

# PRABHU OMER

Assistant Professor  
Electrical Engineering Department  
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## PROFESSIONAL PROFILE

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### Research

- Published 9 peer-reviewed research articles.
- Served as PI for research grant of 17.39 lakhs over 2 years supported by Collaborative Research Scheme by AICTE under TEQIP-3.
- Supervised graduate thesis for 2 M.E./M. Tech. Students and currently advising 1 M.E. student (Co-supervising 1 Ph. D. student).
- Mentoring undergraduate students on different research and design projects.

### Teaching

- Developed and introduced 5 new courses (4 undergraduate level + 1 graduate level) and updated 1 undergraduate course on Power Electronics to align the EE Program with latest trends of applications of AI and Data Science in EE.
- Consistently received positive student evaluations for teaching at both undergraduate and graduate levels.
- Implemented an innovative method for administering assignments, quizzes, and exams that enhances student learning, complies with NBA directives, and deters plagiarism.
- Integrated questions from competitive exams like GATE and ESE into classroom teaching to concurrently prepare students for these examinations.
- Enhancing my skills with core AI and data science courses via the IIT Madras B.S. Degree Program.

### Service

- Conference Organizing Committee Member, 2024 IEEE International Conference on Innovative Trends in Electrical, Electronics and Bio-Technology Engineering (ICITEEB).
- NBA Accreditation Coordinator for Electrical Engineering Department at Chandigarh University, Gharuan. (Received 3 Years of NBA Accreditation, Jun 24 to Jun 27).
- ABET International Accreditation Coordinator for Electrical Engineering Department at Chandigarh University, Gharuan. (Received 6 Years of ABET Accreditation, Jun 21 to Jun 27).
- Currently serving as NAAC Coordinator at Chandigarh University, Gharuan.

## RESEARCH AND TEACHING INTERESTS

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### Power Electronics Converters and Multilevel Inverters – Analysis, Control and Design with Application of AI and Data Science

- Control and design measures to facilitate lower THD output for integration of Distributed Energy Resources (DERs)
- Computing and Analysing the switching control using AI techniques and Data Science
- Quantifying and enhancing the grid resilience for deeper penetration of renewable energy based DERs.

## EDUCATION QUALIFICATIONS

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### **Indian Institute of Technology (IIT) Madras**

*B. S. Degree in Data Science and Applications*

Courses – Mathematics for Data Science, Statistics for Data Science, Python programming, AI etc.

Cumulative GPA – 8.6

**Chennai, India**

*Jan. 2023 to present*

### **Punjab Engineering College (Deemed to be University)**

*Ph. D. in Electrical Engineering*

Dissertation:

‘Analysis and Development of Solar PV Based Standalone System using New Multilevel Inverter Topologies’

Supervisor: Dr. Jagdish Kumar and Dr. Balwinder Singh Surjan

**Chandigarh, India**

*Aug. 2014 to Mar 2021*

### **PEC University of Technology (formerly Punjab Engineering College)**

*M. E. in Electrical Engineering*

Thesis: ‘Comparison of Modulation Strategies of Cascaded-MLI’

