and Technology

B.S in Civil Engineering 2011 – 2015
Joint degree program
Dean's list student

RESEARCH EXPERIENCE

Postdoctoral Research Associate 2024 Aug –
University of Maryland College Park, Project Management Center for Excellence (65%)
Advisor: Gregory B. Baecher, PhD, NAE, Dist.M. ASCE
Affiliation: Center for Risk and Reliability

- Advanced AI for Wildfire Management and Community Resilience
- Quantitively Analysis of Wildfire Response and Equitable Policy Enforcement
- Multi-modal Approach for Geo-cascading Events Disruptions
- Meta-analysis for Landslide Risk Mapping and Monitoring
- Interstates Healthcare Accessibility Assessment During Hurricanes
- Early Warning for Mental Distress from Exposure to Natural Hazards
- A Fine-tuned Large Language Model for Earthquake Damage Assessment
- Crowdsourcing Approach for Inclusive Urban Planning

University of Maryland College Park, Institute for Systems Research (35%)
Advisors: Mark A. Austin, PhD; Jennifer Golbeck, PhD

- Minerva Research Initiative: Semantic Foundations and Formal Methods for Pre-/Post- Federal Acquisition Regulation (FAR) Practices – Sponsor: U.S. Department of Defense (DoD)
- AI/Machine Learning for Wind Turbine Digital Twin Systems
- Evolutionary System-of-System Architectures for Solar Panel Installation

Graduate Research Assistant 2020 – 2024

University of Maryland College Park, Department of Civil and Environmental Engineering
Advisor*:* Gregory B. Baecher, PhD, NAE, Dist.M. ASCE
Affiliation: Center for Risk and Reliability
Topic*: Human-centered Decision-making and Disaster Informatics*

- Social Computing Approaches for Wildfire Resilience Enhancement (*Dissertation*)
- Data-driven Construction Risk Management Performance Evaluation (*2024 **ASCE Best Paper***) - Sponsor: U.S. Department of Transportation (USDOT) & Federal Highway Administration (FHWA)
- Rapid Earthquake Damage Assessment through Multi-classification Machine Learning (*Feature Paper for 2024 Geo-Risk Conference*)
- Crowdsourcing-based Airport System Robustness Evaluation Framework
- Evaluation of the COVID-19 Lockdown Policy Agreement and Its Associations with Socioeconomic Demographics
- Real-time COVID-19 Vaccine Acceptance Assessment at the State and Couty Levels
- Community Resilience Examination from Behavioral and Mental Perspectives During the NYC Blackout
- Online Social Perceptions of ChatGPT in Higher Education
- Adapting to Change: Evaluating Student Expectations in Online Learning Environments Through the CoI Lens
- Simulation-based Missouri River Dam System Reliability Assessment - Sponsor: U.S. Army Corps of Engineers (USACE)
- Bibliometric Review on 5-year LLM Trends, LLM Applications in Biomedical Research, and NLP of Social Media for Disaster Research

PAPERS IN PREPARATION & PREPRINTS

(*corresponding author)

1. **Ma, Z.**, Hu, G., Lin, T., Li, L., Hu, S., & Baecher, G. B. (2024). Assessing Response Disparities in California Wildland-Urban-Interface (WUI) Cities Using the Compartmental Model. arXiv. http://arxiv.org/abs/2411.09946. Intended for Computers, Environment and Urban Systems (*under review*).
2. Li, L., Hu, S., Dai, Y., Deng, M., Momeni, P., Laverghetta G., Fan, L., **Ma, Z.**, Wang, X., Ma, S., Hemphill, L., & Ligatti, J. (2024). Need more accessible facilities: A crowdsourcing approach through online reviews to inclusive urban design. Intended for Computers, Environment and Urban Systems (*under review*).
3. **Ma, Z.***, Li, L., & John, J. (2023). Thriving in a pandemic: Lessons learned from students' perceptions in a resilient university program seen through the CoI lens, arXiv. https://doi.org/10.48550/arXiv.2310.20183.

