

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^AT_EX for 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

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

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

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, L^AT_EX

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