Utkarsh Gangwal

Graduate Research Assistant
Department of Civil and Environmental Engineering
University of Delaware

✉ utkarsh@udel.edu
Google Scholar
🔗 LinkedIn

EDUCATION

Degree	Institute	CPI/%	Year
Ph.D.	University of Delaware	4/4	2021 - Present
B.Tech	IIT Gandhinagar	8.57/10 (Dept. Rank 1)	2017 - 2021
Class XII	Deogiri College, Aurangabad	92.15 ($\tilde{99}th$ Percentile)	2016-2017
Class X	SSHS, Aurangabad	10/10	2014-2015

SELECTIVE RESEARCH EXPERIENCE

- **Critical Facility Accessibility and Road Criticality Assessment Considering Flood-induced Partial Failure** [Jun 2022 - Sep 2022]
  Advisor - Prof. Shangjia Dong (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

- **Road Network Cascading Failure Early-warning Detection Considering Flood-disrupted Access to Critical Facilities** [Feb 2021 - Aug 2021]
  Advisor - Prof. Shangjia Dong (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

- **Investigating systems and network topology driven restoration of perturbed plant-pollinator mutualistic networks** [Jan 2020 - July 2021]
  Advisor - Prof. Udit Bhatia (IIT Gandhinagar)
  - Developing a generalizable restoration strategy for ecological networks taking into account the network topology and network dynamics
  - Understood the mathematical treatment of resilience used to model the behavior of complex systems

- **Identifying early-warning indicators of tipping points in networked systems against sequential attacks** [May 2019 - Jun 2020]
  Advisor - Prof. Udit Bhatia, Prof. Mayank Singh, Prof. Pradumn Kumar Pandey, Dr. Samrat Chatterjee (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. (2022). Critical facility accessibility and road criticality assessment considering flood-induced partial failure. Sustainable and Resilient Infrastructure, 1-19. doi: 10.1080/23789689.2022.2149184
- 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

- Gangwal, U., Bhatia, U., Singh, M., Pandey, P. K., Kamboj, D., & Chatterjee, S. (2021). Identifying early-warning indicators of onset of sudden collapse in networked infrastructure systems against sequential disruptions. Physica A: Statistical Mechanics and its Applications, 126796.j.physa.2021.126796.

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
- Awarded **Kishore Vaigyanik Protsahan Yojana Scholarship** (KVPY) (also called Young Scientist Incentive Plan) initiated by Department of Science and Technology, India, which is aimed at encouraging students to pursue research in basic sciences

PROGRAMMING SKILLS AND SOFTWARES

- **Programming Languages:** Python 3.0, R (Basics), HTML & CSS (Basics), Matlab (Basics)
- **Tools:** ArcGIS Pro, SAS, Gephi, Autodesk Inventor, LaTeX

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

- **Student Guide** [Nov 2020 - April 2021]
  (IIT Gandhinagar)
    - Guided and assisted B.Tech first year students with their academics, extra-curricular activities and helped them in getting familiar with the culture of IIT Gandhinagar
    - Conducted multiple sessions along with fellow student guides to increase interaction among students

- **Mentor, Peer Assisted Learning** [Feb 2021 - April 2021]
  (IIT Gandhinagar)
    - Guided and assisted one B.Tech first year student with his speaking and writing skills
    - Prepared assignments and conducted timely meetings to constantly guide him