4. Li, L., Gao, L., Zhou, J., **Ma, Z.**, Choy, D. F., & Hall, M. A. (2021). Can Social Media Data Be Utilized to Enhance Early Warning: Retrospective Analysis of the U.S. Covid-19 Pandemic (p. 2021.04.11.21255285). https://doi.org/10.1101/2021.04.11.21255285

JOURNAL PAPERS

(*corresponding author)

1. **Ma, Z.***, Li, L., Mao, Y., Wang, Y., Patsy, O. G., Bensi, M. T., Hall, M. A., & Baecher, G. B. (2024). Surveying the use of social media data and natural language processing techniques to investigate natural disasters. *Natural Hazards Review*, vol. 25, no. 4, p. 03124003, Nov. 2024, doi: 10.1061/NHREFO.NHENG-2047.
2. **Ma, Z.***, Li, L., Hemphill, L., Baecher, G. B., & Yuan, Y. (2024). Investigating disaster response for resilient communities through social media data and the Susceptible-Infected-Recovered (SIR) model: A case study of 2020 Western U.S. wildfire season. *Sustainable Cities and Society*, *106*, 105362. https://doi.org/10.1016/j.scs.2024.105362
3. Yu, H., Fan, L., Li, L., Zhou, J., **Ma, Z.,** Xian, L., Hua, W., Zhang, Y., Gandhi, A., & Ma,X. (2024). Large language models in biomedical and health informatics: a bibliometric review. *Journal of Biomedical and Health Informatics.* https://doi.org/10.1007/s41666-024-00171-8
4. Fan, L., Li, L., **Ma, Z.,** Lee, S., Yu, H., & Hemphill, L. (2024). A bibliometric review of large language models research from 2017 to 2023. *ACM Transactions on Intelligent Systems and Technology*. https://doi.org/10.1145/3664930
5. Erfani, A., **Ma, Z.**, Cui, Q., & Baecher, G. B. (2023). Ex post project risk assessment: method and empirical study. *Journal of Construction Engineering and Management*, 149(2), 04022174. https://doi.org/10.1061/JCEMD4.COENG-12588 (*received 2024* ***ASCE Best Paper***)
6. Li, L., **Ma, Z.**, Fan, L., Lee, S., Yu, H., & Hemphill, L. (2023). ChatGPT in education: A discourse analysis of worries and concerns on social media. *Education and Information Technologies,* https://doi.org/10.1007/s10639-023-12256-9
7. Li, L., Mao, Y., Wang, Y. & **Ma, Z**. (2022). How has airport service quality changed in the context of COVID-19: A data-driven crowdsourcing approach based on sentiment analysis. *Journal of Air Transport Management*, 102298. https://doi.org/10.1016/j.jairtraman.2022.102298
8. Li, L., Zhou, J., **Ma, Z**., Bensi, M. T., Hall, M. A., & Baecher, G. B. (2022). Dynamic assessment of the COVID-19 vaccine acceptance leveraging social media data. *Journal of Biomedical Informatics*, *129*, 104054. https://doi.org/10.1016/j.jbi.2022.104054
9. Li, L., **Ma, Z**., Lee, H., & Lee, S. (2021). Can social media data be used to evaluate the risk of human interactions during the COVID-19 pandemic? *International Journal of Disaster Risk Reduction*, *56*, 102142. https://doi.org/10.1016/j.ijdrr.2021.102142
10. Li, L., **Ma, Z**., & Cao, T. (2021). Data-driven investigations of using social media to aid evacuations amid Western United States wildfire season. *Fire Safety Journal*, *126*, 103480. https://doi.org/10.1016/j.firesaf.2021.103480
11. Li, L., **Ma, Z**., & Cao, T. (2020). Leveraging social media data to study the community resilience of New York City to 2019 power outage. *International Journal of Disaster Risk Reduction*, *51*, 101776. https://doi.org/10.1016/j.ijdrr.2020.101776