Cumulative GPA – 9.47/10

**Chandigarh, India**

*Aug. 2011 to June 2013*

### **Gautam Buddh Technical University**

*Bachelor of Technology in Electrical and Electronics Engineering*

Percentage – 73.82

**Lucknow, India**

*July 2007 to May 2011*

## WORK EXPERIENCE

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### **Assistant Professor**

Shri Mata Vaishno Devi University,

*Electrical Engineering Department, University Institute of Engineering*

**Katra, UT of J & K, India**

*Dec. 2024 – Present*

### **Assistant Professor**

Chandigarh University,

*Electrical Engineering Department, University Institute of Engineering*

**Gharuan, Punjab, India**

*Nov. 2021 – Dec. 2024*

### **Assistant Professor**

M J P Rohilkhand University,

*Electrical Engineering Department, Institute of Engineering and Technology*

**Bareilly, U.P., India**

*Sep. 2018 – Sep 2021*

### **Research Assistant**

Punjab Engineering College (Deemed to be University),

*Department of Electrical Engineering*

**Chandigarh, India**

*Aug. 2014 – July 2018*

### **Assistant Professor**

Chandigarh University,

*Electrical Engineering Department, University Institute of Engineering*

**Gharuan, Punjab, India**

*June 2013 – July 2014*

### **Summer Internship**

Panki Thermal Power Station

*(PTPS)*

**Kanpur, U.P., India**

*June 2010 – July 2010*

### **Summer Internship**

Electric Loco Shed

*(ELS – Indian Railways)*

**Kanpur, U.P., India**

*June 2009 – July 2009*

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## TEACHING EXPERIENCE

### A. Teaching Summary (Courses Taught at CU)

Course Number	Course Name	Semester Details
ELT-452 20ELT-353 20ECT-352	Mathematics for Data Science	EE (8 <sup>th</sup> Sem), 2022-23(2) EE (7 <sup>th</sup> Sem), 2023-24(1) EC (6 <sup>th</sup> Sem), 2022-23(2)
22ELT-214 21ELT-316 20ELT-412	Statistics for Data Science	EE (3 <sup>rd</sup> Sem), 2023-24(1) EE (6 <sup>th</sup> Sem), 2023-24(2) EE (7 <sup>th</sup> Sem), 2023-24(1)
21ELT-319	Random Variables and Stochastic Processes	EE (6 <sup>th</sup> Sem), 2023-24(2)
20ELT-311 ELT-301 23ELT-220	Power Electronics	EE (5 <sup>th</sup> Sem), 2022-23(1) EE (5 <sup>th</sup> Sem), 2021-22(1) EE (3 <sup>rd</sup> Sem), 2024-25(1)
21ELT-212 20ELT-252	Control System	EE (4 <sup>th</sup> Sem), 2022-23(2) EE (4 <sup>th</sup> Sem), 2021-22(2)
23ELT-601	Advanced Power Converters	ME (1 <sup>st</sup> Sem), 2023-24(1)

### B. Other Teaching Experience

Institute Name	Course Name	Semester Details
Institute of Engineering and Technology, M J P Rohilkhand University, Bareilly, U.P., India	Electrical Circuit Analysis	EE (3 <sup>rd</sup> Sem), 2019-20(1) EC (3 <sup>rd</sup> Sem), 2019-20(1) EE (3 <sup>rd</sup> Sem), 2020-21(1) EI (3 <sup>rd</sup> Sem), 2020-21(1)
	Power Electronics	EE (5 <sup>th</sup> Sem), 2019-20(1) EC (6 <sup>th</sup> Sem), 2018-19(2) EC (6 <sup>th</sup> Sem), 2019-20(2) EE (5 <sup>th</sup> Sem), 2020-21(1) EI (5 <sup>th</sup> Sem), 2021-22(1)
	Electric Power System-I	EE (4 <sup>th</sup> Sem), 2018-19(2) EE (4 <sup>th</sup> Sem), 2019-20(2) EE (4 <sup>th</sup> Sem), 2020-21(2)
	Computer Aided Power System Analysis	EE (6 <sup>th</sup> Sem), 2019-20(2) EE (6 <sup>th</sup> Sem), 2020-21(2)
	Control System	EE (4 <sup>th</sup> Sem), 2019-20(2) EC (4 <sup>th</sup> Sem), 2019-20(2) EE (4 <sup>th</sup> Sem), 2020-21(2) EC (4 <sup>th</sup> Sem), 2020-21(2)

### C. List of Courses Taught

#### a) Statistics for Data Science

- **New Course** – Undergraduate Level Course for 3<sup>rd</sup> Semester
- The course aims to familiarize the students with large datasets, enabling them to extract various insights. Additionally, it covered basic probability concepts, culminating in a discussion about the random variables.
- Contact Hours – 3 Lectures of 1 hour each per week

