Ankit Singh

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+91-7007955854 ankitsingh23jan@gmail.com ankit.105180@stu.upes.ac.in Ankit Singh
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My area of research is focused on developing power electronics converter topologies and advanced control strategies for improved power quality.

Education

University of Petroleum and Energy Studies **July 2022 – till date (Thesis Submitted, September 2025)**
PhD (Electrical Engineering) *Dehradun, India*

Thesis Title: "*Metaheuristic-based Selective Harmonic Elimination in Hybrid Multilevel Inverter for Improved Power Quality* "

DIT University **July 2019 – June 2021**
M.Tech (Electrical Engineering) *Dehradun, India*

Dr. A. P. J. Abdul Kalam Technical University **July 2014 – June 2018**
B.Tech (Electrical Engineering) *Lucknow, India*

Experience

University of Petroleum and Energy Studies, NIRF Ranking - 43 (*Engineering*) **July 2022 – Present**
Teaching Assistant, Department of Electrical and Electronics Engineering

- **Power Electronics**: Delivered lectures and tutorials on semiconductor devices, power conversion techniques, and control strategies; prepared course materials and assessments.
- **Automotive Electrical and Electronics**: Instructed classes focused on automotive electronic systems, embedded controls, diagnostics, and system integration.
- **Microprocessor and Microcontroller**: Facilitated laboratory sessions on programming, interfacing, and applications of microprocessors and microcontrollers; guided undergraduate students on projects and experiments.
- **Basic Electrical and Electronics Lab**: Supervised hands-on experiments emphasizing fundamental concepts of electrical circuits, electronic components, instrumentation, and troubleshooting methods; provided mentoring to undergraduate students.
- Executed event management tasks involving coordination, timetable arrangements, and participant correspondence for the **International Conference on Intelligent Communication, Control, and Devices (ICICCD 2023, 2024 and 2025)**.

Technical Projects

Ph.D.

1. **Switched Capacitor based Multilevel topologies**
   (a) Designed a switched-capacitor-based seven–level inverter with reduced component count and low inrush current.
   (b) A fault-tolerant switched-capacitor-based nine–level inverter featuring self-balancing capability and low voltage stress.
   (c) A Fault-tolerant capability based switched capacitor based nine–level multilevel inverter with high voltage gain.
   (d) A Dual-Series Single-Parallel switched capacitor (DSSP – SC) eleven–level multilevel inverter.
   (e) A novel nine-level inverter architecture without H–bridge with low voltage stress on semiconductor switches.
   (f) A seventeen–level inverter with low component count for residential application with very high voltage gain.
2. **Improved Modulation technique for Switched Capacitor topologies**
   (a) Adapted and optimized the existing Arithmetic Optimization (AOA) and War Strategy Optimization (WSO) algorithms, incorporating a hybrid PSO approach, to obtain the optimum switching angles for SHE of low order harmonics for high quality output voltage.

(b) Developed an improved LSPWM modulation technique to reduce the THD of output voltage in switched capacitor multilevel inverter topologies.

3. **Dyanmic Performance Evaluation of PV fed SCMLI**
   (a) Conducted a comprehensive performance evaluation of the SHE-controlled SCMLI topology for photovoltaic (PV) applications, focusing on system stability and efficiency under dynamic operating conditions.
   (b) Analyzed transient responses and key power quality metrics, providing actionable insights for optimizing renewable energy integration in variable operating scenarios.
   (c) Carried out extensive simulation and experimental case studies to determine the performance of advanced modulation strategies for switched-capacitor multilevel inverters under dynamic change in irradiance and grid-connected applications.

M.Tech.

1. **Wireless Power Transmission Using Microwave Frequency at 2.45 GHz**
   (a) Designed and simulated a 3×3 rectenna array in MATLAB using Array Antenna Designer Toolbox for efficient wireless power transfer.
   (b) Utilized a Galanz Magnetron (M24FA-210A) operating at 2.45 GHz, achieving significant power transmission up to 700 watts.
   (c) Constructed rectenna arrays with Schottky diodes (1N5819) achieving RF-to-DC conversion.
   (d) Performed extensive experimental analyses measuring voltage, current, power, and transmission efficiency at varying distances.
   (e) Demonstrated effective wireless energy transmission with minimal power dissipation, validating the model through both simulation and experimental data.
2. **ANN-based MPPT for Solar Power Optimization**
   (a) Developed an advanced MPPT system integrated with ANN to enhance PV efficiency, using MATLAB/Simulink for modeling and simulation under varying irradiance and temperature, with a multi-layer ANN model trained using the Levenberg-Marquardt algorithm.
   (b) Achieved high accuracy in predicting the optimal voltage, current, and power outputs, substantially improving the energy harvesting efficiency of the photovoltaic system.
   (c) Validated the system performance through comprehensive simulation studies, showing over 90 percent efficiency in maximum power extraction, effectively minimizing power losses under varying load conditions.
   (d) Demonstrated real-time tracking capabilities with rapid adaptation to environmental changes, significantly outperforming conventional MPPT methodologies in transient and steady-state conditions.
   (e) Concluded that integrating ANN with MPPT notably reduces computational complexity and enhances system reliability compared to traditional methods, providing a robust and efficient solution for renewable energy applications.

B.Tech.