CONFERENCE PAPER

1. **Ma, Z**.& Baecher, G.B. (2025). "A Social-Behavioral Compartmental Model for Wildfire Response," GEO-EXTREME 2025, ASCE Specialty Conference, Long Beach, California, November 2-5, 2025. (*Accepted*)
2. **Ma, Z**., Sousa, R., Hu, S., Einstein, H., & Baecher, G.B. (2025) "Investigate Geo-Cascading Events Disruptions Through Multimodal Data Analysis," GEO-EXTREME 2025, ASCE Specialty Conference, Long Beach, California, November 2-5, 2025. (*Accepted*)
3. **Ma, Z**., Li, L., & Baecher, G.B. (2024). "Crowdsourced Social Media Data for Appraising Geotechnical Safety and Risk," 9th International Symposium for Geotechnical Safety and Risk (ISGSR), Oslo, Norway, August 24 – 27, 2025. (*Accepted*)
4. Qian, H., **Ma, Z**., & Hu, S., (2024). "Mobility Disruption and Risk Perceptions During and After Hurricane Helene," 2025 AAG Annual Meeting, Detroit, Michigan, March 24 – 28, 2025. (*Accepted*)
5. **Ma, Z**., Li, L., Yuan, Y., & Baecher, G.B. (2023). "Appraising Situational Awareness in Social Media Data for Wildfire Response," ASCE Inspire conference, Arlington, Virginia, November 16 – 18, 2023.
6. Li, L., **Ma, Z**., Bensi, M. T. & Baecher, G. B. (2023). "Social Media Crowdsourcing for Damage Assessment Following Earthquake Disasters," Geo-risk 2023, Arlington, Virginia, July 23-26. (***feature paper & plenary presentation**, 9 of 163 papers)*
7. Erfani, **Ma, Z**., A., Cui, Q., & Baecher, G. B. (2023). "Data-Drive Evaluation of Project Risk Registers: Theory, Method, and Case Studies," Geo-risk 2023, Arlington, Virginia, July 23-26.
8. **Ma, Z**., Patev, R.C., Li, L., & Baecher, G.B. (2022). "Missouri River System Simulation," U.S. Society on Dams Annual Conference, San Diego, April 11-14.

PRESENTATIONS & INVITED TALK

(*presenter)

1. **Ma, Z.**, Li, L., & Baecher, G.B. (2025). "Crowdsourced Social Media Data for Appraising Geotechnical Safety and Risk," 9th International Symposium for Geotechnical Safety and Risk (ISGSR), Oslo, Norway, August 24 – 27, 2025. (*Accepted*)
2. Qian, H., **Ma, Z.**, & Hu, S., (2025). "Mobility Disruption and Risk Perceptions During and After Hurricane Helene," 2025 AAG Annual Meeting, Detroit, Michigan, March 24 – 28, 2025. (*Accepted*)
3. **Ma, Z**.*, Hu, G., Lin, T., Li, L., Hu, S., & Baecher, G.B. (2024). "Assessing Inequitable Social Responses to Wildfires: A Case Study of California Using the Epidemiology Model," AGU Fall Meeting 2024, Washington, D.C, December 9-13, 2024. (*Oral Presentation*)
4. Li, L., Lu, Y., Hu, S., **Ma, Z.,** Liu, J., Deng, M., Han, Z., Baecher, G.B. & Hemphill, L. (2024). "Assessing the damage of natural disasters using multimodal large language models and social media crowdsourcing," AGU Fall Meeting 2024, Washington, D.C, December 9-13, 2024. (*Poster presentation*)
5. **Ma, Z**.*, Sousa, R.L., Hu, S., Einstein, H.H., & Baecher, G.B. (2024). "Unveiling Social Disparities in Landslide Recovery through Multimodal Data Analysis," NetMob 2024, Washington, D.C, October 7-9, 2024. (*Poster presentation*)
6. **Ma, Z**.*, Li, L., & Baecher, G.B. (2024). "Topic-based SIR model for Wildfire Situational Awareness," Natural Hazards Research Summit 2024, College Park, Maryland, USA, May 14-15, 2024. (*Poster presentation*)

