

# UTKARSH GANGWAL

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PERSONAL INFORMATION Graduate Research Assistant (DuPont 360K)  
Department of Civil & Environmental Engineering  
Disaster Research Center  
University of Delaware

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EDUCATION **University of Delaware** Newark, DE  
*Ph.D. in Civil Infrastructure Systems, CGPA: 3.98/4* 2021 – Present  
Advisor: Dr. Shangjia Dong

**Indian Institute of Technology (IIT) Gandhinagar** Gandhinagar, Gujarat  
*Bachelor of Technology in Civil Engineering, CGPA: 8.57/10* 2017 – 2021  
(With Honors in Civil Engineering)

RESEARCH INTERESTS

- Interdependent human-infrastructure Network Analysis (Complex network analysis, System dynamic modeling, Geo-spatial AI)
- Societal impact of disaster (Econometrics modeling, Survey analysis)
- Equitable infrastructure planning (Optimization, Community Engagement)

PREPRINTS

- J1. **Gangwal, U.**, Shi, F., & Dong, S. (2024). System dynamic modeling of interdependent socio-physical systems for resource disparity assessment during flooding. *Sustainable Cities and Society*. (Under Review)
- J2. Qian, X., **Gangwal, U.**, Davidson, R., & Dong, S. (2024). A Deep Learning Framework for Joint Synthetic Household and Individual Generation. *Sustainable Cities and Society* (Under Preparation)
- J3. **Gangwal, U.**, Dulam, R., Aderson, A., Kendra, J., Dong, S., & Davidson, R. (2024) How consistent are household adaptations to electric power outages across disruptive events? *International Journal of Disaster Risk Reduction*(Under Preparation)

REFEREED JOURNAL ARTICLES

- J1. **Gangwal, U.**, Siders, A. R., Horney, J., Michael, H. A., & Dong, S. (2023). Critical facility accessibility and road criticality assessment considering flood-induced partial failure. *Sustainable and Resilient Infrastructure*, 8(sup1), 337-355. doi: [10.1080/23789689.2022.2149184](https://doi.org/10.1080/23789689.2022.2149184)
- J2. Dong, S., Gao, X., Mostafavi, A., Gao, J., & **Gangwal, U.** (2023). Characterizing resilience of flood-disrupted dynamic transportation network through the lens of link reliability and stability. *Reliability Engineering & System Safety*, 109071. doi: [10.1016/j.ress.2022.109071](https://doi.org/10.1016/j.ress.2022.109071)
- J3. Horney, J. A., Scales, S. E., **Gangwal, U.**, & Dong, S. (2023). Ensuring Access to Opioid Treatment Program Services Among Delawareans Vulnerable to Flooding. *Delaware Journal of Public Health*, 9(2), 130. doi: [10.32481/djph.2023.06.024](https://doi.org/10.32481/djph.2023.06.024)
- J4. **Gangwal, U.**, & Dong, S. (2022). Critical facility accessibility rapid failure early-warning detection and redundancy mapping in urban flooding. *Reliability Engineering & System Safety*, 108555. doi: [10.1016/j.ress.2022.108555](https://doi.org/10.1016/j.ress.2022.108555)

- J5. **Gangwal, U.**, Singh, M., Pandey, P. K., Kamboj, D., Chatterjee, S., & Bhatia, U. (2022). Identifying early-warning indicators of onset of sudden collapse in networked infrastructure systems against sequential disruptions. *Physica A: Statistical Mechanics and its Applications*, 591, 126796. doi: [10.1016/j.physa.2021.126796](https://doi.org/10.1016/j.physa.2021.126796)

REFERRED  
CONFERENCE  
PROCEEDINGS

- C1. Ma, J., **Gangwal, U.**, & Dong, S. (2023). Fire Station Accessibility, Assessment, and Improvement Considering Probabilistic Road Failure in Facing Flooding. In *ASCE Inspire 2023* (pp. 831-838). doi: [10.1061/9780784485163.096](https://doi.org/10.1061/9780784485163.096)