1. **Solar Powered Electric Vehicle**:
   (a) Led a multidisciplinary team in designing, fabricating, and testing a solar-powered electric vehicle for the Electric Solar Vehicle Championship (ESVC), Andhra Pradesh, India (2018).
   (b) Integrated high-efficiency monocrystalline flexible solar panels optimized using MPPT technology for maximum power extraction.
   (c) Performed endurance testing of a 1500-watt BLDC motor powered by solar energy and a 100 Ah lithium-ion battery.
   (d) Engineered a customized battery casing to mitigate heat issues, enhancing safety and battery longevity.
   (e) Employed a Kelly motor controller for efficient motor management, including real-time heat and performance monitoring displayed on the dashboard.
   (f) Achieved a lightweight design: vehicle weight 220 kg (without driver) optimizing overall performance and energy efficiency.

2. **Wireless Power Transmission** via Induction Coil: Designed and implemented a wireless power transfer system utilizing inductive coupling for efficient short-range power transmission.
3. **Tesla Coil**: Developed a functional Tesla coil system, gaining practical expertise in high-voltage electronics, resonance circuits, and electromagnetic field generation.

Patents

1. **A. Singh** V. Jately and P. Kala, "A Dual-Series Single-Parallel switched capacitor (DSSP – SC) eleven level multilevel inverter". (published)

Publications

Journal Publications

1. **A. Singh**, Vibhu Jately, Peeyush Kala, Jyoti Joshi, Nitin Kumar Saxena, Shashank Mishra, Pavan Khetrapal, Brian Azzopardi,A Novel 7-Level SCMLI with Selective Harmonic Elimination via War Strategy Optimization, ***Results in Engineering***, June, 2025, 105765, ISSN 2590-1230, (https://doi.org/10.1109/ACCESS.2024.3477501)
2. **A. Singh**, V. Jately, P. Kala, R. Singhal and Y. Yang, "Selective Harmonic Elimination using Dwarf Mongoose Optimization in Single-Phase Seven-Level Switched Capacitor Inverter with Reduced Components," ***AEUE - International Journal of Electronics and Communications*** vol. 150, March, 2025, pp. 155768. (https://doi.org/10.1016/j.aeue.2025.155768).
3. **A. Singh**, V. Jately, P. Kala and Y. Yang, "Enhancing power quality in electric vehicles and battery energy storage systems using multilevel inverter topologies–A review," ***Journal of Energy Storage***, vol. 10, January, 2025, pp. 115274. (https://doi.org/10.1016/j.est.2024.115274)
4. **A. Singh**, V. Jately, P. Kala, Y. Yang and B. Azzopardi, "Advancements in Multilevel Inverters for Efficient Harnessing of Renewable Energy: A Comprehensive Review and Application Analysis," ***IEEE Access***, vol. 12, October, 2024, pp. 156939-156964. (https://doi.org/10.1016/j.rineng.2025.105765)
5. **A. Singh**, V. Jately, P. Kala and Y. Yang, "Fault-Tolerant Switched-Capacitor Multilevel Inverter with Harmonic Suppression for Critical Power Applications," ***IEEE Transactions on Aerospace and Electronic Systems*** (Accepted).

Conference Publications

1. **A. Singh**, N. Ahamad, A. Chhetri, A. Mishra,N. Mishra. (2022). Simulation and design of 3× 3 rectenna for wireless power transfer using microwave frequency at 2.45 GHz. In Smart Energy and Advancement in Power Technologies: Select Proceedings of ICSEAPT 2021, Volume 2 (pp. 485-496). Singapore: Springer Nature Singapore. (https://doi.org/10.1007/978-981-19-4975-3$_3$9)
2. N. Mishra, A. Jhan, **A. Singh** and S. Mishra, "An Upgrade to Power Output of Solar Panel utilizing MPPT with Artificial Intelligence," 2022 International Conference on Data Science, Agents Artificial Intelligence (ICDSAAI), Chennai, India, 2022, pp. 1-5. (https://doi.org/10.1109/ICDSAAI55433.2022.10028864)
3. S. Singh, V. Dahima, R. Mishra, A. Kapoor, **A. Singh** and V. L. Devi, "Pioneer Design of a Single-band U-slotted Patch Antenna Tailored for Enhanced Performance in WiMAX and WLAN Environments," 2024 Second International Conference on Microwave, Antenna and Communication (MAC), Dehradun, India, 2024 (https://10.1109/MAC61551.2024.10837556)

Professional Training

1. Industrial Training at IPLUS Automation Pvt. Ltd. (5 months): Completed intensive training focused on PLC and SCADA systems, including hands-on experience in programming, automation system design, supervisory control, and data acquisition technologies. July 2015.
2. Industrial Visit to Coca-Cola Factory, Safedabad, Lucknow, observing production processes, automation systems, quality control practices, and plant operations. Sep 2015.
3. Industrial Training at UPPTCL, Lucknow (4 Weeks): Gained practical exposure in Transmission Line Distribution, focusing on power transmission systems, maintenance practices, grid operations, and distribution network management. June 2017.

Technical skills

- MATLAB/Simulink
- ANSYS HFSS
- RTS controller

- ATmega32 microcontroller
- Advance Design System(ADS)

Languages

English: Advanced Reading, Writing and Speaking

Hindi: Native Language

References

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