Swastik Sharma

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Education

Indian Institute of Technology Kanpur — Kanpur, India
M.Tech + Ph.D. in Electrical Engineering; ***CPI: 9.7/10.0*** — *July 2021 – ongoing*

- **Advisors:** Dr. Swathi Battula & Prof.(Dr.) Sri Niwas Singh
- **Relevant coursework:** Simulation of Modern Power Systems; Economic Operation and Control of Power Systems; Electric Power System Operation and Management under Restructured Environment; Introduction to Reinforcement Learning; Renewable Energy Economics, Policy and Regulations

National Institute of Technology Srinagar — Srinagar, India
B.Tech in Electrical Engineering; ***CGPA: 9.1/10.0*** — *Aug 2017 – Jun 2021*

- **Advisors:** Prof.(Dr.) Abdul Hamid Bhat & Dr. Tabish Nazir Mir

Kendriya Vidyalaya No.1 Jammu — Jammu, India
All India Senior School Certificate Examination (AISSCE); ***Percentage: 89.4%*** — *May 2017*

Publications

Journals

- S. Sharma, S. Battula and S. N. Singh, "IDSO-Managed Bid-Based Transactive Design for DER Participation in Wholesale Markets While Preserving T-D Interactions," *IEEE Transactions on Energy Markets, Policy and Regulation.*, pp. 1-16 doi: 10.1109/TEMPR.2026.3661757.

Conference Proceedings

- S. Sharma, S. Battula and S. N. Singh, "Towards Improved System Flexibility: Enabling IDSO's Swing Contract Market Participation," *2026 IEEE Power & Energy Society Transmission & Distribution (T&D) Conference & Exposition, Chicago, IL, USA, 2026*, pp. 1-5 **[Accepted]**.
- S. Sharma, S. Battula and S. N. Singh, "Transactive Electric Vehicle Agent: A Deep Reinforcement Learning Approach," *2024 IEEE Power & Energy Society General Meeting (PESGM), Seattle, WA, USA, 2024*, pp. 1-5, doi: 10.1109/PESGM51994.2024.10688919.

Preprints

- S. Sharma, S. Battula and S. N. Singh, "IDSO-Managed Bid-Based Transactive Distribution Systems Design for DER Participation in Wholesale Markets While Preserving T-D Interactions," *arXiv preprint arXiv:2508.08187, 2025.*, pp. 1-17 doi: 10.48550/arXiv.2508.08187.

Awards & Achievements

Prime Minister's Research Fellow (PMRF): Awarded the prestigious research fellowship in India for a period of **3.5 years** starting from Jan 2023.

Ranked FIRST in the Department of Electrical Engineering, NIT Srinagar : Scored the highest CGPA among a class of 80 students.

Cash Award and Letter of Appreciation from MHRD: Awarded a cash prize and a letter of appreciation from Mrs. Smriti Zubin Irani, then Minister of HRD, GOI, for achieving the highest possible CGPA in the All India Secondary School Examination.

Skills

Programming: C, C++, Python, MATLAB

Technologies: Git, Simulink, GridLabD, PSIM, CPLEX

Visual Designs: Canva, Illustrator, Photoshop

Typesetting: MS-Word, MS-PowerPoint, LaTeX

Experience

Advanced Power Systems Laboratory, IIT Kanpur — Kanpur, India
Research Scholar — *July 2021 - ongoing*

- Development of Integrated Transmission and Distribution Systems Testbed.
- Development of Bid-based TES-based Distribution Systems Testbed.

Power Electronics Laboratory, NIT Srinagar — Srinagar, India
B.Tech Project — *Nov 2020 - June 2021*

- Development of novel SVPWM technique for matrix converters that employs all the valid switching states.

BSNL Advance Level Telecommunication Training Centre (ALTTC) — Ghaziabad, India
Student Intern — *July 2019*

- Roles and responsibilities of the Electrical Engineering department in telecom industries

National Hydroelectric Power Corporation (NHPC), Salal — Jammu, India
Student Intern — *Jan 2019 – Feb 2019*

- Working of a Hydroelectric Power Plant
- Electrical Engineering Department's role in the project.

Teaching Assistantship Duties

PMRF

CSJM University Kanpur, India: LaTeXfor Document Editing (Workshop) — *Jan 2025 - April 2025*

- A 30-hour hands-on workshop for BTech students.