PRESENTATIONS

- P1. Assessing the impact of flood disruption on healthcare facility access equity, *Transportation Resilience 2023*. Washington D.C., Nov 2023 (Talk)
- P2. Community Resilience Modeling Using Dynamic System Approach, *ASCE Inspire 2023*. Washington D.C., Nov 2023
- P3. Road Criticality Assessment for Communities Access to Critical Facilities in Delaware, *Natural Hazards Workshop 2023*. Boulder, CO, Jul 2023
- P4. Assessing the impact of flooding on healthcare facility accessibility in Delaware communities, *DENIN Research Symposium 2023*. Newark, DE, Apr 2023
- P5. Road Criticality and Resource Redundancy Mapping in Delaware Coastal Community, *Natural Hazards Workshop 2022*. Online, Jul 2022

HONORS &  
AWARDS

- **UD Disaster Research Center Travel Awards 2023**
- **UD COE Graduate Student Travel Awards 2023**
- **Honorable Mention** at the [UD GIS day](#), 2022 for the map "Hospital Access Disparities after Hurricane Harvey in Harris County, TX, 2017"
- **Director's Gold Medal** at IIT Gandhinagar for overall outstanding performance among all B.Tech students
- **Institute Gold Medal** at IIT Gandhinagar for securing the highest cumulative performance index among all B.Tech Civil Engineering students
- **Best poster award** Chatterjee, Samrat, et al. "A Network-of-Network Approach for Cyber-Based Contingency Analysis of Interdependent Infrastructure Networks Under Uncertainty." Society of Risk Analysis, Washington DC (2019)
- **Scholarship for Academic Excellence** at IIT Gandhinagar for the academic year 2017-18, 2018-19, and 2019-20
- **Dean's List Honour**, at IIT Gandhinagar Semester- I of Academic Year- 2018-19 and Semester- I of Academic Year- 2019-20

PEER  
MENTORING

**Research Mentor**

- Aiden Pape, Undergrad Researcher (Middlebury College) *Jun-Sept 2023*  
*Research: Generating Geolocated Synthetic Population to Assess Travel Need to Access Opioid Treatment Centers*
- Jack Kingham, Undergrad Researcher (UD) *Jun-Sept 2023*  
*Research: Predicting Travel Patterns to Delaware Healthcare Facilities During Flooding*

- Jiaji Ma, Undergrad Researcher (UVA) *Jun-Sept 2022*  
*Research: Fire station access equity in facing flood disruption*  
 (Work published and presented at ASCE INSPIRE conference 2023)
- Annabelle Dorsett, Undergrad Researcher (UD) *Apr-Jun 2022*  
*Research: Infrastructure service usage behavior analysis*

SELECTIVE  
RESEARCH  
EXPERIENCE

**Household adaptations consistency to electric power outages across disruptive events (NSF #1735483)** *Sept 2023 - Present*

*Advisor(s): Dr. Shangjia Dong, Dr. Rachel Davidson, Dr. James Kendra*

- Used mixed logit models to understand the relation between various adaptations, outage duration, and individual characteristics
- Investigated how common different adaptations are across different states for past experiences and future disasters
- Evaluating the predictive power of the models

**System dynamic modeling of interdependent socio-physical systems for resource disparity assessment during flooding (NASEM #SCON-1000063)** *Jan 2022 - Mar 2024*

*Advisor(s): Dr. Shangjia Dong, Dr. Fengyan Shi*

- Developed a system dynamic model to capture the interdependency of social and physical systems during disaster preparedness through human consumption and competition for infrastructure services
- Analyzed the impact of physical and social vulnerability by estimating the resources available at micro- and macro-level
- Proposed a framework for analyzing interactions across multilayered systems

**Critical facility accessibility and road criticality assessment during flooding (UDRF #21A00986, DelDOT #T202266002)** *Jun-Sept 2022* *Advisor(s): Dr. Shangjia Dong, Dr. AR Siders, Dr. Jennifer Horney, Dr. Holly Michael*

- Identified accessibility disparities for Delaware state while taking into account partial failure by integrating the depth-disruption function to travel time calculations
- Used modified betweenness centrality to identify critical roads for access to critical facilities for the network and census block groups
- Proposed a weighted criticality metric to identify flooded roads critical to disconnected communities for restoring access to critical facilities

TEACHING

**Teaching Assistant (University of Delaware)**

Semester	Course	Students	Title
S 2024	CIEG351	53	(UG) Transportation Engineering
S 2023	CIEG351	62	(UG) Transportation Engineering
S 2023	CIEG451	62	(UG) Transportation Engineering Lab

UG: Undergraduate-level

SERVICES

**Reviewer**

- COTA International Conference of Transportation Professionals (CICTP)
- ASCE International Conference on Computing in Civil Engineering (i3CE)