7. **Ma, Z.***, Li, L., Yuan, Y., & Baecher, G.B. (2023). "Leveraging social media data for enhancing wildfire situational awareness," Natural Hazard Workshop, Broomfield, Colorado, USA, July 12-13, 2023. (*Oral presentation*)
8. **Ma, Z.***, Li, L., Yuan, Y., & Baecher, G.B. (2023). "Appraising Situational Awareness in Social Media Data for Wildfire Response," ASCE Inspire Conference, Arlington, Virginia, November 16-18, 2023. (*Poster presentation*)
9. Erfani, A., **Ma, Z.***, Cui, Q., & Baecher, G. B. (2023). "Data-Drive Evaluation of U.S. Major Transportation Project Risk Registers," Geo-risk 2023, Arlington, Virginia, July 23-26. (*Oral presentation*)
10. **Ma, Z.***, Li, L., Bensi, M. T., Hemphill, L. & Baecher, G. B. (2023). "Epidemic model for disaster response in Twitter community: experiment in 2020 Western U.S. wildfire season," AGU Fall Meeting 2023, San Francisco, California, December 11-15, 2023. (*Oral presentation*)
11. **Ma, Z.***, Li, L., & John, J. (2023). "The impact of the COVID-19 Pandemic on Student's expectations," Affordable Degrees-at-Scale Symposium, USA, December 4-6. (*Poster presentation*)
12. **Ma, Z.*** (2023) "Investigating Disaster Response Through Social Media Data and The Susceptible-Infected-Recovered (SIR) Model," invited presentation to co-host seminar by the Center for Disaster Resilience and Center for Risk and Reliability, University of Maryland, September 20, 2023.

PROPOSALS & GRANTS EXPERIENCE

Government Agency

National Science Foundation (**NSF**)
Human-Environment and Geographical Sciences Program (HEGS) – Transdisciplinary REsearch in Environmental Social Science (TREES)
"Exploring Spatial Dynamics of Public Responses and Interstate Governance to Hurricane Helene through AI and Resilience Frameworks"
My role: **Primary Investigator (PI)**; Amount: $200,000/yr - $250,000/yr; Period of Grant Award: FY2025 to FY 2028 (expected)
Current Status: *Submitted*

National Science Foundation (**NSF**) and Centers for Disease Control and Prevention (**CDC**)
The Public Health Extreme Events Research (PHEER) Rapid Research Awards
"Enhancing Post-Hurricane Healthcare Resilience: Real-Time Data Analysis of Accessibility and Disruptions"
My role: Co-PI; Amount: $5,000; Period of Grant Award: FY2024; Submitted in 9/2024
Current Status: *Not Funded*

National Science Foundation (**NSF**) and National Institutes of Health (**NIH**)
Special Call for Health Outcomes and Climate-related Disaster Research
The proposal will focus on utilizing several perishable data sources to assess health outcomes during 2024 Hurricane Beryl/Helene
My role: Co-PI; Amount: $10,000 - $50,000; Current Status: *Submitting Proposal*

Foundation

Amazon Science Sustainability
Research Track: Climate risk assessment
"Resilience in Motion: AI and Mobility Data for Validating Recovery in Cascading

Disasters"
My role: Co-PI; Amount: $50,000 - $100,000 (Unrestricted funds), up to $40,000 (AWS Promotional Credits); Current Status: *Under Review*

Lever for Change
The Trust in American Institutions Challenge
"*Measuring Ten Years of US Institutional Trust of the Public*"
My role: Co-PI; Amount: $10,000,000 for 10 selected teams; Current Status: *Submitting Proposal*

Bezos Earth Fund
AI for Climate and Nature Grand Challenge
"AI framework for dynamic and robust landslide risk mapping and monitoring"
My role: Co-PI; Amount: $50,000 (phase 1) and up to $2,000,000 (phase 2); Current Status: *withdrawn due to conflict agreements between collaboration institutions and funding agency*