NPTEL Course: Smart Grids: Basics to Advanced Technologies — *Jan 2025 – April 2025*

- Doubt clearing and problem-solving sessions.

CSJM University Kanpur, India: Python for ML/AI (Workshop) — *April 2024*

- A 30-hour hands-on workshop for BTech students.

NPTEL Course: Smart Grids: Basics to Advanced Technologies — *Jan 2024 – April 2024*

- Doubt clearing and problem-solving sessions.

ABV-IIITM Gwalior, India: Fundamentals of Electrical Engineering — *Oct 2023*

- Problem-solving tutorial and laboratory practicals.

NPTEL Course: Fundamentals of Electrical Engineering — *July 2023 – Oct 2023*

- Doubt clearing and problem-solving sessions.

IIT Kanpur

EE630(P): Simulation of Modern Power Systems — *Aug 2025 – ongoing*

- Conducting lab sessions for students to understand the fundamentals of power systems and equipping them with skills to perform simulations on Python.

EE675: Introduction to Reinforcement Learning — *Jan 2025 – May 2025*

- Assisting instructor with correcting quizzes and assignments and clearing doubts of students.
- Preparing quizzes and assignments.

EE633A: Electric Power System Mgmt. & Operation in Restructured Environment — *Jan 2023 – May 2023*

- Assisting instructor with correcting quizzes and assignments and clearing doubts of students.
- Preparing quizzes and assignments.

EE632A: Economic Operation & Control of Power Systems — *Aug 2022 – Dec 2022*

- Assisting instructor with correcting quizzes and assignments and clearing doubts of students.
- Preparing quizzes and assignments.

ESO203A: Introduction to Electrical Engineering — *Jan 2022 – May 2022*

- Preparing questions for the weekly quizzes and assisting tutors with correcting quizzes and doubts of students.

DPGC Duty — *Aug 2021 – Dec 2021*

- Assisting the Departmental Post Graduate Committee with tasks such as admission verification, etc.

Projects

Python-based Three-Phase Distribution Optimal Power Flow Program (T-DOPF)| *GitHub*

- Developed a Pyomo-based solver for Three-Phase Distribution Network OPF (T-DOPF), addressing a lack of open-source softwares specifically tailored to three-phase systems.
- Implemented a Three-Phase LinDistFlow formulation that supports DERs and capacitors, enabling deeper operational and integration studies.
- Included thermal line limit constraints, a feature often missing in other solvers, to improve reliability and comprehensive modelling.

Meta Reinforcement Learning using Recurrent Neural Networks | *GitHub*

- A course project for the course EE675A: Introduction to Reinforcement Learning at IIT Kanpur
- Meta Reinforcement Learning is a technique which focuses on learning how to learn. Meta RL can help you adapt quickly to a task, even if it is much different than what it was originally trained for.
- Tested on bandit agents with different environments to make them adapt to a policy quickly to achieve the maximum reward.
- The results were compared with other state-of-art agents such as UCB, Thompson Sampling etc.

Novel Technique to implement SVPWM for Matrix Converters | *GitHub*

- As part of my B.Tech Final Year Project implemented a project that can utilise all of the switching states while using the SVPWM technique for modulation of matrix converter coupled to an induction motor load.
- The switches, when controlled using a PWM technique, have a drawback of Common Mode Voltage (CMV) between the ground of the AC supply and the neutral of the motor load.
- A Zero-CMV technique has been proposed in literature which limits the CMV by using only the rotating space vectors in the SVPWM. But it results in a limit over Voltage Transfer Ratio of 0.5
- But using the active and zero space vectors in the SVPWM of Matrix Converters results in a VTR of 0.866
- Hence, to have the best of both worlds, a technique which utilises all of the space vectors is proposed.
- Recieved an **Outstanding** grade for this project.

Research Interests

– Transactive Energy Systems Design
– Transmission & Distribution Interactions
– Power Market Operations
– Integrated Transmission & Distribution Systems Modelling
– Deep Reinforcement Learning Applications to T&D Designs

Organizations

Institute of Electrical and Electronics Engineers (IEEE) *Dec 2021 – Present*
Graduate Student Member

IEEE Power & Energy Society Student Branch Chapter IITK *Feb 2024 – Jan 2025*
Secretary

IEEE Power & Energy Society Student Branch Chapter IITK *Feb 2023 – Jan 2024*
Webmaster