#### **b) Mathematics for Data Science**

- **New Course** – Undergraduate Level Course for 4<sup>th</sup> Semester
- This course covered basic concepts in linear algebra, calculus, optimization, discrete mathematics, and graphs, with a focus on their applications to machine learning and data science. Students learned how to use mathematical structures to represent real-life situations.
- Contact Hours – 3 Lectures and 1 Tutorial of 1 hour each per week

#### **c) Random Variables and Stochastic Processes**

- **New Course** – Undergraduate Level Course for 6<sup>th</sup> Semester
- The course broadened the scope of random variables in statistics for data science to encompass various types of multiple random variables with different distributions, parameter estimation, hypothesis testing, and data analysis via regression models. These topics constitute key components of data science and AI education.
- Contact Hours – 3 Lectures of 1 hour each per week

#### **d) Electric Circuit Analysis**

- Undergraduate Level Course for 3<sup>rd</sup> Semester
- This course covered the basics of Electronics & Electrical Engineering, including Network Theorems, First and Second-order Network Solutions, Sinusoidal Steady State Analysis, Electric Circuit Analysis with Laplace Transform, Two Port Networks, and Network Function. The course also discussed the GATE and ESE questions for concurrent preparation
- Contact Hours – 3 Lectures and 1 Tutorial of 1 hour each per week

#### **e) Electrical Measurements and Measuring Instruments**

- Undergraduate Level Course for 4<sup>th</sup> Semester
- This course covered electrical and electronic measuring instruments used in labs and industries. Students learn about analog and digital instruments, including voltmeters, ammeters, wattmeter, energy meters, etc., along with AC and DC bridges and display devices like DVM, CRO, DSO. The course also discussed the GATE and ESE questions for concurrent preparation
- Contact Hours – 3 Lectures of 1 hour and 2 labs of 2 hours each per week

#### **f) Control Systems**

- Undergraduate Level Course for 4<sup>th</sup> Semester
- The course offered a foundational understanding of control systems and mathematical modeling principles such as transfer functions, system stability, performance analysis, and controller design methods for developing control strategies for dynamic systems. The course also discussed the GATE and ESE questions for concurrent preparation
- Contact Hours – 3 Lectures of 1 hour and 2 labs of 2 hours each per week

#### **g) Power Electronics**

- Undergraduate Level Course for 5<sup>th</sup> Semester
- This course started with the fundamentals of power semiconductor devices and their characteristics. The course further covered the concepts and designing of various types of power converters such as AC/DC, DC/DC, DC/AC, AC/AC and their simulation in MATLAB software. The course also discussed the GATE and ESE questions for concurrent preparation
- Contact Hours – 3 Lectures of 1 hour and 2 labs of 2 hours each per week

#### **h) Electric Power System-I**

- Undergraduate Level Course for 4<sup>th</sup> Semester
- This course builds the fundamentals of the students related to electrical power system, starting from the Per Unit system and then extended the discussion on Line parameters, line types, cables, supports, sag, insulators, travelling waves and corona effect on lines. The course also discussed GATE and ESE questions for concurrent preparation.
- Contact Hours – 3 lectures and 1 tutorial of 1 hour each per week

**i) Computer Aided Power System Analysis**

- Undergraduate Level Course for 6<sup>th</sup> Semester
- This course started with the impedance diagram and then moved to symmetrical faults and asymmetrical fault analysis with asymmetrical components in between. The course also discussed about the load flow and stability of power system. The course was aided through MATLAB programs for verifying the results.
- Contact Hours – 3 lectures and 1 tutorial of 1 hour each per week