TEACHING & MENTORING

Teaching

Program Coordinator, *PMI reaccreditation*	2024 – 2025
Teaching Assistant, *Project Cost Accounting and Finance*	2019 –
Teaching Assistant, *Introduction to Project Management*	2022 – 2024
Teaching Assistant, *Introduction to Construction Management*	2023
Teaching Assistant, *Legal Aspects of Architectural and Engineering Practice*	2022
Course designer, edX course – *Developing the Risk Management Plan with Expert Judgement* (launched Sep.30, 2022)	2021 – 2022

Mentoring

Mentor for one graduate student at Univ. of Maryland – College Park, "Impact of hurricanes on healthcare facilities"	2023
Mentor for one undergraduate student at Univ. of Maryland – College Park, "The application of natural language processing in nature disaster"	2022
Mentor for one undergraduate student at Univ. of Maryland – College Park, "Misinformation in the COVID-19 pandemic"	2021

AWARDS & HONORS

2024 Arthur M. Wellington Prize, ASCE	2024
2024 Thomas Fitch Rowland Prize, ASCE's Construction Institute	2024
Future Faculty Fellowship (Travel funds $2,500), A. James Clark School of Engineering, University of Maryland College Park	2022
Undergraduate Seismic Design Competition (Rank #28), Earthquake Engineering Research Institute (EERI)	2015
Foreign Exchange Scholarship (First-class award ￥30,000), Zhejiang University of Science and Technology	2013

ONLINE MEDIA

Civil Remarks Magazine: "AI can help sort out social media data during a wildfire"
Engineering at Maryland Magazine: "Social media for recovery and action"

SERVICE TO PROFESSION

Journal Article Reviewer

- Sustainable Cities and Society
- Cities
- International Journal of Disaster Risk Reduction
- Automation in Construction
- International Journal of Transportation Science and Technology
- Natural Hazard Review
- Earthquake Spectra
- IEEE Transactions on Computational Social Systems
- Environmental Modelling and Software
- Progress in Disaster Science
- Scientific Reports
- Computing
- PeerJ Computer Science
- Intelligent Automation & Soft Computing
- Computers, Materials & Continua

Conference Proceeding Reviewer

- 12NCEE National Conference on Earthquake Engineering

LEADERSHIP & ACTIVITIES

Graduate Assistant Advisory Committee (GAAC), University of Maryland 2022 –
Student Member, American Geophysical Union (AGU) 2022 –
Professional Affiliate member, American Society of Civil Engineers (ASCE) 2022 –
Student member, Earthquake Engineering Research Institute (EERI) 2014 –

INDUSTRY EXPERIENCE

Staff Engineer, Yu&Associates, Inc., Elmwood Park, NJ, USA 2017 – 2018

- Overseen the preliminary subsurface investigation of various construction projects, e.g.,
    - *the rehabilitation of Throngs Neck Bridge*
    - *reconstruction of the playground in Bensonhurst Park*
    - *construction of new facilities at the Springfield Gardens United Methodist Church*
- Provided support to the senior project manager for boring location plans and soil profile drawings
- Conducted cost estimation for bidding proposals and geotechnical reports

Staff Engineer, JHB Engineering, Montebello, NY, USA 2017

- Conducted field readings and building condition inspection survey during the pre-construction phase

- Performed excavation and foundation design
- Managed daily logistics and collaborated with external contractors during construction to resolve issues and enhance project timelines

Intern, Zhejiang Jianjing Investment & Consultation Co. Ltd, Zhejiang, China 2018

- Assisted in project planning, scheduling, and coordination
- Reviewed all requests for information and change requests, providing timely and appropriate responses

SKILLS & CERTIFICATES

Programming: Python, R, Java, Git, MATLAB/Simulink

Software: Tableau, GoldSim, ArcGIS, QGIS, NodeXL, AutoCAD, Revit, Risk Assessment Software (@RISK), Sap2000

Language: English, Chinese (Mandarin)

Certificate: Engineer-in-Training (Civil), CA|#159139