

# Utkarsh Gangwal

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## EDUCATION

Degree	Institute	CPI/%	Year
Ph.D.	University of Delaware	3.98/4	2021 - Present
B.Tech	IIT Gandhinagar	8.57/10 (Dept. Rank 1)	2017 - 2021

## SELECTIVE RESEARCH EXPERIENCE

- **Critical Facility Accessibility and Road Criticality Assessment Considering Flood-induced Partial Failure** [Jun 2022 - Sep 2022]  
(University of Delaware)
  - 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
- **Critical Facility Accessibility Rapid Failure Early-Warning Detection and Redundancy Mapping in Urban Flooding** [Feb 2021 - Aug 2021]  
(University of Delaware)
  - Developed a network-theory-based detection model to identify the critical point after which the rate of road access loss to critical facilities starts to accelerate
  - Calculated the number of critical facilities that each network component has access to within reach and reveal the resource redundancy inequity and risk disparity across the network
  - Spatially mapped the accessibility and identified service deserts for Harris County, Texas under Hurricane Harvey and 500-year flood
- **Identifying Early-Warning Indicators of Tipping Points in Networked Systems Against Sequential Attacks** [May 2019 - Jun 2020]  
(IIT Gandhinagar)
  - Predicted and tipping points or critical thresholds of networks, at which further perturbation can lead to instantaneous loss of intended functionality
  - Identified the precursors to the tipping points and determined the entire robustness characteristics of networks with different architecture in presence of disturbances of varying sizes
  - Understood the responses to simultaneous disruptions for the real-world networks (US Airspace Airport network, Indian Railways Network) and synthetic networks (Erdos-Renyi and Barabasi Albert Network)

## PUBLICATIONS

- **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)
- 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)
- **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)
- **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: [j.physa.2021.126796](https://doi.org/j.physa.2021.126796)
- 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)
- 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)

## SELECTED ACHIEVEMENTS & AWARDS

- Received an **Honorable Mention** at the [UD GIS day](#), 2022 for the map "Hospital Access Disparities after Hurricane Harvey in Harris County, TX, 2017"
- Awarded the **Director's Gold Medal** at IIT Gandhinagar for overall outstanding performance among all B.Tech students
- Awarded the **Institute Gold Medal** at IIT Gandhinagar for securing the highest cumulative performance index among all B.Tech Civil Engineering students
- 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) (Awarded the **best poster award**)
- Awarded the **Scholarship for Academic Excellence** at IIT Gandhinagar for the academic year 2017-18, 2018-19, and 2019-20
- Recipient of **Dean's List Honour**, Semester- I of Academic Year- 2018-19 and Semester- I of Academic Year- 2019-20

## PROGRAMMING SKILLS AND SOFTWARES

- **Programming Languages:** Python 3.0, R (Basics), HTML & CSS (Basics), Matlab (Basics)
- **Tools:** ArcGIS Pro, SAS, Gephi, Autodesk Inventor, L<sup>A</sup>T<sub>E</sub>X

## SELECTED COURSE PROJECTS

- **Transportation Asset Management Plan (TAMP) for City of Newark** [Feb 2022 - May 2022]  
*Course title: Advanced Infrastructure Management Bootcamp (Advisor - Prof. Sue McNeil) (University of Delaware)*
  - Developed a TAMP along with 4 members for Newark business area and outlined the strategy to prioritize & preserve assets
  - Analyzed the associated risks while proposing various asset management process enhancements
- **Risk assessment of drone delivery on a university campus** [Oct 2021 - Dec 2021]  
*Course title: Risk Analysis (Advisor - Prof. Shangjia Dong) (University of Delaware)*
  - Worked in a team of 3 to identify the risk associated with drone delivery system
  - Calculated the consequence by developing a mathematical model as a combination of complete and partial drone damage, human injuries, and fatalities

## SELECTED POSITIONS OF RESPONSIBILITY

- **Convener, Student Senate** [Jul 2020 - Apr 2021]  
*(Chairman, Student Senate, IIT Gandhinagar)*
  - Represented the views of student community in the institute senate (chaired by director IITGN) and also a member of the Senate Student Affairs Committee (SSAC)
  - Created IITGN's first *Constitution for Student Governance* and revamped the POR (Position of Responsibilities) verification process to make it efficient and reliable
  - Convened the student senate meetings and restructured the senate meetings to increase the efficiency
- **Co-founder and member, SynOCE** [Jan 2019 - Apr 2021]  
*(Syndicate of Civil Engineers, IIT Gandhinagar)*
  - Organized various sessions to increase interaction among undergraduate and graduate Civil engineering students
  - Created the first edition of Sync with CE: magazine of SynOCE along with a few other members
- **Sponsorship Team Executive & Networking Dinner Coordinator, Amalthea '18** [Jul 2018 - Oct 2018]  
*(Annual Technical Summit, IIT Gandhinagar)*
  - Assisted in raising a sponsorship amount of rupees 35.2 lacs
  - Managed the logistics of Networking Dinner which was attended by more than 100 prominent guests

## MENTORSHIP EXPERIENCES

- **REU Mentor** [Jun 2022 - Aug 2022]  
*(University of Delaware)*
  - Mentored an undergraduate student with different steps of research including problem formulation, methodology, and visualization
  - Conducted frequent meetings to guide the student through various tasks of the REU program