**j) Advanced Power Converters**

- **New Course** – Post Graduate Level Course for 1<sup>st</sup> Semester
- This course started with small introduction of power semiconductor devices and the major course discussed about the designing and analysis of various types of isolated and non-isolated DC/DC converters and Multilevel inverters and their control strategies along with their simulation verification on MATLAB software.
- Contact Hours – 3 lectures and 1 tutorial of 1 hour each per week

## **STUDENT ADVISING**

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**A. Current Students**

**Ph. D. Students**

1. Ms. Amritjot Kaur, Ph. D. Starting date – July 2021 (As Co-Supervisor)

**M. E. Students**

1. Mr. Gaurav, “Virtual Inertia Control for Deeper penetration of Renewable Energy in the Modern Grid”, Thesis Starting date – August 2024 (As Supervisor)

**B. Thesis Completed and Degree Awarded Students**

**M. E. Students**

1. Ms. Kundayi Muchafangeyi, “Optimization of DC sources and switching angles of a Multilevel Inverter using optimized Selective Harmonic Elimination”, June 2024 (As Supervisor)
2. Mr. Bavanpreet Singh, “Effect of Switching Angle Distribution on the performance of the Multilevel Inverter”, Completed on July 2023 (As Supervisor)
3. Ms. Rohini Sharma, “Development of new control strategy for controlling a Multilevel Inverter”, Completed on July 2014

**C. Undergraduate Senior Design Projects**

1. Senior Design project, “High Beam Detection and Rectification”, 2021-2022.
2. Senior Design project, “Designing a new toll collection system for vehicles”, 2022-2023.
3. Senior Design project, “Design of 11-level multilevel inverter for Distortion reduction and compliance with the Grid code”, 2022-2023.
4. Senior Design project, “Battery Heat Management System for Electric Vehicle Safety”, 2022-2023.
5. Senior Design project, “Solar panel cleaning and cooling system for enhancing the efficiency of the panel”, 2022-2023.
6. Senior Design project, “Design of Street pole lighting with Hybrid power generation and air purification system”, 2023-2024, sponsored by Chandigarh University.
7. Senior Design project, “Solar PV panel tracker with zero sensor utilization”, 2023-2024.
8. Senior Design project, “Designing of a solar DC home system”, 2023-2024.

- Senior Design project, “Smart helmet with air quality monitoring and accident detection”, 2023-2024.

## AWARDS AND HONORS

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- Best paper award, UPCON 2018, Prabhu Omer, Jagdish Kumar, Balwinder Singh Surjan, “A New Multilevel Inverter Topology with Reduced Switch Count and Device Stress”, 2018 IEEE UPCON, MMMUT Gorakhpur, India.
- Qualified GATE examination 6 times (2010-2015) with very good GATE score.
- Received MHRD Fellowship from July 2014 – June 2018.
- Received MHRD Fellowship from July 2011 – June 2013.
- Won several prizes in various competitions like Debate competition, MIME and others, organized at college level.

## RESEARCH AND FUNDING GRANTS

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### A. Funded

- Prabhu Omer (Principal Investigator), Jagdish Kumar, Shimi S.L., D. D. Sharma, Pranjali Saxena (Co-Investigators), “Solar PV integration with hybrid multilevel inverter for efficient standalone system”, Funding agency – AICTE under TEQIP-3, Grant received – 17.39 Lakhs, Status – Completed.

### B. Submitted/Pending

- Prabhu Omer (Co-Investigator), Ashutosh Tripathi (Principal Investigator), Praveen Kumar Mishra (Co-Investigator), “Development of intelligent and efficient integrated solar PV and battery based Solar DC home system for off grid application”, Funding Agency – Hartek Power pvt. Ltd., Grant applied – 35.00 Lakhs.

