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EDUCATION

Degree	Institute	CPI/%	Year
Ph.D.	University of Delaware	-	2021 - Present
B.Tech	IIT Gandhinagar	8.57/10 (Rank: 1/23)	2017 - 2021
Class XII	Deogiri College, Aurangabad	92.15 (99th Percentile)	2016-2017
Class X	SSHS, Aurangabad	10/10	2014-2015

RESEARCH EXPERIENCE

- **Road Network Cascading Failure Early-warning Detection Considering Flood-disrupted Access to Critical Facilities** [Feb 2021 - Aug 2021]
Advisor - Prof. Shangjia Dong
 - Predicted the early-warning indicators of road networks considering flood-disrupted access to critical facilities
 - Calculated the resource redundancy after flood disruption and showed the disparity in critical services available across Harris County, Texas
- **Investigating systems and network topology driven restoration of perturbed plant-pollinator mutualistic networks** [Jan 2020 - July 2021]
Advisor - Prof. Udit Bhatia
 - 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 understand 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
 - 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 (United States Airspace Airport network, Indian Railways Network) and synthetic networks (Erdos-Renyi and Barabasi Albert Network)
- **Approach to evaluate monetary losses due to large scale disruptions** [Jan 2019 - May 2019]
Advisor - Prof. Udit Bhatia
 - Made recovery graphs for Indian Railways Network (IRN) using various network centralities and studied the robustness of this network
 - Evaluated the monetary losses incurred to the IRN using python

MANUSCRIPTS

- Gangwal, U., Dong, S. (2021). Road Network Cascading Failure Early-warning Detection Considering Flood-disrupted Access to Critical Facilities
(Submitted to *Reliability Engineering and System Safety (Elsevier)*)
- Gangwal, U., Bhatia, U., Singh, M., Pandey, P. K., Kamboj, D., & Chatterjee, S. (2020). Identifying early-warning indicators of tipping points in networked systems against sequential attacks. arXiv preprint arXiv:2009.11322.
(Under review in *Physica A: Statistical Mechanics and its Applications (Elsevier)*)
- Dubey, S., Gangwal, U., & Bhatia, U. (2020). Investigating systems and network topology driven restoration of perturbed plant-pollinator mutualistic networks.
(Under preparation)

ACHIEVEMENTS & AWARDS

- 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**)
- Selected in the **Summer Undergraduate Research Fellowship (SURF)** program at Caltech for the summer of 2020 to work on the topic "Constructing granular structures with novel mechanical properties through inverse design" (called-off due to the global pandemic)
- 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 [2017]

PROGRAMMING SKILLS AND SOFTWARES

- **Programming Languages:** Python 3.0, C++ (Basics), Matlab (Basics), R (Basics)
- **Tools:** Gephi, ArcGIS, SAP2000, Ansys, Autodesk Inventor, Geo5, Adobe Premiere Pro, MASTAN2, L^AT_EX

SELECTED COURSE PROJECTS

- **Design of transmission tower** [Aug 2020 - Dec 2020]
Course title: Comprehensive project (Advisor - Prof. Manish Kumar)
 - Working in a group of 5 members to propose detailed design of a 220 kV transmission tower with three phase double circuit system of conductors and bolted connections
 - Proposed the structural design of cross-arms and transmission tower, geometry and configuration of conductors and earth wires, determined the loads, designed the foundation, studied various Indian Standard codes, and analysed the transmission tower using SAP2000
- **Designing a twin apartment** [Jan 2020 - Jul 2020]
Course title: Concrete design (Advisor - Prof. Dhiman Basu)
 - Designed a RC frame 5-storey twin apartment to withstand dead loads, live loads, and earthquake loads
 - Studied the crucial elements of a building such as the beam, column, slabs, stairs, and foundation in detail
- **Automation of Irrigation System** [Jan 2019 - May 2019]
Course title: Sustainability and environment (Advisor - Prof. Vimal Mishra; Prof. Udit Bhatia)
 - Automated the irrigation system using the data of soil moisture sensors to decide the adequate amount of water
 - Learned about the elements of sustainability (environmental, social, and economic) and implemented these in the proposed model

POSITIONS OF RESPONSIBILITY & EXTRA-CURRICULAR ACTIVITIES

- **Convener, Student Senate** [Jul 2020 - Apr 2021]
(Head of 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
- **Member, Sanjeevani'19** [Nov 2019 - Jan 2020]
(Awareness and Health Camp, IIT Gandhinagar)
 - Organized the health checkup camp for the villagers, construction workers, and security personnel
 - Assisted in spreading awareness about basic health in the villages nearby IIT Gandhinagar
- **Member, Professional Development Council** [Apr 2019 - Jul 2020]
(IIT Gandhinagar)

- Organized workshops for students aimed to develop the soft-skills and worked with the team to plan and execute new initiatives for the benefit of the student community
- Worked closely with Career Development Services (CDS), IITGN to coordinate with the companies and the students
- **Senator, Student Senate** [Apr 2019 - Jul 2020]
(IIT Gandhinagar)
 - Elected as the batch representative of B.Tech '17
 - Managed the logistics of JEE Open House which was organized for prospective B.Tech students. It was attended by around 400 students
- **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