

# 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

### Conferences

- 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.

## 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 Center (ALTTC)

Ghaziabad, India

*Student Intern*

*July 2019*

- Roles and responsibilities of 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: L<sup>A</sup>T<sub>E</sub>X for Document Editing (Workshop)

*Jan 2025 - April 2025*

- A 30-hour hands-on workshop for Bachelor 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

### EE675: Introduction to Reinforcement Learning

*Jan 2025 – ongoing*

- 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

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### 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.

## AWARDS & ACHIEVEMENTS

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**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

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**Programming:** C, C++, Python, MATLAB

**Technologies:** Git, Simulink, GridLabD, PSIM, CPLEX

**Visual Designs:** Canva, Illustrator, Photoshop

**Typesetting:** MS-Word, MS-PowerPoint, L<sup>A</sup>T<sub>E</sub>X

## RESEARCH INTERESTS

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

## ORGANIZATIONS

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**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*