### C. Denied

- Prabhu Omer (Principal Investigator), Jagdish Kumar, Shimi S.L., D. D. Sharma, Pranjali Saxena (Co-Investigators), “Solar PV based DC home system for efficient utilization of Electrical energy”, Funding agency – AICTE under TEQIP-3, Grant applied – 22.37 Lakhs

## PUBLICATIONS AND PATENTS

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### Publication Summary:

Total number of Citations – 246, Number of Citations in 2023-24 – 80, h-index – 5, i10-index – 5

Category	Published/Accepted	Under Review
Journal Papers	3	-
Conference Papers	7	1
Patents	3 (Published)	1 (Filed)

### A. Refereed Journal Articles (Published/Accepted/Submitted)

- P. Omer, J. Kumar and B. S. Surjan, "A Review on Reduced Switch Count Multilevel Inverter Topologies," in IEEE Access, vol. 8, pp. 22281-22302, 2020, doi: 10.1109/ACCESS.2020.2969551.
- R. Sharma, G. Sharma and P. Omer, “Cascaded Nine Level Inverter Using Pulse Width Modulation and Hybrid PWM,” in International Journal of Engineering Research and Applications, vol. 4, pp. 129-133, 2014.
- R. Sharma, G. Sharma and P. Omer, “Selective Harmonic Elimination for a Cascaded Multilevel Inverter,” in International Journal of Research in Advent Technology, vol. 2, pp. 106-114, 2014.

## **B. Refereed Conference Articles (Published/Accepted/Submitted)**

1. P. Omer, "Low Distortion Multilevel Inverter for Efficient Solar PV Generation for EV Application," IEEE International Transportation Electrification Conference India 2023 (iTEC INDIA 2023), India, 2023
2. B. Singh and P. Omer, "7-Level MLI Harmonic Performance Analysis Based on Distribution of Switching Angles," 2023 3rd Asian Conference on Innovation in Technology (ASIANCON), Ravet IN, India, 2023, pp. 1-6
3. P. Omer, J. Kumar and B. S. Surjan, "Optimized SHE-PWM Technique for Low Distortion Single Phase MLI for PV Standalone System," 2018 5th IEEE Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON), Gorakhpur, 2018, pp. 1-6, doi: 10.1109/UPCON.2018.8596992.
4. P. Omer, J. Kumar and B. S. Surjan, "A New Multilevel Inverter Topology with Reduced Switch Count and Device Stress," 2018 5th IEEE Uttar Pradesh Section International Conference on Electrical, Electronics and Computer Engineering (UPCON), Gorakhpur, 2018, pp. 1-6, doi: 10.1109/UPCON.2018.8596999
5. P. Omer, J. Kumar and B. S. Surjan, "Design of robust PID controller for Buck converter using Bat algorithm," 2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES), Delhi, 2016, pp. 1-5, doi: 10.1109/ICPEICES.2016.7853209.
6. P. Omer, J. Kumar and B. S. Surjan, "Comparison of multicarrier PWM techniques for cascaded H-bridge inverter," 2014 IEEE Students' Conference on Electrical, Electronics and Computer Science, Bhopal, 2014, pp. 1-6, doi:10.1109/SCEECS.2014.6804463.
7. M. Kundayi, P. Omer, "DC Sources and Switching Angles optimization for Enhanced performance of a 9-Level MLI", IEEE Asian Conference on Intelligent Technologies (ACOIT 2024), Kolar, India.

## **C. Thesis**

1. Prabhu Omer, "Analysis and Development of Solar PV Based Standalone System using New Multilevel Inverter Topologies," Ph. D. dissertation, Department of Electrical Engineering, Punjab Engineering College (Deemed to be University), Chandigarh, Mar. 2021.
2. Prabhu Omer, "Comparison of Modulation Strategies of Cascaded-MLI," Master's Thesis, Department of Electrical Engineering, PEC University of Technology (formerly Punjab Engineering College), Chandigarh, June 2013.

## **D. Patents**

1. Ajit Kumar, Amandeep Rana, Prabhu Omer, "High Beam Detection and Rectification", Patent filed, March 2024.
2. Anand Tiwari, Prabhu Omer, Anirudh Sharma, Sourav Yadav, Rashik Saini, Baljinder Singh, "System For Battery Heat Management And Method Thereof" Application No. 202411060044.
3. Prabhu Omer, Akshit Kothari, Purna Srivastava, "Solar Panel Cleaning And Cooling System" Application No. 202411032289.
4. Ajit Kumar, Amandeep Rana, Prabhu Omer, "System For Battery Heat Management And Method Thereof" Application No. 202411060044.

## **E. Research Interests**

1. Virtual Inertia of Renewable Energy Sources onto grid for deeper penetration and stability
2. Renewable energy based DER integration with grid
3. Application of AI and optimization in control of Multilevel inverters
4. Intelligent off grid DC domestic systems using solar PV

## PROFESSIONAL SERVICE AND ACTIVITIES

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### A. Service to Department Committee

- Serving as NAAC Accreditation Coordinator at Chandigarh University, Jun 2024 – till Date.
- Served as NBA Accreditation Coordinator for EE Department at Chandigarh University, Aug 2023 – May 2024.
- Served as ABET Accreditation Coordinator for EE Department at Chandigarh University, June 2022 – May 2023.
- Serving as Experiential Learning Coordinator for EE Department at Chandigarh University, July 2023 – till date.
- Serving as Project Coordinator for EE Department at Chandigarh University, July 2022 – till date.
- Serving as a BoS member for review and revision of curriculum of EE department at Chandigarh University, July 2022 – till date.
- Serving as a member of Research and Development Committee (RDC) at Chandigarh University, July 2022 – till date.

### B. Mentoring Academically Challenged Students

- Mentoring a group of 30 students who are having difficulties with their academics.
- Mentoring includes, taking remedial classes and psychological support.

### C. Service to Professional Society

- Serving as conference organizing committee member for 2024 IEEE International Conference on Innovative Trends in Electrical, Electronics and Bio-Technology Engineering (ICITEEB) at Chandigarh University, Gharuan, India.
- Served as conference organizing committee member of 2020 International Conference on Academic Research in Engineering, Management and Information Technology (ICAREMIT-2020), FET, MJP Rohilkhand University, Bareilly, India.
- Organized Smart India Hackathon (SIH) 2020, a National level event of MIC, MHRD, GoI, FET, MJP Rohilkhand University, Bareilly, India.

### D. Professional Society Membership

- Member, IEEE
- Member, IEEE Power and Energy Society (PES)
- Member, IEEE Power Electronics Society
- Member, IEEE Vehicular Traffic Society (VTS)

### E. Peer Review Service

- Reviewer, IEEE Transactions on Power Electronics
- Reviewer, IET Power Electronics
- Reviewer, IET Renewable Power Generation
- Reviewer, Electric Power System and Components, Taylor & Francis
- Reviewer, ICSPCRE2024, NIT Rourkela, India
- Reviewer, ICITEEB2024, Chandigarh University, India

### F. Seminar/Workshops/Training Programs Attended

- Big Data Applications in Electrical Engineering, Short term Course, NITTTR Chandigarh, 20.02.2023 – 24.02.2023
- Smart Grid and Renewable Energy Sources, Short term Course, NITTTR Chandigarh, 29.08.2022 – 02.09.2022
- Artificial Intelligence and Optimization, Short term Course, NITTTR Chandigarh, 21.01.2019 – 25.01.2019
- MATLAB and SIMULINK: Signal Processing and Control system Design, Short term Course, NITTTR Chandigarh, 29.08.2016 – 02.09.2016



- MATLAB and its Hardware Interface, Short term Course, NITTTR Chandigarh, 28.11.2016 – 02.12.2016
- IOT and its Applications, Faculty Development Program, BMSCE Bengaluru, 24.06.2019 – 05.07.2019
- Advanced Pedagogy and Digital Tools, Faculty Development Program, IIT Roorkee, 17.06.2019 – 21.06.2019

## REFERENCES

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1. Dr. Jagdish Kumar  
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